

EMC TEST REPORT For FCC

Test Report No.	:	2008090053				
Date of Issue	:	September 11, 2008				
Model/Type No.	:	KCF-E220MCO				
FCC ID	:	WQT-KCF-E220MCO				
Kind of Product	:	Digital Cable Receiver				
Applicant	:	KAONMEDIA Co., Ltd.				
Applicant Address	:	KAONMEDIA Building, 513-4 Yatap-Dong, Bundang-Gu, Sungnam-City, Kyonggi-Do, 463-839, Korea				
Manufacturer	:	JOINT TECHNOLOGY ELECTRONICS CO., LTD.				
Manufacturer Address	:	A, AREA, DONGJIANG INDUSTRY, SHUIKOUTOWN, HUIZHOU, GUANGGONG, CHINA				
Contact Person	:	Tae-Sung, Kim / Manager / Standardization Team				
Telephone	:	+82-31-724-8861				
Received Date	:	September 9, 2008				
Test Date	:	September 10, 2008				
Test Results	:	In Compliance 🛛 Not in Compliance				

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

Tested by

Eun-Won, Lee **EMC** Test Engineer Date: September 11, 2008

Reviewed by

James Hong EMC Technical Manager Date: September 11, 2008

Test Report No.: 2008090053 Date: September 11, 2008 This Report shall not be reproduced except in full without the written approval of CTK Form No.: CTK-RF-EF-Part15(Rev.3.0)

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REPORT REVISION HISTORY

Date	Revision	Page No
September 11, 2008	Issued (2008090053)	All

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1.0 General Product Description

1.0.1 Tested Equipment

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- Unless otherwise indicated, all tests were conducted on Model KCF-E220MCO.
 - Tests performed on Model _____ were considered to be representative of Model(s) ____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions:		/) by 180(L) by 45(H)	
Mobility:	Hand-held	🛛 Table-top 🗌 Bu	ilt-in
	Traveling	Floor-standing	
Serial No.:	Prototype		

1.0.3 Electrical Ratings

Input: 90-250 Vac, 50/60 Hz, 17 W Output: -

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: 120 Vac Frequency: 60 Hz

1.0.5 Clock & Other Frequencies Utilized

27 MHz, 121.5 MHz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

Not applicable



EUT Configuration(s) 1.3

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
LCD TV	SAMSUNG	GBD32KE	-	-

Cable Description

#	Description	Ferrite Core	Length (m)	Other Details
1	EUT Power Cable, Unshielded	No	1.8	Connect to AC Power
2	AC Power Cable, Unshielded	No	1.8	Connect to AC Power
3	Audio out Cable, Unshielded	No	1.5	Between the EUT and a LCD TV
4	Video out Cable, Unshielded	No	1.5	Between the EUT and a LCD TV
5	TV Out Cable, Shielded	No	1.8	Between the EUT and a LCD TV
6	Loop Out Cable, Shielded	No	1.8	Unterminated (only cable)
7	RS-232C Cable, Shielded	No	1.8	Unterminated (only cable)
8	RF IN Cable, Shielded	No	20.0	Connect to a TV Test Transmitter (Analog Signal)
9	ANT IN Cable, Shielded	No	20.0	Connect to a TV Test Transmitter (Digital Signal)

1.4 **Test Software**

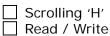


Display Test Patterns – V1.5 Ping.exe 🛛 Not applicable

1.5 EUT Operating Mode(s)

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

Standby

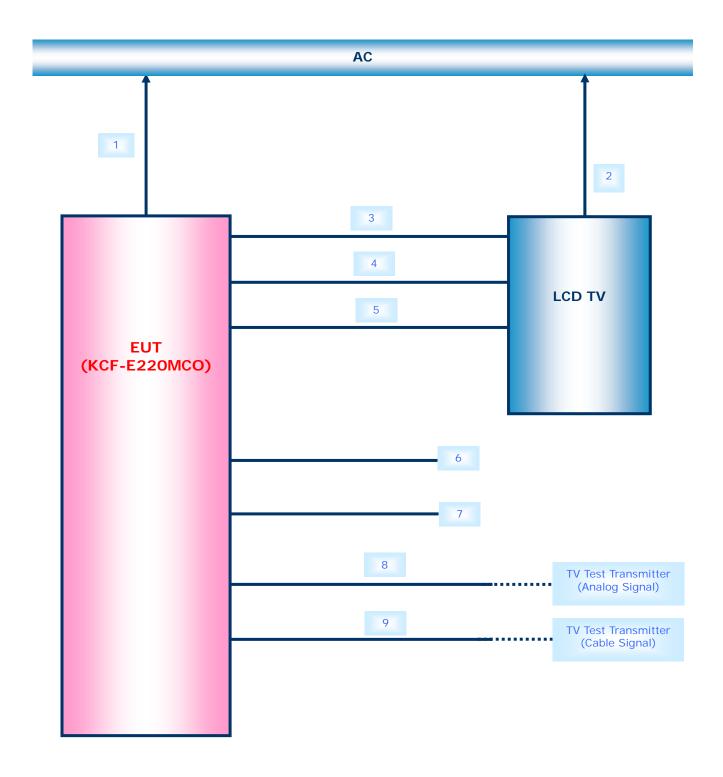


Display circles pattern

- Practice operation 1) Analog signal receiving mode
 - 2) Cable signal receiving mode



1.6 Configuration





1.7 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.

1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 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 C63.4-2003 7.2.3, 7.2.4, 8.3.1.1, 8.3.1.2



1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	FCC 93250
JAPAN	VCCI	10 meter Open Area Test Site and one conducted site.	R-948, C-986
KOREA	MIC	EMI (10 meter Open Area Test Site and two conducted sites) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and interruptions)	No. 51, KR0025
International	KOLAS	EMC	AND TESTING NO.119 THE
Europe	GLAS	EMC EN 55011, EN 55022, EN 61000-6-3, EN 61000-6-4, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61000-6-2, EN 50130-4, EN 55024, EN 61204-3, EN 60601-1-2, 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	L TÜV No.13000796-02



2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

EN 61000-6-3:2007		
EN 61000-6-4:2007		
EN 55011:2007 +A2:2007	Group 1 Class A	Group 2
EN 55013:2001 +A1:2003 +A2:2006		
EN 55014-1:2006		
EN 55015:2006		
EN 61204-3:2000	Class A	Class B
EN 61131-2:2003		
EN 61326-1:2006	Class A	Class B
EN 55022:2006	Class A	Class B
EN 61000-3-2:2006		
EN 61000-3-3:1995 +A1:2001 +A2:2005		
VCCI V-3/2008.04	Class A	Class B
AS/NZS CISPR22:2006	Class A	Class B
K FCC Part 15 Subpart B	Class A	🛛 Class B
CISPR 22:2006	Class A	Class B



2.1 Conducted Voltage Emissions

Test Date

September 10, 2008

Test Location

Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
	Field Strength Meter	Rohde & Schwarz	ESHS30	828144/002	2009-02-27
	LISN	EMCO	3825/2	9607-2575	2009-08-19
	LISN	EMCO	3825/2	9409-2246	2009-08-19
\boxtimes	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2009-03-04
\boxtimes	LISN	Rohde & Schwarz	ESH3-Z5	100207	2008-12-20
\boxtimes	LISN	EMCO	3825/2	9206-1971	2008-12-20

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Settings

IF Band Width: 9 kHz

Test Procedures

The EUT was placed on a non-metallic table 0.8m above the metallic, grounded floor and 0.4m from the reference ground plane wall. The distance to other metallic surfaces was at least 0.8m.

Amplitude measurements were performed with a quasi-peak detector and an average detector.

Test was performed in Analog signal receiving mode and Cable signal receiving mode. The emission of Cable signal receiving mode was higher, only the test results of Cable signal receiving mode is listed in Appendix A.



Test Results

The requirements are:

MET

Frequency	Measured Data	Margin	Remark
(MHz)	(dBuV)	(dB)	Renark
4.82	52.2	3.8	Quasi-peak

□ NOT MET

Frequency (MHz)	Measured Data (dBuV)	Margin (dB)	Remark

□ NOT APPLICABLE

Remarks

See Appendix A for test data.



2.2 Radiated Electric Field Emissions

Test Date

September 10, 2008

Test Location

Itesting was performed at a test distance of 3 meter Open Area Test Site

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
\boxtimes	Field Strength Meter	Rohde & Schwarz	ESVS30	829673/015	2009-01-28
\boxtimes	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2010-06-20
\boxtimes	EMC Analyzer	Agilent	E7405A	MY45110859	2009-01-21
\boxtimes	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078894	2008-11-29
\boxtimes	PREAMPLIFIER	Agilent Technologies	8449B	3008A02307	2008-11-05

Frequency Range of Measurement

30 MHz to 2 GHz

Instrument Settings

IF Band Width: 120 kHz (30 MHz ~ 1 GHz) IF Band Width: 1 MHz (1 GHz ~ 2 GHz)

Test Procedures

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity. The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

Measurements were performed with a quasi-peak detector.

Test was performed in Analog signal receiving mode and Cable signal receiving mode. The emission of Cable signal receiving mode was higher, only the test results of Cable signal receiving mode is listed in Appendix A.



Test Results

The requirements are:

MET

Frequency	Measured Data	Margin	Remark
(MHz)	(dBuV/m)	(dB)	Remark
266.61	43.0	3.0	Quasi-peak

□ NOT MET

_ L				
	Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
ſ				

□ NOT APPLICABLE

Remarks

See Appendix A for test data



2.3 Antenna-Conducted Power

Test Date

September 10, 2008

Test Location

Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
\boxtimes	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
\boxtimes	Matching Pad	Rohde & Schwarz	RAM	100618	2009-07-18

Instrument Settings

IF Band Width: 100 kHz (30 MHz ~ 1 GHz) IF Band Width: 1 MHz (Above 1 GHz)

Test Procedures

Antenna-conducted power measurements are performed with the EUT antenna terminals connected directly to a spectrum analyzer, if the antenna impedance matches the impedance of the measuring instrument. Otherwise, use an impedance-matching network to connect the measuring instrument to the antenna terminals of the EUT. Losses in decibels in any impedance matching network used are added to the measured value in dBuV.

With the EUT tuned to one of the number of frequencies, measure both the frequency and voltage present at the antenna input terminals over the frequency range specified in the individual equipment requirements. Repeat this measurement with the EUT tuned to another frequency until the number of frequencies have been successively measured.

Power available from the EUT antenna terminals is the ratio of V^2/R , where V is the loss-corrected voltage measured at the antenna terminals, and R is the impedance of the measuring instrument.

Test Results

The requirements are:

🖂 Met NOT MET

Remarks

<u>No values due to local oscillator higher than 20dB below the limits was measured</u> <u>during the disturbance voltage at the antenna terminals.</u> <u>Emissions 20dB's below the limit were not necessarily recorded.</u>



2.4 Output and Spurious Conducted Level

Test Date

September 10, 2008

Test Location

Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
\boxtimes	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
\boxtimes	Matching Pad	Rohde & Schwarz	RAM	100618	2009-07-18

Instrument Settings

IF Band Width: 100 kHz (30 MHz ~ 1 GHz) IF Band Width: 1 MHz (Above 1 GHz)

Test Procedures

The Output signal level is the maximum voltage level present at the output terminals of the EUT on a particular frequency during normal use of the device.

Measurements were made by direct connection to the spectrum analyzer and EUT with proper impedance matching.

The Cable was supported between the EUT and the measuring instrument in a straight horizontal line so it had at least 75 cm clearance from any conducting surface. The EUT was provided with a typical signal consistent with normal operation. For each channel on which the device operates and in each mode in which the device operates, the video carrier level, audio carrier level and the spurious emissions over the frequency rage was measured and recorded.

Test Results

The requirements are:

\boxtimes	MET	
	NOT	MET

Remarks See Appendix A for test data.



2.5 Antenna Transfer Switch

Test Date

September 10, 2008

Test Location

Shielded Room

Test Equipment

	Name of Equipment	Manufacturer	Model No.	Serial No.	Due Date
\boxtimes	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
\square	Matching Pad	Rohde & Schwarz	RAM	100618	2009-07-18

Instrument Settings

IF Band Width: 100 kHz (30 MHz ~ 1 GHz)

Test Procedures

Isolation was measured for all positions of an antenna transfer switch on all output channels of the EUT. All unused RF ports or terminals was terminated in a proper impedance. TV interface device transfer switch isolation is the difference the levels of a signal going into one antenna input port of the switch and that of the same signal coming out of another antenna input port of the transfer switch. The isolation of an antenna transfer switch equipped with coaxial connectors was performed by measuring the maximum voltage of the visual carrier. The maximum voltage corresponds to the peak envelope power of a modulated signal during maximum amplitude peaks. Using an impedance-matching device, the length of coaxial cable was connected between the antenna terminal of the switch and the measuring instrument. The measuring instrument was tuned to the output channel of the EUT in peak mode. The voltage level present at the antenna input port of the EUT and the output channel of the EUT was measured and recorded

Test Results

The requirements are:

\boxtimes	MET	
	NOT	MET

Remarks

No Values in other frequencies was detected during antenna transfer switch Measurements.



APPENDIX A – TEST DATA

Conducted Voltage Emissions

Frequency	Corre	ection			Quasi	-peak			Ave	rage	
	Fac	tor	Line	Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
[MHz]	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
1.40	0.1	0.6	Н	56.0	45.3	46.0	10.0	46.0	25.5	26.2	19.8
2.00	0.1	0.7	Н	56.0	45.5	46.3	9.7	46.0	26.2	27.0	19.0
4.75	0.2	0.7	Н	56.0	50.7	51.6	4.4	46.0	31.6	32.5	13.5
4.82	0.2	0.7	Н	56.0	51.3	52.2	3.8	46.0	33.5	34.4	11.6
5.01	0.2	0.7	Н	60.0	48.3	49.2	10.8	50.0	31.6	32.5	17.5
24.21	1.0	0.8	Ν	60.0	43.3	45.1	14.9	50.0	38.8	40.6	9.4

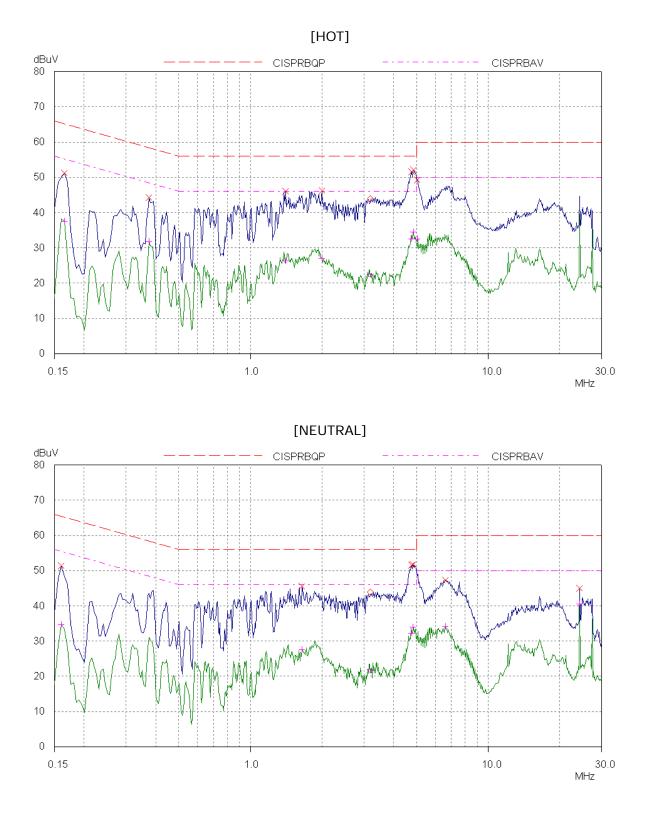
H : HOT, N : NEUTRAL



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Radiated Electric Field Emissions

	[30 MHz ~ 1GHz]								
Frequency	Reading	Pol.	Height		Correction Factor		Result	Margin	
[MHz]	[dBuV/m]		[m]	Antenna	Cable	[dBuV/m]	[dBuV/m]	[dB]	
47.99	24.1	V	1.0	9.6	0.3	40.0	35.4	4.6	
196.51	27.3	Н	1.8	7.3	1.5	43.5	36.1	7.4	
266.61	30.9	Н	2.1	10.0	2.1	46.0	43.0	3.0	
271.32	29.4	Н	2.0	10.2	2.1	46.0	41.7	4.3	
337.22	27.8	Н	1.5	12.0	2.6	46.0	42.5	3.5	
801.79	18.3	V	1.0	19.7	4.4	46.0	42.4	3.6	

H : Horizontal, V : Vertical



[1 GHz ~ 2 GHz]

Frequency	Reading	Pol.	Height	Correction Factor			Limits	Result	Margin
[MHz]	[dBuV/m]		[m]	Antenna	Amp. Gain	Cable	[dBuV/m]	[dBuV/m]	[dB]
	Ν	lo emissio	n were det	ected at a l	evel greate	r than 20dE	3 below limit		



Output and Spurious Conducted Level

[Output Signal Test Data]

Test Channel	Frequency	Reading	Correction Factor	Limits	Result	Margin
ondriner	[MHz]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dB]
	56.75	41.8	7.6	56.5	49.4	7.1
3	61.25	57.3	7.6	69.5	64.9	4.6
	65.75	41.7	7.6	56.5	49.3	7.2
	62.75	41.7	7.6	56.5	49.3	7.2
4	67.25	57.1	7.6	69.5	64.7	4.8
	71.25	41.6	7.6	56.5	49.2	7.3

Correction Factor = Matching Pad Loss + Cable Loss

[Output Terminal Conducted Spurious Test data]

Test Chann	Frequency [MHz]	Reading [dBuV]	Correction Factor [dB]	Limits [dBuV]	Result [dBuV]	Margin [dB]
3	No omissi	on wore de	tostod at a k	wol groator t	han 20dB be	low limit
4		on were de		ever greater t		