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EMC TEST REPORT For FCC

Test Report No. : 2008090049
Date of Issue : September 11, 2008
Model/Type No. : KCF-220MCO
FCC ID : WQT-KCF-220MCO
Kind of Product : Digital Cable Receiver
Applicant : KAONMEDIA Co., Ltd.
Applicant Address : KAONMEDIA Building, 513-4 Yatap-Dong, Bundang-Gu,
Sunghnam-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



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REPORT REVISION HISTORY

Date	Revision	Page No
September 11, 2008	Issued (2008090049)	All

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TABLE OF CONTENTS

REPORT REVISION HISTORY	2
1.0 General Product Description	4
1.1 Model Differences	4
1.2 Device Modifications	4
1.3 EUT Configuration(s)	5
1.4 Test Software	5
1.5 EUT Operating Mode(s)	5
1.6 Configuration	6
1.7 Calibration Details of Equipment Used for Measurement	7
1.8 Test Facility	7
1.9 Measurement Procedure	7
1.10 Laboratory Accreditations and Listings	8
2.0 Emissions Test Regulations	9
2.1 Conducted Voltage Emissions	10
2.2 Radiated Electric Field Emissions	12
2.3 Antenna-Conducted Power	14
2.4 Output and Spurious Conducted Level	15
2.5 Antenna Transfer Switch	16
APPENDIX A – TEST DATA	17
Conducted Voltage Emissions	17
Radiated Electric Field Emissions	19
Output and Spurious Conducted Level	21
APPENDIX B - Test Setup Photos and Configuration	22
Conducted Voltage Emissions	22
Radiated Electric Field Emissions	23
Antenna-Conducted Power	24
Output and Spurious Conducted Level	25
Antenna Transfer Switch	26
APPENDIX C – EUT Photographs	27
EUT External Photographs	28
EUT Internal Photographs	29
PCB	30
FCC ID label and location	33



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1.0 General Product Description

1.0.1 Tested Equipment

- ☒ Unless otherwise indicated, all tests were conducted on Model KCF-220MCO.
☐ Tests performed on Model _____ were considered to be representative of Model(s) _____.

1.0.2 Equipment Size, Mobility and Identification

Dimensions: Approx. 248(W) by 180(L) by 45(H) ☒ mm ☐ inch
Mobility: ☐ Hand-held ☒ Table-top ☐ Built-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



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	S-VHS out Cable, Shielded	No	1.8	Between the EUT and a LCD TV
6	TV Out Cable, Shielded	No	1.8	Between the EUT and a LCD TV
7	Loop Out Cable, Shielded	No	1.8	Unterminated (only cable)
8	RS-232C Cable, Shielded	No	1.8	Unterminated (only cable)
9	RF IN Cable, Shielded	No	20.0	Connect to a TV Test Transmitter (Analog Signal)
10	ANT IN Cable, Shielded	No	20.0	Connect to a TV Test Transmitter (Digital Signal)

1.4 Test Software

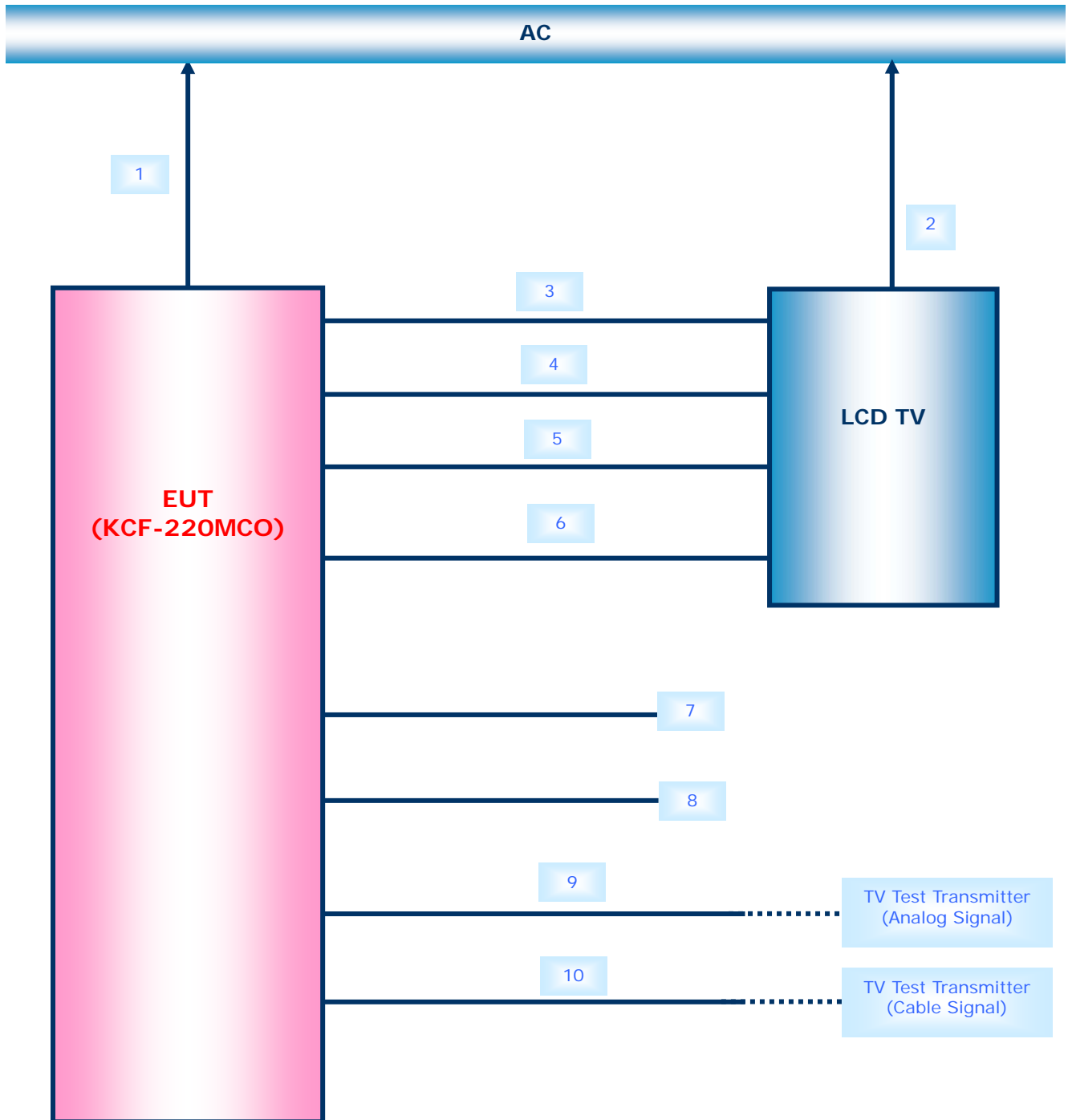
- | | |
|-------------------------------------|------------------------------|
| <input type="checkbox"/> | EMC Test V 1.0 |
| <input type="checkbox"/> | Display Test Patterns – V1.5 |
| <input type="checkbox"/> | Ping.exe |
| <input checked="" type="checkbox"/> | Not applicable |

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
- ☐ Scrolling ‘H’
- ☐ Read / Write

1.6 Configuration





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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








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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.	 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	
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	 No.13000796-02



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2.0 Emissions Test Regulations

The emissions tests were performed according to following regulations:

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



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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
<input type="checkbox"/>	Field Strength Meter	Rohde & Schwarz	ESHS30	828144/002	2009-02-27
<input type="checkbox"/>	LISN	EMCO	3825/2	9607-2575	2009-08-19
<input type="checkbox"/>	LISN	EMCO	3825/2	9409-2246	2009-08-19
<input checked="" type="checkbox"/>	Field Strength Meter	Rohde & Schwarz	ESHS30	862024/001	2009-03-04
<input checked="" type="checkbox"/>	LISN	Rohde & Schwarz	ESH3-Z5	100207	2008-12-20
<input checked="" type="checkbox"/>	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.



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Test Results

The requirements are:

☒ MET

Frequency (MHz)	Measured Data (dBuV)	Margin (dB)	Remark
4.88	39.3	6.7	Average

☐ NOT MET

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

☐ NOT APPLICABLE

Remarks

See Appendix A for test data.



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2.2 Radiated Electric Field Emissions

Test Date

September 10, 2008

Test Location

☒ Testing 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
<input checked="" type="checkbox"/>	Field Strength Meter	Rohde & Schwarz	ESVS30	829673/015	2009-01-28
<input checked="" type="checkbox"/>	ULTRA Broadband Antenna	Rohde & Schwarz	HL562	361324/014	2010-06-20
<input checked="" type="checkbox"/>	EMC Analyzer	Agilent	E7405A	MY45110859	2009-01-21
<input checked="" type="checkbox"/>	Double Ridged Guide Antenna	ETS-Lindgren	3115	00078894	2008-11-29
<input checked="" type="checkbox"/>	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.



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Test Results

The requirements are:

☒ MET

Frequency (MHz)	Measured Data (dBuV/m)	Margin (dB)	Remark
191.75	40.5	3.0	Quasi-peak

☐ NOT MET

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

☐ NOT APPLICABLE

Remarks

See Appendix A for test data



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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
<input checked="" type="checkbox"/>	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
<input checked="" type="checkbox"/>	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

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



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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
<input checked="" type="checkbox"/>	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
<input checked="" type="checkbox"/>	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 range was measured and recorded.

Test Results

The requirements are:

- ☒ MET
☐ NOT MET

Remarks

See Appendix A for test data.



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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
<input checked="" type="checkbox"/>	EMC Analyzer	Agilent	E7403A	MY42000054	2008-10-22
<input checked="" type="checkbox"/>	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:

- ☒ MET
☐ NOT MET

Remarks

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



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APPENDIX A – TEST DATA

Conducted Voltage Emissions

Frequency [MHz]	Correction Factor		Line	Quasi-peak				Average			
				Limit	Reading	Result	Margin	Limit	Reading	Result	Margin
	LISN	Cable		[dBuV]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dB]
4.68	0.2	0.7	N	56.0	44.0	44.9	11.1	46.0	36.6	37.5	8.5
4.74	0.2	0.7	H	56.0	47.7	48.6	7.4	46.0	38.0	38.9	7.1
4.75	0.2	0.7	N	56.0	45.6	46.5	9.5	46.0	36.6	37.5	8.5
4.81	0.2	0.7	H	56.0	47.4	48.3	7.7	46.0	38.0	38.9	7.1
4.88	0.2	0.7	H	56.0	47.3	48.2	7.8	46.0	38.4	39.3	6.7
4.94	0.2	0.7	N	56.0	46.6	47.5	8.5	46.0	36.7	37.6	8.4

H : HOT, N : NEUTRAL



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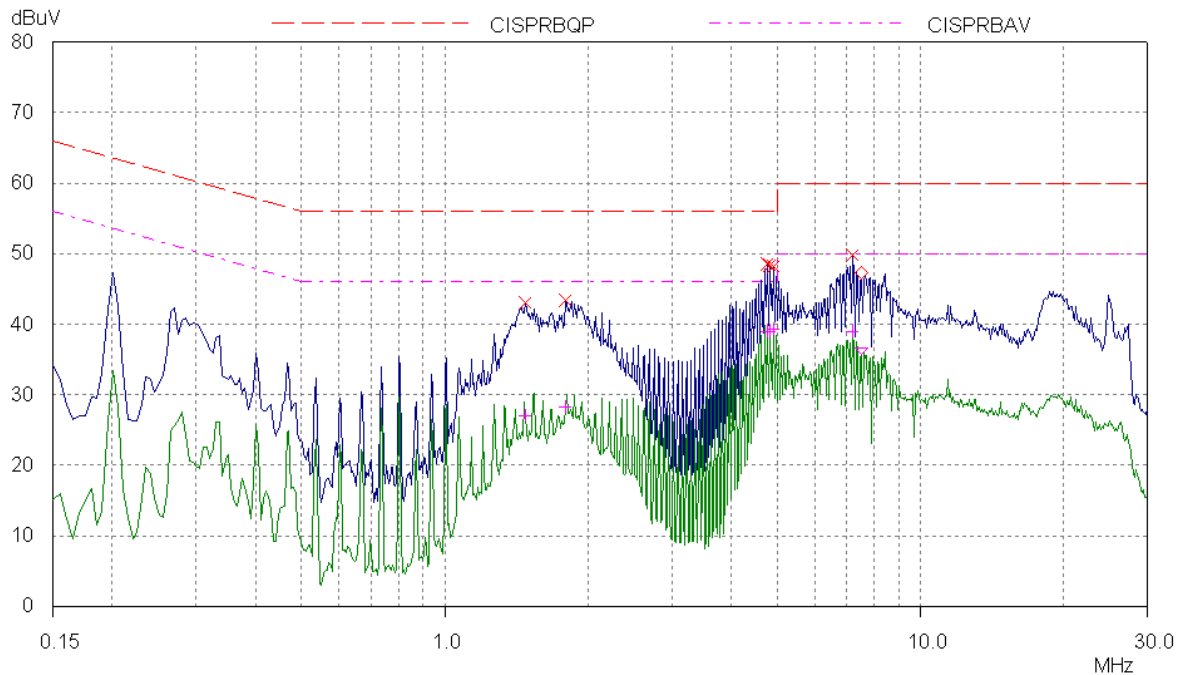
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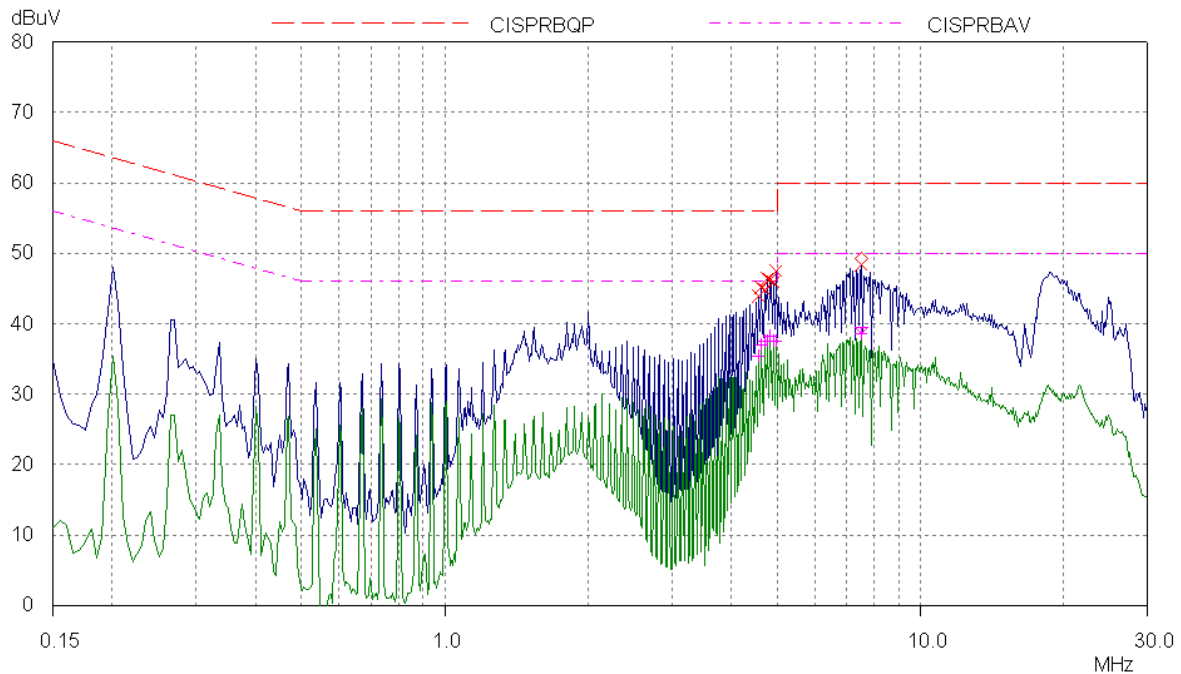
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[HOT]



[NEUTRAL]





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[30 MHz ~ 1GHz]

H : Horizontal, V : Vertical



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[1 GHz ~ 2 GHz]

Frequency [MHz]	Reading [dBuV/m]	Pol.	Height [m]	Correction Factor			Limits [dBuV/m]	Result [dBuV/m]	Margin [dB]
				Antenna	Amp. Gain	Cable			
No emission were detected at a level greater than 20dB below limit									



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Output and Spurious Conducted Level

[Output Signal Test Data]

Test Channel	Frequency [MHz]	Reading [dBuV]	Correction Factor [dB]	Limits [dBuV]	Result [dBuV]	Margin [dB]
3	56.75	41.9	7.6	56.5	49.5	7.0
	61.25	57.5	7.6	69.5	65.1	4.4
	65.75	41.8	7.6	56.5	49.4	7.1
4	62.75	41.7	7.6	56.5	49.3	7.2
	67.25	56.3	7.6	69.5	63.9	5.6
	71.25	41.8	7.6	56.5	49.4	7.1

Correction Factor = Matching Pad Loss + Cable Loss

[Output Terminal Conducted Spurious Test data]

Test Channel	Frequency [MHz]	Reading [dBuV]	Correction Factor [dB]	Limits [dBuV]	Result [dBuV]	Margin [dB]
3	No emission were detected at a level greater than 20dB below limit					
4						