
**European Union (EU) Council Directive 2004/108/EC
Electromagnetic Compatibility (EMC) and FCC Part 15
Subpart B Class B Test Report for Information
Technology Equipment**

Sensaray

Model 819

May 10, 2013

Tests Conducted by:

ElectroMagnetic Investigations, LLC

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Test Summary Information	4
Revision History	6
Authorizations	6
Device Under Test Information	8
Device Under Test Selection Justification	9
Emissions Test Report	10
Radiated Emissions Information	11
Purpose	12
DUT Modifications	12
Radiated Emissions Results	13
Cables	13
Measurement Bandwidths	13
Conducted Emissions Information	19
Purpose	20
DUT Modifications	20
Conducted Emissions Results	21
Cables	21
Measurement Bandwidths	21
Power Line Harmonics and Voltage Fluctuations Information	29
Purpose	29
DUT Modifications	29
Power Line Harmonics and Voltage Fluctuation Results	30
Cables	30
Power Line Harmonics and Voltage Fluctuation Data Sheet	31
Power Line Harmonics and Voltage Fluctuation Photographs	35
Immunity Test Report	36
ElectroStatic Discharge (ESD) Information	37
Purpose	38
DUT Modifications	38
ElectroStatic Discharge Results	39
Cables	39
ElectroStatic Discharge Photographs	41
Radiated Immunity Information	44
Purpose	45
DUT Modifications	45
Radiated Immunity Results	46
Cables	46
Radiated Immunity Data Sheet	47
Radiated Immunity Photographs	48

Electrical Fast Transients (burst) Immunity Information	51
Purpose	52
DUT Modifications	52
Electrical Fast Transient (burst) Immunity Results	53
Cables	53
Electrical Fast Transient (burst) Immunity Data Sheet	54
Surge Immunity Information	56
Purpose	58
DUT Modifications	58
Surge Immunity Results	59
Cables	59
Surge Immunity Data Sheet	60
Surge Immunity Photographs	61
RF Conducted Immunity Information.....	62
Purpose	62
DUT Modifications	63
Conducted Immunity Results	64
Cables	64
Conducted Immunity Data Sheet	65
Conducted Immunity Photographs	66
Voltage Sag and Interrupts Immunity Information.....	68
Purpose	68
DUT Modifications	69
Cables	70
Voltage Sag and Interrupts Immunity Photographs	72
Magnetic Field Immunity Information	73
Purpose	73
DUT Modifications	73
Magnetic Field Immunity Results	74
Cables	74
Magnetic Field Immunity Data Sheet	75
Magnetic Field Immunity Photographs	76
Appendix A: Performance Criteria.....	77
Performance Criteria A	77
Performance Criteria B	77
Performance Criteria C	77
Performance Criteria D	78

Test Summary Information

Report Number: SEN20130502
Issue Date: May 10, 2013
Test Item: Model 819
Serial Number: 515183

Emissions:

Result	Product Standard	Test Standard	Description
Pass	EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B	EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B	Radiated Emissions
Pass	EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B	EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B	Conducted Emissions
Pass	EN61000-3-2:2006+A1:2009+A2:2009 Class A	EN61000-3-2:2006+A1:2009+A2:2009 Class A/IEC61000-3- 2:2005+A1:2008+A2:2009 Class A	Power line Harmonics
Pass	EN61000-3-3:2008/IEC 61000-3- 3:2008	EN 61000-3-3:2008/IEC 61000-3- 3:2008 Class A	Power line Voltage Fluctuation & Flicker

Immunity:

Result	Product Standard	Test Standard	Description	Performance Criteria	Test Levels
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 2:2008(IEC 61000- 4-2:2008Ed.2)	Electrostatic Discharge Immunity	Criteria B	4 kV Contact Discharge 8 kV Air Discharge
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 3:2006+A1:2008+ A2:2010(IEC6100 0-4- 3:2006+A1:2007+ A2:2010	RF Field Immunity	Criteria A	3 V/m, 80-1000 MHz 3 V/m, 1.4-2 GHz 1 V/m, 2-2.7 GHz
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 4:2004+A1:2010 (IEC61000-4- 4:2004+A1:2010)	Electrical Fast Transient/Burst (EFT) Immunity	Criteria B	1 kV peak
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 4:2006(IEC61000- 4-5:2005)	Electrical Slow Transient (Surge) Immunity	Criteria B	1 kV peak – DM 2 kV peak - CM
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 6:2009(IEC61000- 4-6:2008Ed.3)	RF Conducted Immunity	Criteria A	3 Vrms, 150 kHz to 80 MHz
Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 8:2010(IEC 61000- 4-8:2009Ed.2)	Magnetic Field Immunity	Criteria A	3 A/m, 50 & 60 Hz

Pass	EN55024:2010(CISPR2 4Ed.2:2010)	EN61000-4- 11:2004(IEC61000 -4-11:2004Ed.2)	Voltage Interruption Immunity	Various	>95% dip, 10 mS, Perf. B; 30% dip, 500 mS, Perf. C; >95% drop, 5 S, Perf. C
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- The Equipment was tested in the configuration and modes of operation provided by the client. Test levels were specified by the client within the test plan. Any additional tests not reported herein are the responsibility of the client as the overall product compliance is the responsibility of the client
- This report may only be reproduced in its entirety. To reproduce this report in part, specific written permission must be obtained from ElectroMagnetic Investigations.
- Specific test descriptions can be found in the specific individual section of the test report.

Deviations to the Test Standard

No Deviations were made to the standard test methods

Revision History

Version	Date Issued	Description of Revision
01	5-20-13	Added company approval signature.

Authorizations

FCC: The 3-meter Semi-Anechoic Chamber and Conducted Emissions facilities are fully described in reports filed with the Federal Communications Commission. Corresponding letters of acceptance are maintained in our files.

Industry Canada: Accepted by Industry Canada for performance of radiated emissions measurements.


European Union (CE): ElectroMagnetic Investigations, LLC is equipped and capable of performing EMC CE compliance testing to European Union EMC CE requirements for Information Technology Equipment (ITE), Measurement, Control and Laboratory Equipment (MCL), and other equipment.

American Association of Lab Accreditations (A2LA): ElectroMagnetic Investigations is accredited to perform the tests contained within this report to the standards listed.




Testing Cert#2569.01


Report Approved By:


 _____ Signature	<u>16 May 2013</u> Date	<u>Henry Benitez</u> Name
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Report Written By:

 _____ Signature	<u>10 May 2013</u> Date	<u>Jackie Benitez</u> Name
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Testing Performed By:

 _____ Signature	<u>07 May 2013</u> Date	<u>Ryan Benitez</u> Name
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 _____ Signature	<u>07 May 2013</u> Date	<u>Henry Benitez</u> Name
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_____ Signature	_____ Date	_____ Name
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Testing requested by:

Company Name:	Sensoray
Company Address:	7313 SW Tech Center Drive
City, State Zip:	Portland, OR. 97223
Test Requested By:	Alexander Kostromitin
Model:	Model 819
First Date of Test:	May 02, 2013
Last Date of Test:	May 06, 2013
Date Samples Received:	May 02, 2013
Equipment Design Stage:	Production representative
Equipment Condition:	Good

Device Under Test Information

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
I/O Ports	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System	Windows 7
Exercising Software	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz

Device Under Test Selection Justification

- Sensoray certifies that product tested is a representative sample of unit to be sold.

I, Bill Tanner, Jr., representative for Sensoray verify that the product tested is representative of units to be sold.

Bill Tanner Jr

(Signature)

Emissions Test Report

Radiated Emissions Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed on a non-conducting tabletop 80 cm tall. Each device is placed on the tabletop 10 cm from its neighboring device. The excess cable length was draped off of the rear of the table. If the excess cable fell closer than 40 cm from the ground plane, the cable were bundled in non-inductive bundles of 30-40 cm loops (when possible) to maintain 40 cm in height. The measurement antenna was then placed 3 m from the closest approach of the DUT/AE system. Any AE that had to be placed outside the measurement area was setup either outside of the chamber or under the floor, depending on size and convenience.

The DUT and the AE were operated in the modes specified by the client while the emissions were measured.

To measure the emissions at the frequency range specified in this report, a preliminary scan was performed with a linearly polarized antenna while the turntable was rotated 360 degrees and the antenna mast was raised from 1 meter height to 4 meters in height in both a horizontal polarization and a vertical polarization. Any emissions that were found to be within 6 dB of the specified limit were then maximized to find the level that was recorded.

The maximization process included manual manipulation of the cables, continuous height scanning, and continuous azimuth scanning.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (Version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Frequency Range Tested	30 MHz to 1 GHz

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic emission limits as specified by EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B to support compliance to the European Union EMC Directive 2004/108/EC, FCC Part 15 Subpart B Class B, and other regulations based on this standard.

The radiated emissions test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed. The testing was performed at a facility which meets the requirements set forth by ANSI C63.4, including but not limited to mains impedance, cable bundling, and Volumetric Normalized Site Attenuation. The emissions reported were maximized through a combination of turntable (or azimuth) maximization, tower (or height) maximization, and cable maximization.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Radiated Emissions Results

Test Standards: EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B

Radiated Emissions: Emissions are within specification limits.

Least Margin: 1.5 dB at 179.9 MHz.

Test Measurement uncertainties (k=2.05) :

Radiated Field strength at 3m measured with:

Chase Bicon (30 MHz – 1 GHz)..... ±5.6 dB

Sample radiated emissions field strength measurement:

RF Reading from Spectrum Analyzer (dBuV) + Cable Loss Factor (dB) + Antenna Factor (dB) – Pre-Amplifier Amplification (dB) = Final Radiated Emission Level (dBuV/m).

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Measurement Bandwidths

Frequency (MHz)	Peak (kHz)	Quasi-Peak (kHz)	Average (kHz)
0.15 – 30	9.0	9.0	9.0
30 – 1000	120	120	120
>1000	1000	N/A	1000

Radiated Emission Plots

ElectroMagnetic Investigations, LLC Radiated Emissions Test Sheet Revision 08

Job Reference Number: SEN20130502	Temperature (°F): 72	Device Under Test (DUT): Model 819
Test Date: 2-May-2013	Relative Humidity (%): 31	Serial Number: 515183
Location: Hillsboro	Barometric Pressure: 29	Test Filename: SEN_RE
Profile Version:	Test Distance (m): 3	Test Operator: Ryan Benitez

Product Standard: EN55022:2010/CISPR 22Ed6:2008 Class B
Test Standard: EN55022:2010/CISPR 22Ed6:2008 Class B

	Equipment	Manufacturer	Model Number	Calibration Due	Serial Number
Analyzer:	8566	Hewlett Packard (Agilent)	8566B & 85650A	15-Jun-2017	3407A08563 & 3303A01823
Pre-Amp:	LN1000	Amplifier Research	LN1000	12-Dec-2013	13993
Pre-Amp2:	HF-Preamp	MiteQ	AMF-4D-01001800-34-10P-GS	19-May-2013	1260489
Antenna:	Lab Chase	Chase	CBL 6112A	31-Mar-2014	2203
Antenna2:	Horn	ETS Lindgren	3117	7-May-2015	S009842
Antenna3:	N/A	N/A	N/A	N/A	N/A
Pre-Selector:	N/A	N/A	N/A	N/A	N/A
Site Source:	EMISS01	EMI	N/A	N/A	SS01

Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

Deviations from Standard: None

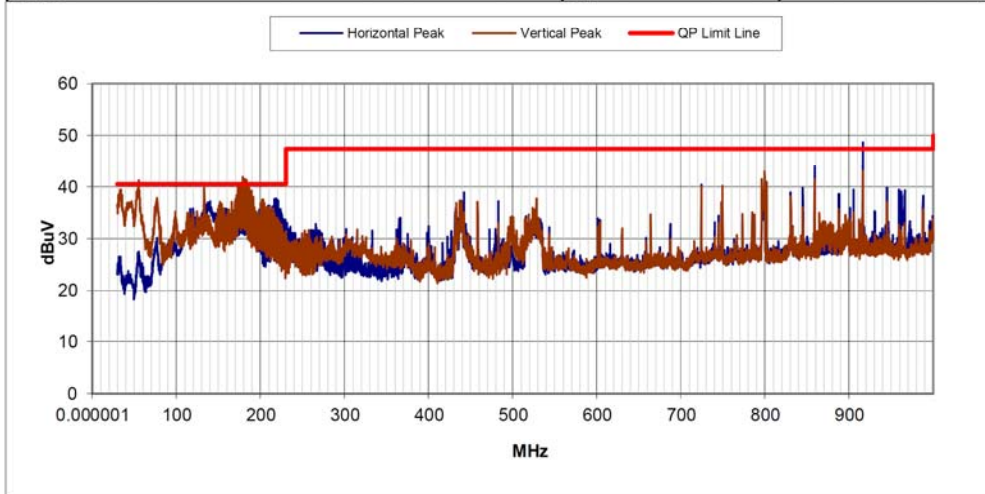


RADIATED EMISSIONS DATA SHEET

Revision 08
2/10/2012

Customer: Sensoray	Job Reference#: SEN20130502
Contact: Alexander (Sasha) Kostromitin	Date: 5/2/2013
DUT: Model 819	Temperature: 72°F
Serial Number: 515183	Humidity: 31%
Voltage/Freq: 120 V 60 Hz	Barometric Pressure: 29 inHg
Tested by: Ryan Benitez	Location: Hillsboro
Product Standards: EN55022:2010/CISPR 22Ed6:2008 Class B	
FCC Part 15 Subpart B Class B	
Test Standard: CISPR 22 B	

TEST RESULTS	Distance	RUN #
Pass	3m	1

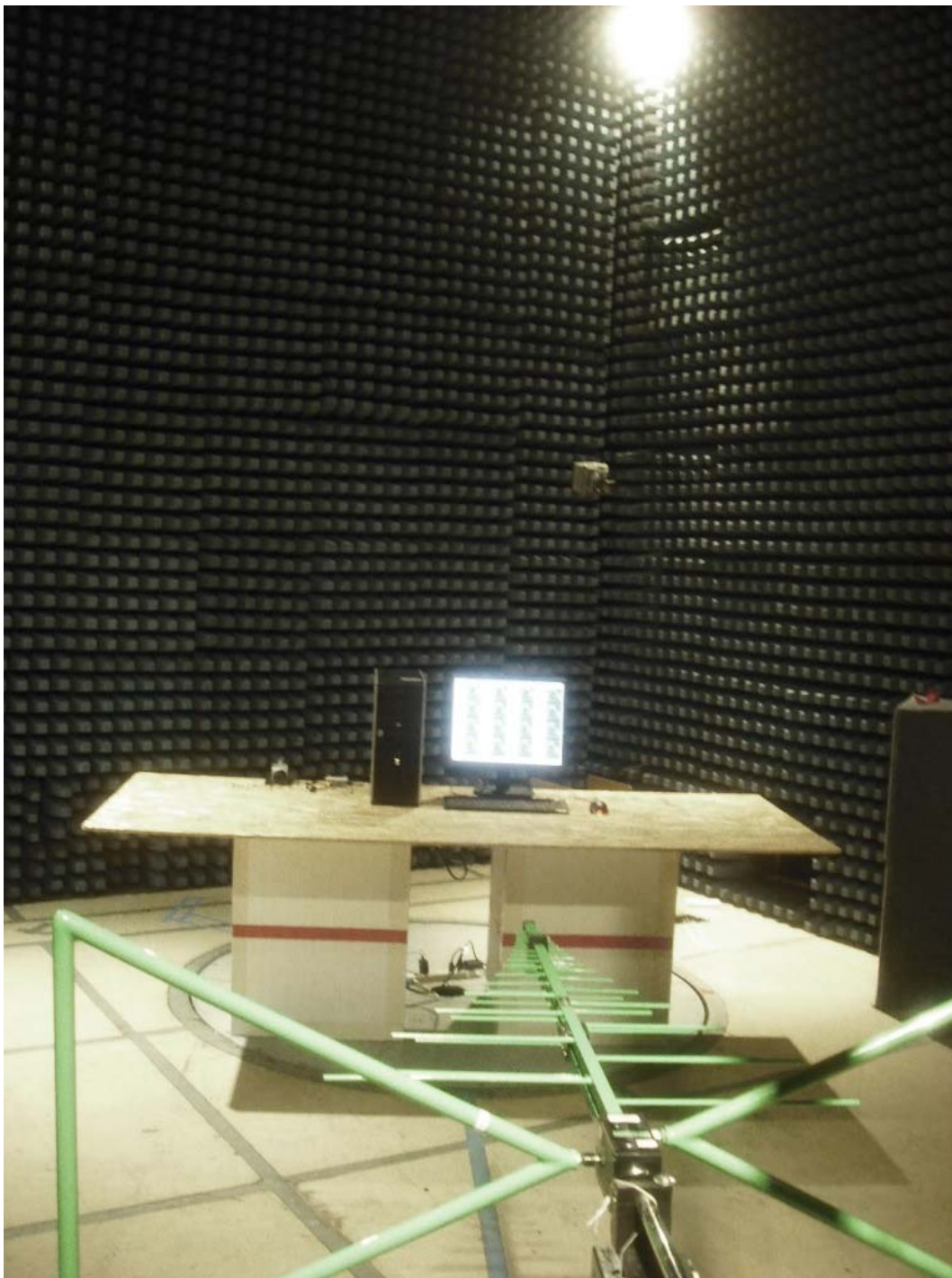


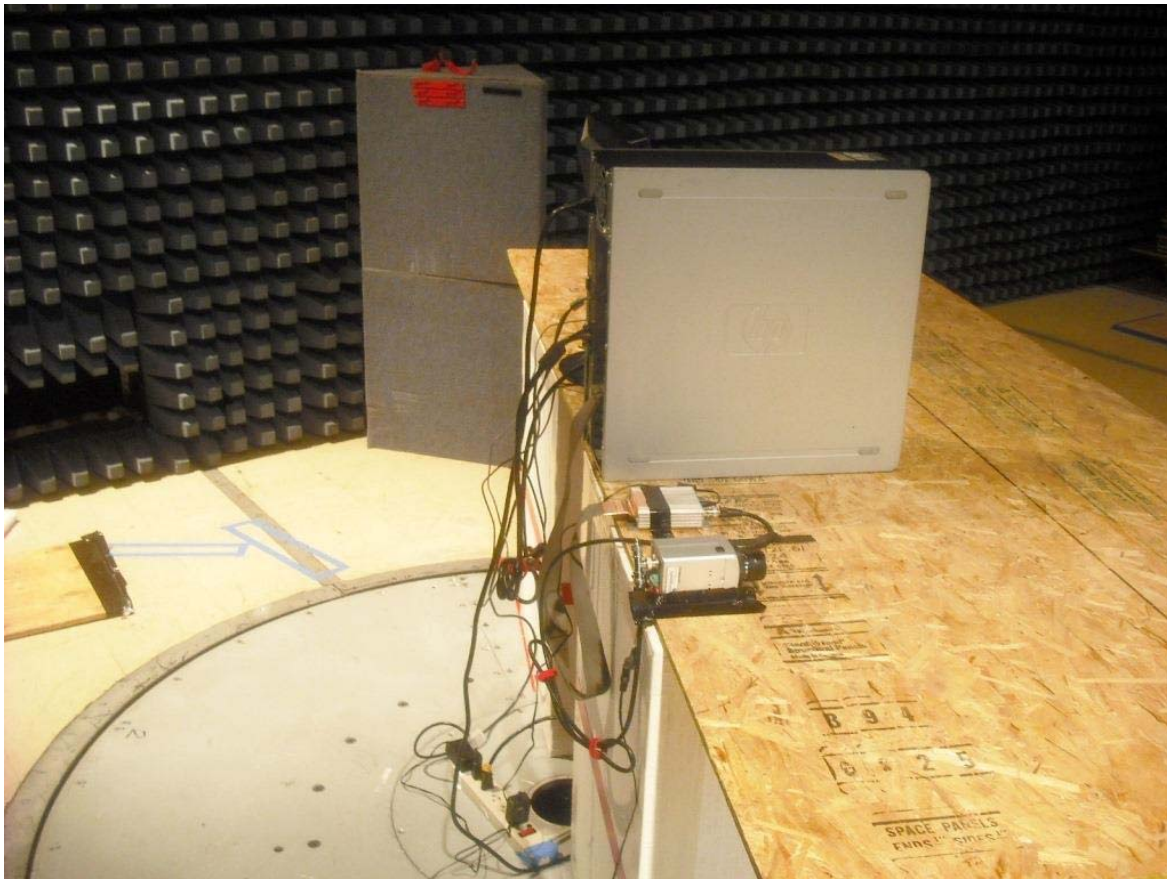
COMMENTS	SIGNATURE
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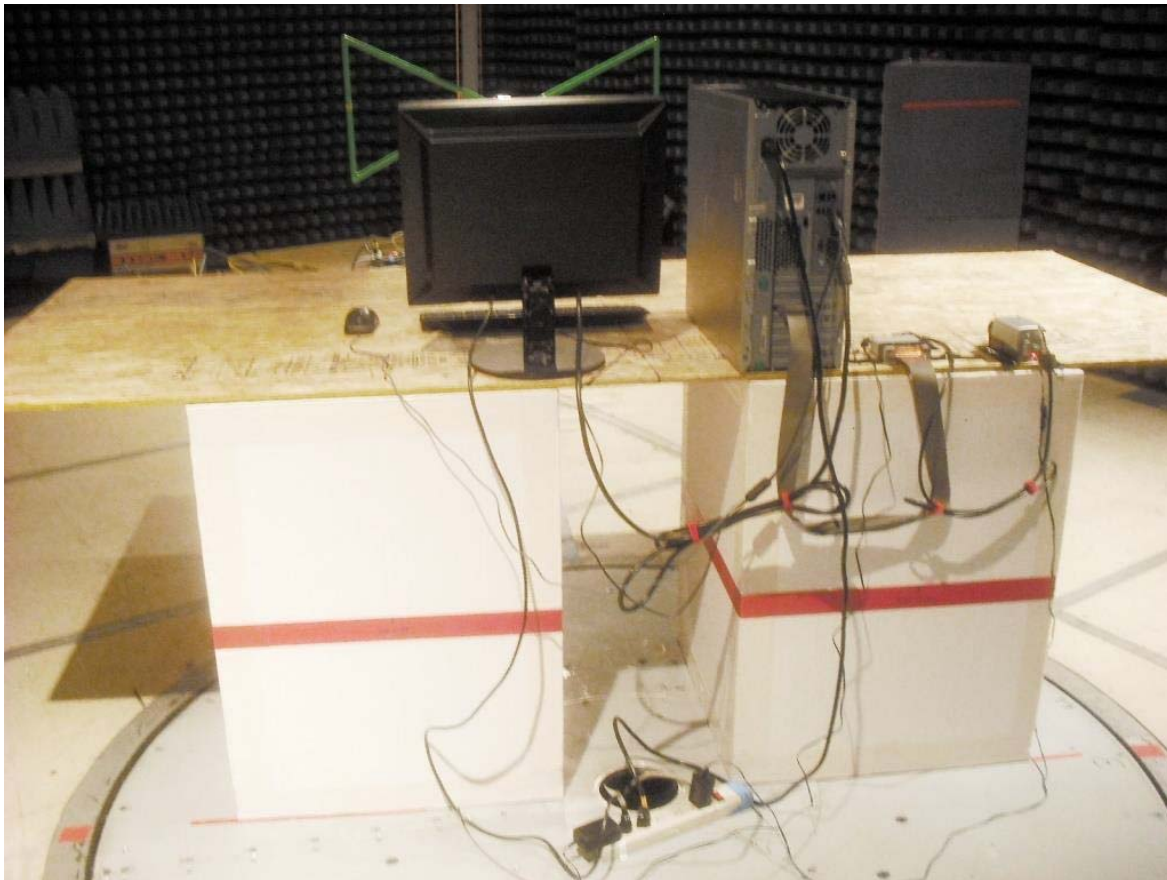
Class B; *Ryan Benitez*

Peak Data				Final Data				
Freq (MHz)	Amplitude (dBμV)	Limit (dBμV)	Margin (dB) / Orientation	Freq (MHz)	Peak (dBμV)	QP (dBμV)	Limit (dBμV)	Margin (dB) / Orientation
175.306	40.472	40.46	-0.012	178.874	41.233	38.593	40.46	1.867
176.47	38.331	40.46	2.129	179.989	41.154	38.934	40.46	1.526
178.798	41.862	40.46	-1.402	181.207	40.891	38.851	40.46	1.609
179.962	41.392	40.46	-0.932	182.39	40.579	38.469	40.46	1.991
181.126	39.467	40.46	0.993	183.564	40.927	37.947	40.46	2.513
181.32	41.411	40.46	-0.951	916.33	46.402	45.302	47.46	2.158
182.484	41.341	40.46	-0.881					
183.454	41.283	40.46	-0.823					
183.648	38.617	40.46	1.843					
184.618	38.198	40.46	2.262					
916.386	48.701	47.46	-1.241					

Radiated Emissions Photographs







Conducted Emissions Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed on a non-conducting tabletop 80 cm tall. Each device is placed on the tabletop 10 cm from its neighboring device. The excess cable length was draped off of the rear of the table. If the excess cable fell closer than 40 cm from the ground plane, the cable were bundled in non-inductive bundles of 30-40 cm loops (when possible) to maintain 40 cm in height. The measurement LISN was located on the floor at least 80 cm from the nearest approach of the DUT.

The DUT and the AE were operated in the modes specified by the client while the emissions were measured.

To measure the emissions at the frequency range specified in this report, cables were arranged in a manner to maximize emissions and a preliminary peak scan was performed. Any emissions that were found to be within 6 dB of the average limit were remeasured with the average detector. Any peaks found to be within 6 dB of the QP limit were remeasured using the QP detector. If there were no peaks found to be within 6 dB of the average limit, then the measurement was considered complete, and the data recorded was peak data as compared to the average limit.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Frequency Range Tested	150 kHz - 30 MHz

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic emission limits as specified by EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B to support compliance to the European Union EMC Directive 2004/108/EC, FCC Part 15 Subpart B Class B, and other regulations based on this standard.

The conducted emissions test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed. The testing was performed at a facility which meets the requirements set forth by ANSI C63.4, including but not limited to mains impedance and cable bundling. The emissions reported were maximized through cable maximization.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Conducted Emissions Results

Test Standard: EN55022:2010/CISPR 22Ed6:2008 Class B/FCC Part 15 Subpart B Class B.

Conducted Emissions: Emissions are within specification limits.

Least Margin:11.3 dB at 10.5 MHz.

Conducted Emissions Measurement System uncertainty (k=2.05)..... ±3.7 dB

Sample conducted emissions measurement:

RF Reading from Spectrum Analyzer (dBuV) + Cable Loss Factor (dB) + LISN Factor (dB) = Final Conducted Emission Level (dBuV).

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Measurement Bandwidths

Frequency (MHz)	Peak (kHz)	Quasi-Peak (kHz)	Average (kHz)
0.15 – 30	9.0	9.0	9.0
30 – 1000	120	120	120
>1000	1000	N/A	1000

Conducted Emission Plots

ElectroMagnetic Investigations, LLC

Conducted Emissions Test Sheet

Revision 08

Job Reference Number: SEN20130502	Temperature (°F): 70	Device Under Test (DUT): Model 819
Test Date: 2-May-2013	Relative Humidity (%): 30	Serial Number: 515183
Location: Hillsboro	Barometric Pressure: 29.9	Test Filename: SEN_CE_
Profile Version:		Test Operator: Ryan Benitez

Product Standard: EN55022:2010/CISPR 22Ed6:2008 Class B	
Test Standard: EN55022:2010/CISPR 22Ed6:2008 Class B	

	Manufacturer	Model Number	Calibration Due	Serial Number
Analyzer:	8566	Hewlett Packard (Agilent)	8566B & 85650A	3407A08563 & 3303A01823
Pre-Selector:	2706	Tektronix	2706	B010476
LISN 1:	Main	FCC	FCC-LISN-50-50-4-02	19-Apr-2015
LISN 2:	N/A	N/A	N/A	N/A
TLISN:	N/A	N/A	N/A	N/A
Site Source:	EMISS01	EMI	N/A	N/A

Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

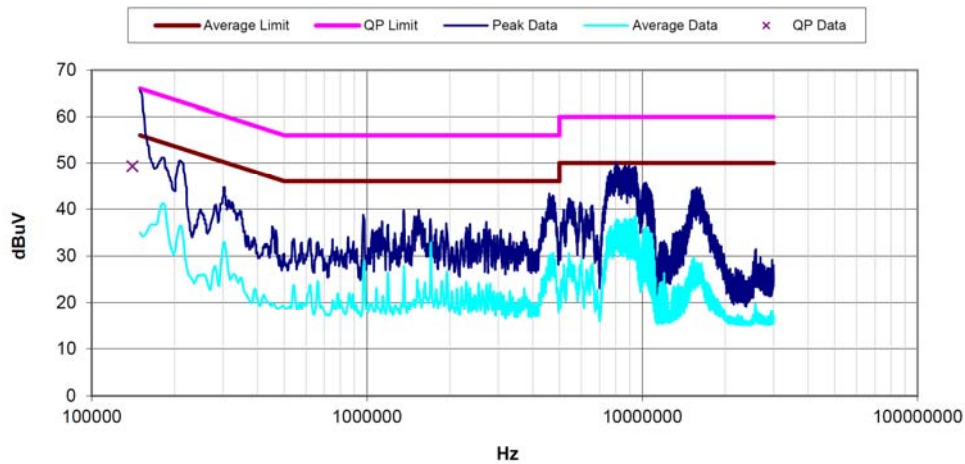
Deviations from Standard: None

CONDUCTED EMISSIONS DATA SHEET

Revision 08
2/10/2012

Customer: Sensoray	Job Reference#: SEN20130502
Contact: Alexander (Sasha) Kostromitin	Date: 5/2/2013
DUT: Model 819	Temperature: 70
Serial Number: 515183	Humidity: 30
Voltage/Freq: 120 V 60 Hz	Barometric Pressure: 29.9 inHg
Tested by: Ryan Benitez	Location: Hillsboro
Product Standards: FCC Part 15 Subpart B Class B	
EN55022:2010/CISPR 22Ed6:2008 Class B	
Test Standard: CISPR 22 B	

TEST RESULTS	LCL Adapter	LINE	RUN #
Pass	N/A	Line	1



COMMENTS	SIGNATURE
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CISPR B - 120 VAC; 60 Hz;	<i>Ryan Benitez</i>
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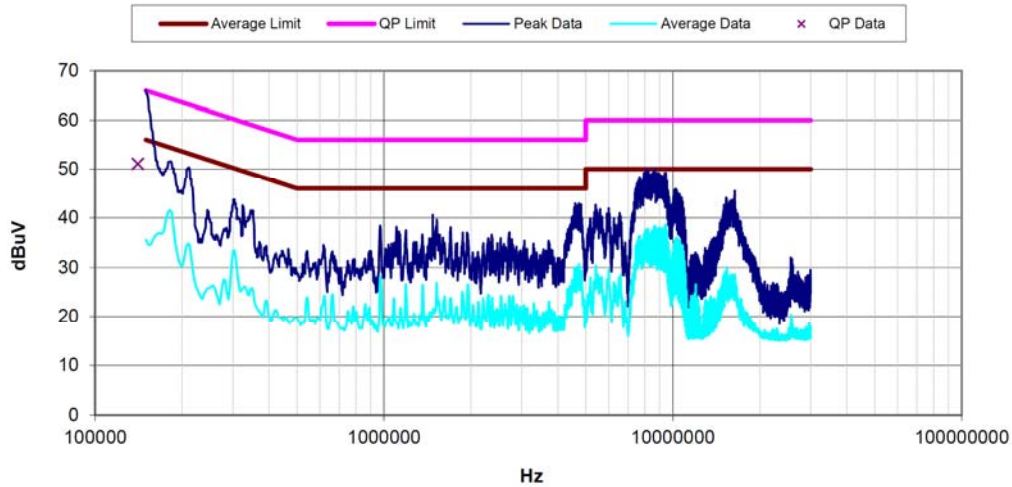
Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)
0.15	65.69	0.31	8.115	37.75	12.25	0.14054	49.310539	17.230529
0.3039	44.706	15.429554	8.118	37.756	12.244			
			8.622	37.842	12.158			
0.9708	38.729	17.271	8.706	37.72	12.28			
1.1361	37.336	18.664	8.961	37.753	12.247			
1.36125	39.749	16.251	8.964	37.749	12.251			
1.54365	39.762	16.238	9.123	37.793	12.207			
4.596	43.31	12.69	9.126	37.79	12.21			
			9.375	38.089	11.911			
			9.378	38.292	11.708			
5.432	42.242	17.758	9.381	38.094	11.906			
5.956	41.354	18.646	9.459	38.457	11.543			
8.028	50.042	9.958	9.462	38.655	11.345			
8.956	49.47	10.53	9.465	38.452	11.548			
10.308	45.653	14.347	9.468	38.049	11.951			

CONDUCTED EMISSIONS DATA SHEET

Revision 08
2/10/2012

Customer: Sensoray	Job Reference#: SEN20130502
Contact: Alexander (Sasha) Kostromitin	Date: 5/2/2013
DUT: Model 819	Temperature: 70
Serial Number: 515183	Humidity: 30
Voltage/Freq: 120 V 60 Hz	Barometric Pressure: 29.9 inHg
Tested by: Ryan Benitez	Location: Hillsboro
Product Standards: FCC Part 15 Subpart B Class B	
EN55022:2010/CISPR 22Ed6:2008 Class B	
Test Standard: CISPR 22 B	

TEST RESULTS	LCL Adapter	LINE	RUN #
Pass	N/A	Neutral	1



COMMENTS	SIGNATURE
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CISPR B - 120 VAC; 60 Hz;	<i>Ryan Benitez</i>
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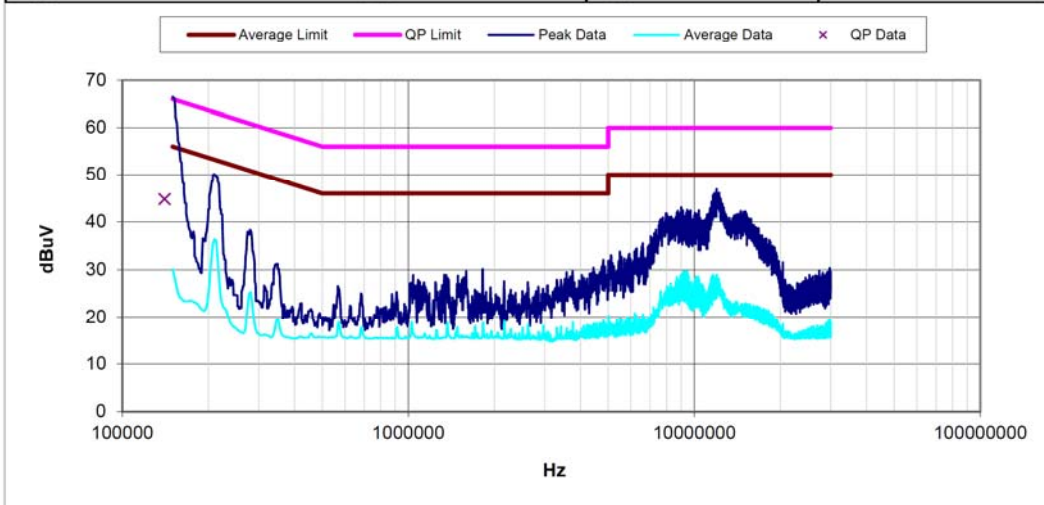
Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBµV)	Margin (dB)	Freq (MHz)	Amplitude (dBµV)	Margin (dB)	Freq (MHz)	Amplitude (dBµV)	Margin (dB)
0.15	66.203	-0.203	8.619	38.039	11.961	0.14056	51.090557	15.449329
0.3039	43.716	16.419554	8.622	38.242	11.758			
			8.625	38.245	11.755			
0.97365	38.346	17.654	8.703	37.925	12.075			
1.1076	38.123	17.877	8.706	38.326	11.674			
1.4781	40.59	15.41	8.709	38.126	11.874			
1.70325	38.02	17.98	8.961	37.959	12.041			
4.596	42.92	13.08	8.964	37.956	12.044			
			9.375	38.305	11.695			
			9.378	38.308	11.692			
5.408	42.628	17.372	9.381	38.111	11.889			
8.684	49.939	10.061	9.459	38.271	11.729			
10.228	45.884	14.116	9.462	38.668	11.332			
10.556	44.841	15.159	9.465	38.665	11.335			
10.64	44.258	15.742	9.468	38.262	11.738			

CONDUCTED EMISSIONS DATA SHEET

Revision 08
2/10/2012

Customer: Sensoray	Job Reference#: SEN20130502
Contact: Alexander (Sasha) Kostromitin	Date: 5/2/2013
DUT: Model 819	Temperature: 70
Serial Number: 515183	Humidity: 30
Voltage/Freq: 230 V 50 Hz	Barometric Pressure: 29.9 inHg
Tested by: Ryan Benitez	Location: Hillsboro
Product Standards: EN55022:2010/CISPR 22Ed6:2008 Class B	
EN55022:2010/CISPR 22Ed6:2008 Class B	
Test Standard: CISPR 22 B	

TEST RESULTS	LCL Adapter	LINE	RUN #
Pass	N/A	Line	1



COMMENTS	SIGNATURE
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CISPR B - 230 VAC; 50 Hz;	<i>Ryan Benitez</i>
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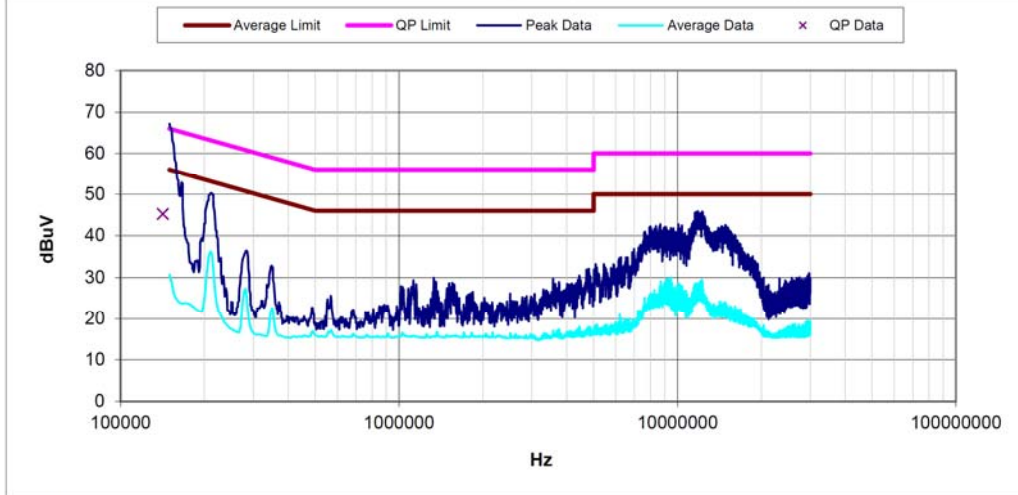
Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)
0.15	66.59	-0.59	0.207	35.128	18.196827	0.14038	44.820377	21.730153
0.20985	50.128	13.083252	0.20985	36.328	16.883252			
0.2811	38.315	22.468311	0.2127	36.12	16.979208			
			9.123	29.393	20.607			
1.33845	28.97	27.03	9.126	29.59	20.41			
1.59495	29.715	26.285	9.129	29.388	20.612			
1.82295	30.187	25.813	9.207	29.513	20.487			
3.756	29.722	26.278	9.21	29.71	20.29			
4.808	32.11	23.89	9.375	29.489	20.511			
			9.378	29.692	20.308			
			9.381	29.494	20.506			
5.112	33.098	26.902	9.459	29.657	20.343			
5.496	33.708	26.292	9.462	29.655	20.345			
5.924	33.386	26.614	9.465	29.652	20.348			
6.608	35.494	24.506	9.468	29.449	20.551			

CONDUCTED EMISSIONS DATA SHEET

Revision 08
2/10/2012

Customer: Sensoray	Job Reference#: SEN20130502
Contact: Alexander (Sasha) Kostromitin	Date: 5/2/2013
DUT: Model 819	Temperature: 70
Serial Number: 515183	Humidity: 30
Voltage/Freq: 230 V 50 Hz	Barometric Pressure: 29.9 inHg
Tested by: Ryan Benitez	Location: Hillsboro
Product Standards: EN55022:2010/CISPR 22Ed6:2008 Class B	
EN55022:2010/CISPR 22Ed6:2008 Class B	
Test Standard: CISPR 22 B	

TEST RESULTS	LCL Adapter	LINE	RUN #
Pass	N/A	Neutral	1

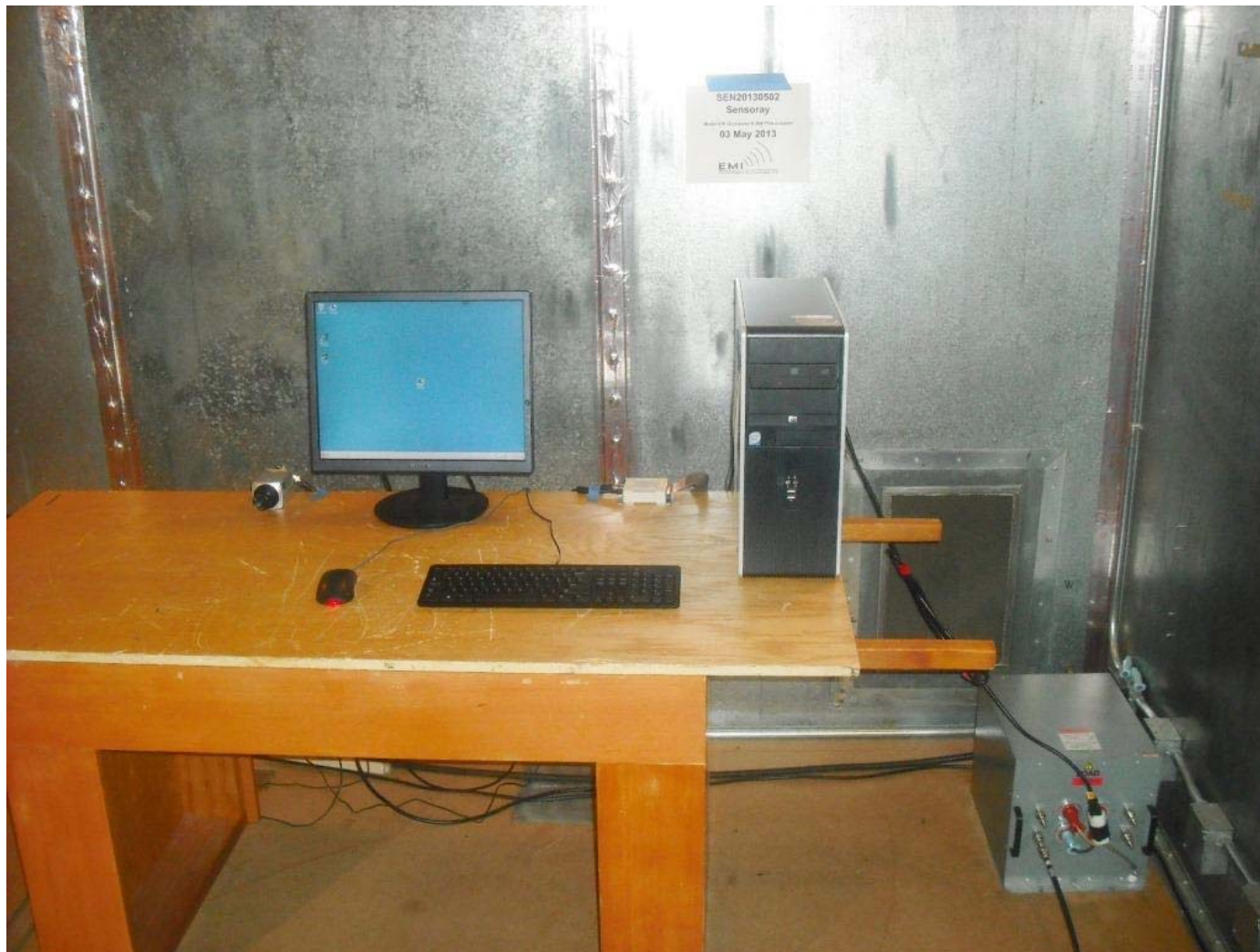


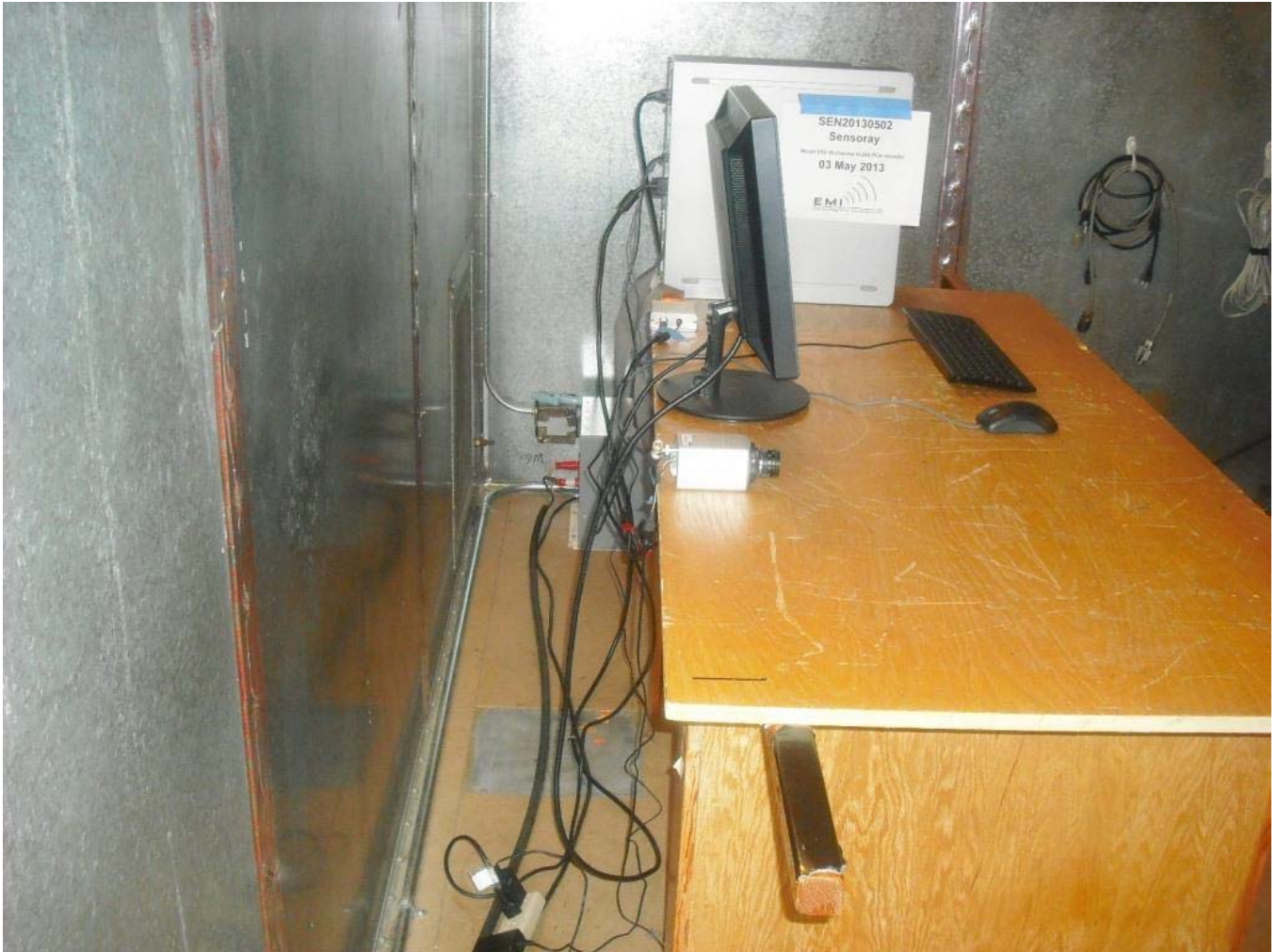
COMMENTS	SIGNATURE
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CISPR B - 230 VAC; 50 Hz;	<i>Ryan Benitez</i>
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Peak Data			Average Data			QP Data		
Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)	Freq (MHz)	Amplitude (dBμV)	Margin (dB)
0.15	67.403	-1.403	0.207	34.938	18.386827	0.14184	45.231842	21.23275
0.2127	50.33	12.769208	0.20985	36.338	16.873252			
0.28395	36.53	24.169524	0.2127	35.93	17.169208			
0.3495	32.872	26.102357	9.123	29.601	20.399			
			9.126	29.598	20.402			
1.1304	29.346	26.654	9.207	29.519	20.481			
1.3356	29.984	26.016	9.21	29.516	20.484			
1.3584	28.962	27.038	9.375	29.505	20.495			
1.55505	28.761	27.239	9.378	29.708	20.292			
3.58	29.72	26.28	9.381	29.511	20.489			
4.8	32.12	23.88	9.459	29.871	20.129			
			9.462	30.068	19.932			
			9.465	30.065	19.935			
5.088	33.296	26.704	9.468	29.462	20.538			
5.444	33.264	26.736	12.225	29.495	20.505			

Conducted Emissions Photographs





Power Line Harmonics and Voltage Fluctuations Information

The test measures to amount of fluctuation and flicker on an AC mains caused by the Device Under Test. This test is applicable to all electrical and electronic equipment that has an input current not exceeding 16A per phase and is designed to be placed on a low voltage (between 220 V and 250 V) AC mains distribution network.

The supply voltage was voltage specified rated voltage of the DUT. If a range was specified for the DUT, the voltage was 230 V for a single phase system.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic emission limits as specified by EN61000-3-2:2006+A1:2009+A2:2009/IEC61000-3-2:2005+A1:2008+A2:2009, limits for harmonic current emissions (equipment input current ≤ 16 A per phase) and EN 61000-3-3:2008/IEC 61000-3-3:2008, limitation of voltage fluctuations and flicker in low-voltage supply systems for equipment rated < 16 A to support compliance to the European Union EMC Directive 2004/108/EC.

The emissions test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Power Line Harmonics and Voltage Fluctuation Results

Test Standard: EN61000-3-2:2006+A1:2009+A2:2009 Class A/IEC61000-3-2:2005+A1:2008+A2:2009 Class A.

Emissions: Emissions are within specification limits.

Test Standard: EN 61000-3-3:2008/IEC 61000-3-3:2008 Class A.

Emissions: Emissions are within specification limits.

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Product: SENS Serial no: Description: Test Date: May 03 2013 4:51pm Result Name: SENS1		May 03 2013 4:55pm Page 1 of 1	
Type of Test: Fluctuating Harmonics Test Limits: Class A Power Analyzer: Voltech PM6000 SN: 100006700076 Firmware version: v1.22.07RC5 Channel(s): 1. SN: 090015501444, 28 Adjusted Date: 30 OCT 2012. 2. SN: 090015500178, 28 Adjusted Date: 31 OCT 2012. 3. SN: 090015500067, 28 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None Shunt(s): 1. SN: 091024300282, 4 Adjusted Date: 31 OCT 2012. 2. SN: 091024300284, 4 Adjusted Date: 31 OCT 2012. 3. SN: 091024300289, 4 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None		AC Source: Mains / Manual Source	
Harmonic Results Against Chosen Limits: <h1 style="text-align: center;">PASS</h1>		Notes:	
Test Parameter Details		User Entered	
Operating Frequency:	50	Measured 49.7453	
Operating Voltage:	230	229.6567	
Specified Power:	0.0000	49.5537	
Fundamental Current:	0.0000	0.2691	
Power Factor:	0.0000	0.7775	
Average Input Current:		0.2630	
Maximum POHC:		0.0114	
POHC Limit:		0.2514	
Maximum THC:		0.0664	
Minimum Power:	75		
Class Multiplier:	1.0000		
Test Duration:	00:02:30		

Product:	SENS	May 03 2013 4:55pm
Serial no:		Page 1 of 1
Description:		
Result Name:	SENS1	
Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date: May 03 2013 4:51pm
Type of Test:	Fluctuating Harmonics Test - Worst Case Table (2006)	
Power Analyzer:	Voltech PM6000 SN: 100006700076 Firmware version: v1.22.07RC5	
Channel(s):	1. SN: 090015501444, 28 Adjusted Date: 30 OCT 2012. 2. SN: 090015500178, 28 Adjusted Date: 31 OCT 2012. 3. SN: 090015500067, 28 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
Shunt(s):	1. SN: 091024300282, 4 Adjusted Date: 31 OCT 2012. 2. SN: 091024300284, 4 Adjusted Date: 31 OCT 2012. 3. SN: 091024300289, 4 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
PASS		

Class	Class A
Class Multiplier	1

Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL	Harm	Limit 1	Limit 2	Average Reading	<L1 <L2	Max Reading	<L2	Pass FAIL
2	1.0800A	1.6200A	10.09mA	✓✓	10.69mA	✓	N/A	3	2.3000A	3.4500A	59.28mA	✓✓	61.20mA	✓	N/A
4	430.0mA	645.0mA	2.419mA	✓✓	3.763mA	✓	N/A	5	1.1400A	1.7100A	9.145mA	✓✓	9.923mA	✓	N/A
6	300.0mA	450.0mA	1.674mA	✓✓	2.252mA	✓	N/A	7	770.0mA	1.1560A	7.042mA	✓✓	7.777mA	✓	N/A
8	230.0mA	345.0mA	1.266mA	✓✓	1.445mA	✓	N/A	9	400.0mA	600.0mA	5.159mA	✓✓	5.465mA	✓	N/A
10	184.0mA	276.0mA	1.521mA	✓✓	2.006mA	✓	N/A	11	330.0mA	495.0mA	5.612mA	✓✓	6.187mA	✓	N/A
12	153.3mA	230.0mA	2.348mA	✓✓	2.533mA	✓	N/A	13	210.0mA	315.0mA	8.403mA	✓✓	8.681mA	✓	N/A
14	131.4mA	197.1mA	3.122mA	✓✓	3.581mA	✓	N/A	15	150.0mA	225.0mA	8.405mA	✓✓	10.68mA	✓	N/A
16	115.0mA	172.5mA	3.073mA	✓✓	3.359mA	✓	N/A	17	132.3mA	198.5mA	1.510mA	✓✓	3.624mA	✓	N/A
18	102.2mA	153.3mA	3.119mA	✓✓	3.796mA	✓	N/A	19	118.4mA	177.6mA	6.127mA	✓✓	7.053mA	✓	N/A
20	92.00mA	138.0mA	3.074mA	✓✓	3.639mA	✓	N/A	21	107.1mA	160.7mA	4.100mA	✓✓	4.869mA	✓	N/A
22	83.63mA	125.4mA	2.793mA	✓✓	3.287mA	✓	N/A	23	97.82mA	146.7mA	5.043mA	✓✓	6.204mA	✓	N/A
24	76.66mA	115.0mA	1.139mA	✓✓	1.460mA	✓	N/A	25	90.00mA	135.0mA	3.861mA	✓✓	4.834mA	✓	N/A
26	70.76mA	106.1mA	0.989mA	✓✓	1.463mA	✓	N/A	27	83.33mA	125.0mA	3.664mA	✓✓	4.365mA	✓	N/A
28	66.71mA	98.57mA	1.623mA	✓✓	1.906mA	✓	N/A	29	77.58mA	116.3mA	2.602mA	✓✓	3.594mA	✓	N/A
30	61.33mA	92.00mA	0.980mA	✓✓	1.139mA	✓	N/A	31	72.58mA	108.8mA	2.275mA	✓✓	2.707mA	✓	N/A
32	57.50mA	86.25mA	1.054mA	✓✓	1.175mA	✓	N/A	33	68.18mA	102.2mA	2.199mA	✓✓	2.635mA	✓	N/A
34	54.11mA	81.17mA	0.906mA	✓✓	1.085mA	✓	N/A	35	64.28mA	96.42mA	1.906mA	✓✓	2.281mA	✓	N/A
36	51.11mA	76.66mA	0.750mA	✓✓	1.104mA	✓	N/A	37	60.81mA	91.21mA	1.969mA	✓✓	2.235mA	✓	N/A
38	48.42mA	72.63mA	0.527mA	✓✓	0.730mA	✓	N/A	39	57.69mA	86.53mA	1.130mA	✓✓	1.480mA	✓	N/A
40	46.00mA	69.00mA	0.735mA	✓✓	0.827mA	✓	N/A								

Product:	SENS	May 09 2013 10:52am
Serial no:		Page 1 of 1
Description:		
Result Name:	819	
Voltech IEC61000-3 Windows Software 1.14.06RC1		Test Date: May 03 2013 5:01pm
Type of Test:	Flickermeter Test - Table	
Power Analyzer:	Voltech PM6000 SN: 100006700076 Firmware Version: v1.22.07RC5	
Channel(s):	1. SN: 090015501444, 28 Adjusted Date: 30 OCT 2012. 2. SN: 090015500178, 28 Adjusted Date: 31 OCT 2012. 3. SN: 090015500067, 28 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
Shunt(s):	1. SN: 091024300282, 4 Adjusted Date: 31 OCT 2012. 2. SN: 091024300284, 4 Adjusted Date: 31 OCT 2012. 3. SN: 091024300289, 4 Adjusted Date: 31 OCT 2012. 4. SN:None Adjusted Date:None 5. SN:None Adjusted Date:None 6. SN:None Adjusted Date:None	
AC Source:	Mains / Manual Source	
Overall Result:	Notes:	
PASS		

	Plt
Limit	0.650
Reading	0.071

	Pst	dc (%)	dmax (%)	d(t) > 3.3%(ms)
Limit	1.000	3.300	4.000	500
Reading 1	0.071	0.000	0.000	0
Reading 2	0.071	0.000	0.000	0
Reading 3	0.071	0.000	0.000	0
Reading 4	0.071	0.000	0.000	0
Reading 5	0.071	0.000	0.000	0
Reading 6	0.071	0.000	0.000	0
Reading 7	0.071	0.000	0.000	0
Reading 8	0.071	0.000	0.000	0
Reading 9	0.071	0.000	0.000	0
Reading 10	0.071	0.000	0.000	0
Reading 11	0.071	0.000	0.000	0
Reading 12	0.071	0.000	0.000	0

Power Line Harmonics and Voltage Fluctuation Photographs



Immunity Test Report

ElectroStatic Discharge (ESD) Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

Table-top DUTs and the AE that is designated to be placed in the measurement area were placed on a non-conducting tabletop 80 cm tall with a horizontal coupling plane. The DUT and AE were isolated from the horizontal coupling plane by a thin non-conducting surface 0.5 mm thick. The horizontal coupling plane was attached to the a ground plane on the floor by two 470 Ω resistors. A vertical coupling plane was placed on the table-top for vertical coupling plane tests. The vertical coupling plane was also terminated to the ground plane on the floor by two 470 Ω resistors.

Floor standing DUTs and AE were placed on the ground plane with a 10 cm thick insulator isolating the equipment from the ground plane. The only ground connection allowed was the ground connection that was created by the power connector, or that which would normally be present in the application of the DUT.

The ground plane on the floor extended past the edge of the tabletop or the DUT by at least one half a meter on all sides. The DUT was placed at least 1 meter from all conducting surfaces.

The DUT and the AE were operated in the modes specified by the client while the ESD test was performed. The DUT was subjected to both air and contact discharges. The specific number of discharges at each voltage level is specified within this report. Any contact discharges were applied to all conductive surfaces as specified in the test standard. Any air discharges were applied to non-conducting surfaces as specified in the test standard. If any response was seen within the DUT system, it was noted in the report. The testing was performed with the DUT fully configured with appropriate AE and connecting cables.

All targets tested were recorded along with the type of discharge, the number of discharges, voltage level, polarity, and the reaction of the DUT system.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	4 kV contact discharge, 8 kV air discharge

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity requirements as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The ESD test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

ElectroStatic Discharge Results

Test Standard: EN61000-4-2:2008(IEC 61000-4-2:2008Ed.2)

ElectroStatic Discharge:DUT performed to Criteria B

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

ElectroStatic Discharge Data Sheet

ElectroMagnetic Investigations, LLC

ESD Test Sheet

Revision 08

Job Reference Number	SEN20130502	Temperature (°F)	70	Device Under Test (DUT)	Model 819
Test Date	5-May-2013	Relative Humidity (%)	30	Serial Number	515183
Location	Hillsboro	Barometric Pressure	30	Voltage/Freq	120 V 60 Hz
				Test Operator	Henry Benitez



Product Standard	EN55024:2010(CISPR 24Ed2:2010)
Test Standard	EN61000-4-2:2008(IEC 61000-4-2:2008Ed.2) ±4kV Contact / ±8kV Air Performance Class B

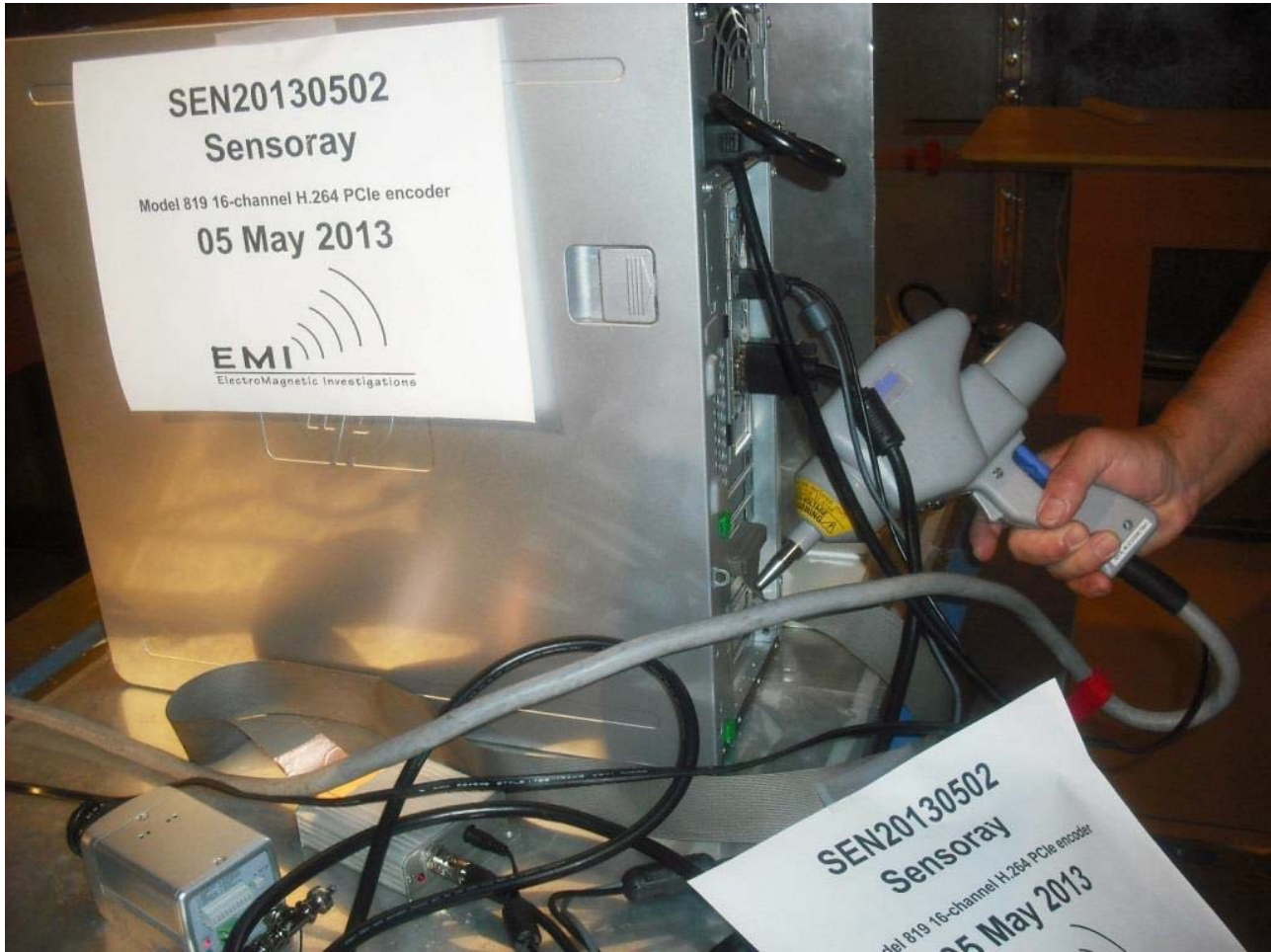
	Equipment	Manufacturer	Model Number	Calibration Due	Serial Number
ESD Generator	ESD	Noiseken	ES2002 & TC815R	September 30, 2016	ESS0827941 & ESS0817835

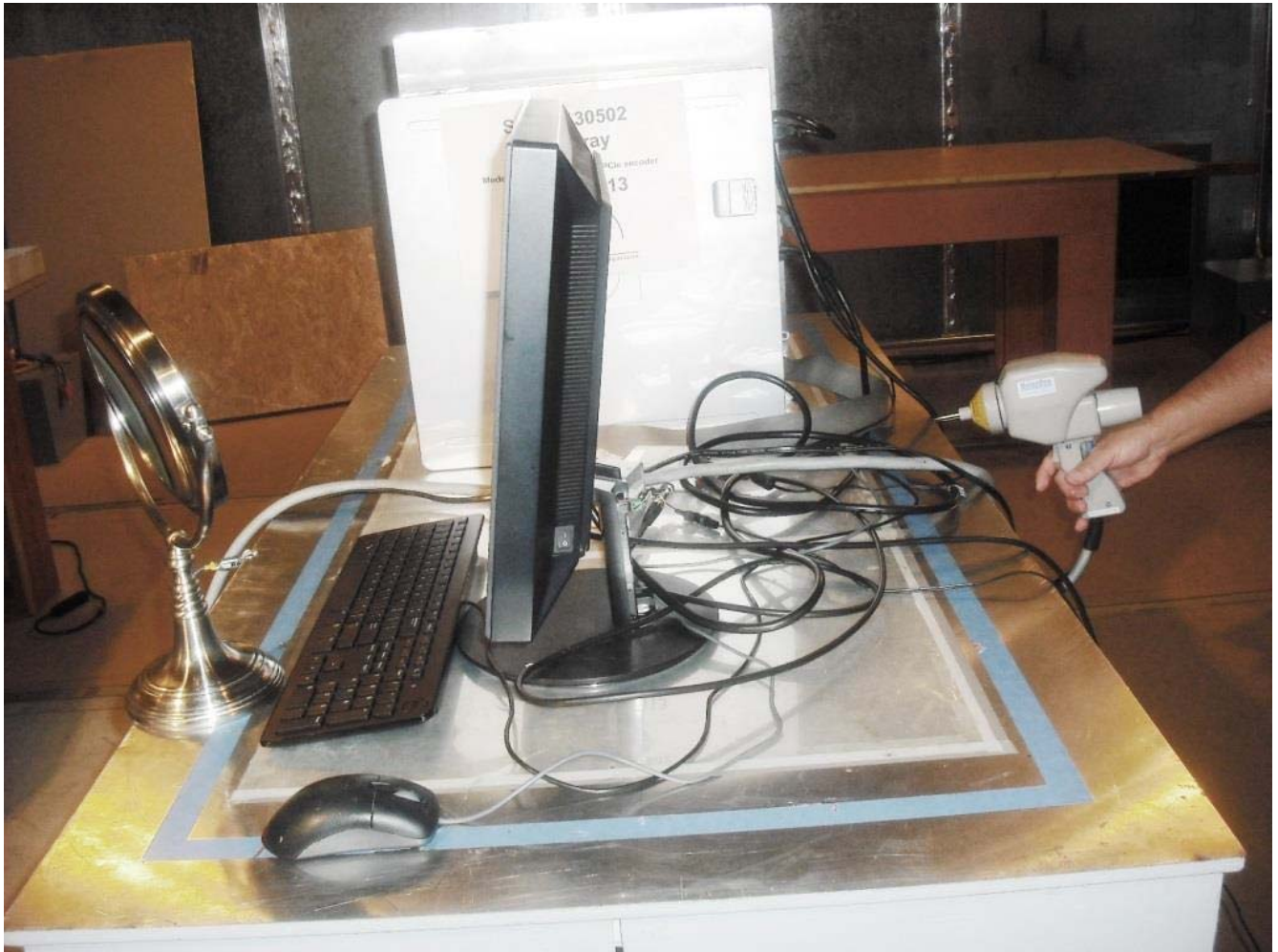
Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

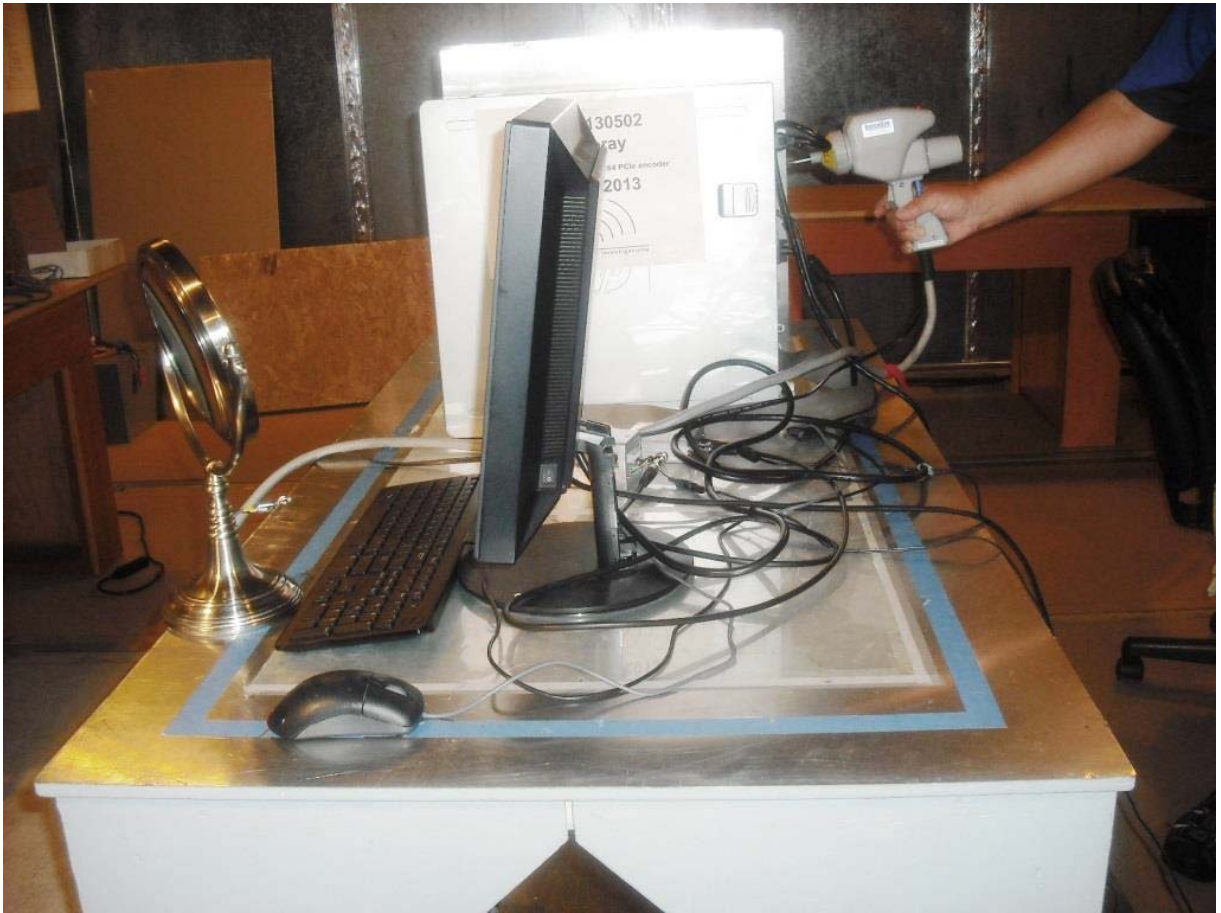
Test Location	Discharge Type	Voltage Level	Voltage Polarity	Number of Events	Comments / DUT Response	Stated Criteria	Pass / Fail	Picture
819 Board I/O Connector, PC back chassis.	Contact	2 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	Yes
819 Board I/O Connector, PC back chassis.	Contact	4 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
Horizontal coupling plane	Contact	2 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
Horizontal coupling plane	Contact	4 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
Vertical coupling plane	Contact	2 kV	±	10 Each	No degradation of performance observed.	B	Pass	
Vertical coupling plane	Contact	4 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
819 Board I/O Connector, PC back chassis.	Air	2 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
819 Board I/O Connector, PC back chassis.	Air	4 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	
819 Board I/O Connector, PC back chassis.	Air	8 kV	±	10 Each	Display screens blanks out momentarily and returns to normal on its own.	B	Pass	

Deviations from Standard:

ElectroStatic Discharge Photographs







Radiated Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed on a non-conducting tabletop 80 cm tall. Each device is placed on the tabletop 10 cm from its neighboring device. The excess cable length was draped off of the rear of the table. If the excess cable fell closer than 40 cm from the ground plane, the cable were bundled in non-inductive bundles of 30-40 cm loops (when possible) to maintain 40 cm in height. The transmit antenna was then placed 3 m from the DUT/AE system. Any AE that had to be placed outside the measurement area was setup either outside of the chamber or under the floor, depending on size and convenience.

The DUT and the AE were operated in the modes specified by the client while the susceptibility was measured.

The field was calibrated to a uniform field in a fully anechoic chamber as per the requirements within IEC61000-4-3 using an empty room. The power required to produce this field was recorded for playback when the DUT is placed within the chamber. The uniform field was created over a vertical plane of dimensions 1.5 m by 1.5 m placed 0.8 m above the floor. If the DUT can be completely exposed to the field using a smaller uniform surface, the surface was reduced to meet the appropriate size of the DUT, but the surface would never be smaller than 0.5 m by 0.5 m.

The face of the DUT and it corresponding system was placed at vertical surface used for calibration.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	3 V/m, 80-1000 MHz, 3V/m, 1-2.7 GHz

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The radiated immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Radiated Immunity Results

Test Standard: EN61000-4-3:2006+A1:2008+A2:2010(IEC61000-4-3:2006+A1:2007+A2:2010

Radiated Immunity:DUT performed to Criteria A

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Radiated Immunity Data Sheet

ElectroMagnetic Investigations, LLC

Radiated Immunity Test Sheet

Revision 08

Job Reference Number: SEN20130502
 Test Date: 2-May-2013
 Location: Hillsboro
 Test Level (V/m) <= 1 GHz: 3 V/m
 Test Level (V/m) 1 to 2 GHz: 3 V/m
 Test Level (V/m) >= 2 GHz: 3 V/m

Temperature (°F): 70
 Relative Humidity (%): 30
 Barometric Pressure: 30
 Calibration Points: 8 pt

Device Under Test (DUT): Model 819
 Serial Number: 515183
 Voltage/Freq: 120 V 60 Hz
 Test Filename: SEN_RI_
 Test Operator: Ryan Benitez

Ryan Benitez

Product Standard: EN55024:2010(CISPR 24Ed2:2010)
 EN61000-4-3:2006+A1:2008+A2:2010(IEC 61000-4-3:2006+A1:2007+A2:2010)
 3 V/m, 80% AM (1 kHz), 80 to 2700 MHz
 Test Standard: Performance Class A

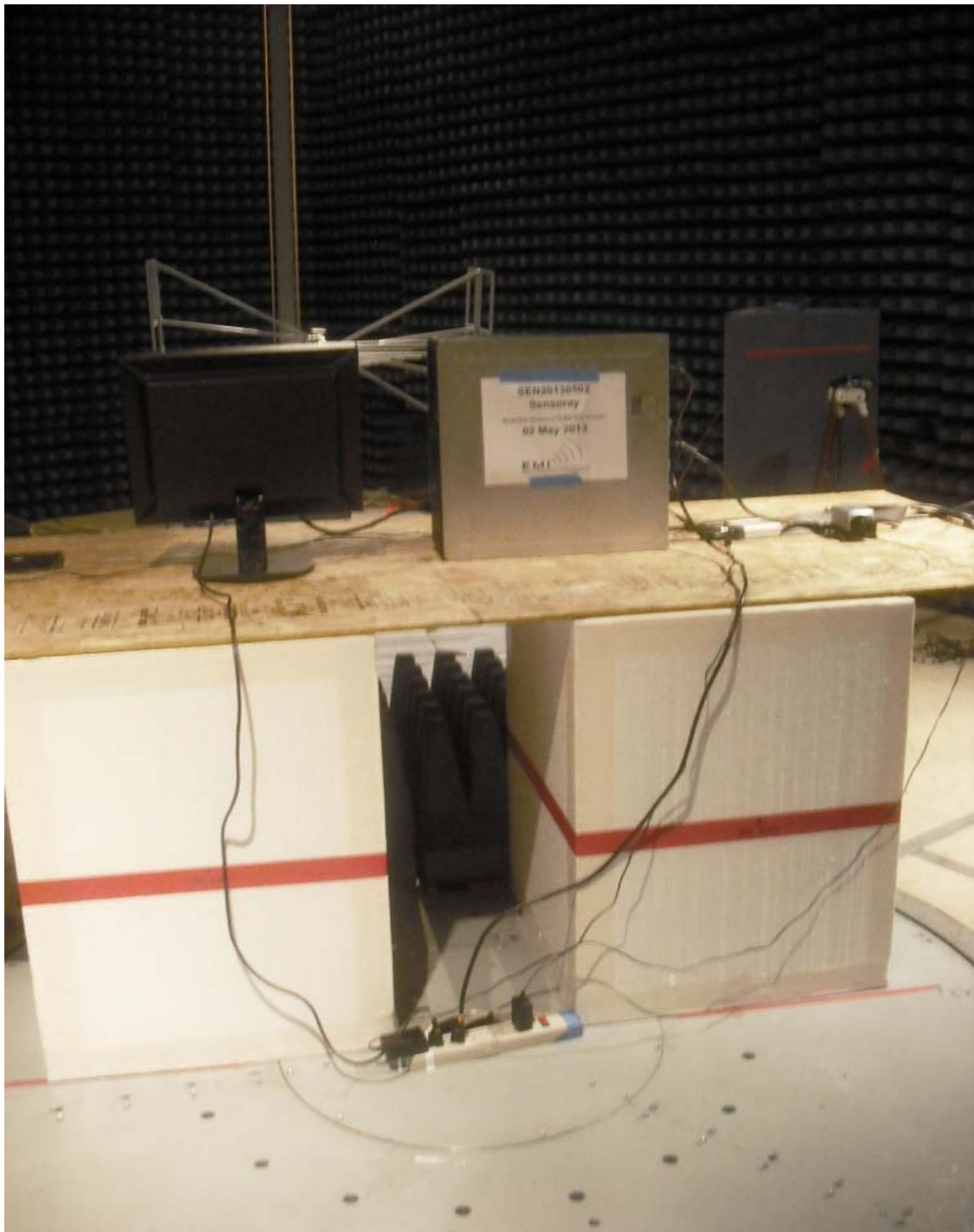
	Manufacturer	Model Number	Calibration Due	Serial Number
Antenna	EMCO	3141	N/A	1204
Antenna 2	ETS Lindgren	3117	7-May-2015	S009842
Probe	EMCO	HI 6005	8-Nov-2015	33983
Signal Generator	Marconi	2024	26-Oct-2015	112282/239
Signal Generator 2	HP	8673D	26-Oct-2015	2938A01008
Amplifier	IFI	CMX5001	N/A	2151-1196
Amplifier 2	AR	25S1G4A	N/A	300668

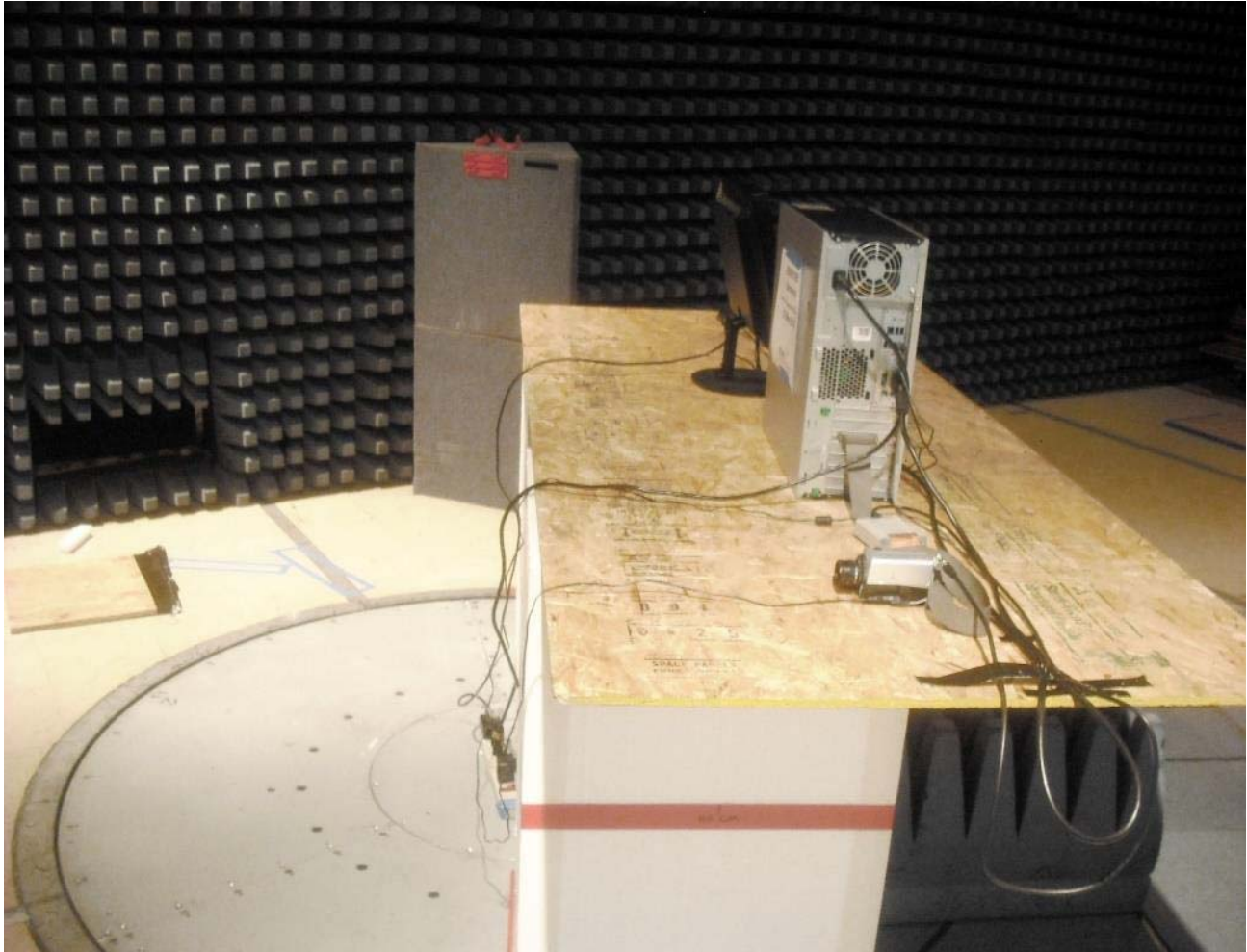
Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

Test Details	Polarization	Azimuth	Start (MHz)	Stop (MHz)	Criteria	Comments / DUT Response	Pass / Fail	Picture
Front	Horizontal	0°	80	2700	A	No degradation of performance observed.	Pass	Yes
	Vertical	0°	80	2700	A	No degradation of performance observed.	Pass	
Left Side	Horizontal	90°	80	2700	A	No degradation of performance observed.	Pass	
	Vertical	90°	80	2700	A	No degradation of performance observed.	Pass	
Back	Horizontal	180°	80	2700	A	No degradation of performance observed.	Pass	
	Vertical	180°	80	2700	A	No degradation of performance observed.	Pass	
Right Side	Horizontal	270°	80	2700	A	No degradation of performance observed.	Pass	
	Vertical	270°	80	2700	A	No degradation of performance observed.	Pass	

Deviations from Standard: None

Radiated Immunity Photographs







Electrical Fast Transients (burst) Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed 10 cm above a conducting surface. Each device is placed on the tabletop 10 cm from its neighboring device. The excess cable length was serpentine (not coiled) on the tabletop 10 cm above the ground plane. The power lines subjected to the transient were plugged directly into the generator. I/O's that were greater than 3 m in length were passed through a capacitive clamp, and also exposed to the transient.

The waveform of the transient can be seen in the following figure.

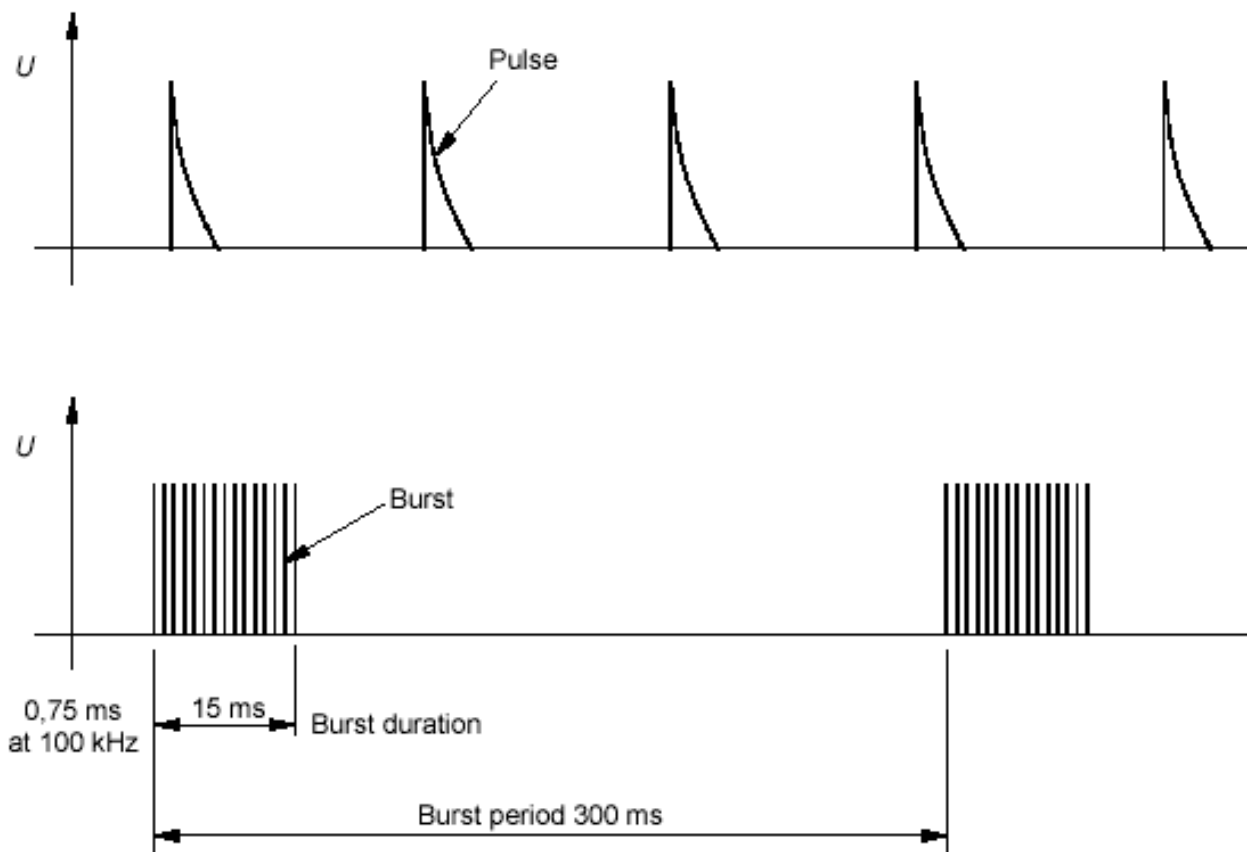


Figure: EFT/Burst Waveform

The DUT and the AE were operated in the modes specified by the client while the susceptibility was measured.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	1 kV Peak

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) Section 10 to support compliance to the European Union EMC Directive 2004/108/EC.

The electrical fast transient immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Electrical Fast Transient (burst) Immunity Results

Test Standard: EN61000-4-4:2004+A1:2010 (IEC61000-4-4:2004+A1:2010)

EFT / Burst Immunity:DUT performed to Criteria B

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Electrical Fast Transient (burst) Immunity Data Sheet

ElectroMagnetic Investigations, LLC

Burst Test Sheet

Revision 08

Job Reference Number: SEN20130502	Temperature (°F): 70	Device Under Test (DUT): Model 819
Test Date: 3-May-2013	Relative Humidity (%): 30	Serial Number: 515183
Location: Hillsboro	Barometric Pressure: 30	Voltage/Freq: 230 V 50 Hz
		Test Operator: Ryan Benitez
		<i>Ryan Benitez</i>

Product Standard: **EN55024:2010(CISPR 24Ed2:2010)**
EN61000-4-5:2006(IEC 61000-4-5:2005)
 Test Standard: **±1 kV peak DM - AC**
±2 kV peak CM - AC

	Equipment	Manufacturer	Model Number	Calibration Due	Serial Number
Generator	UCS	EMTest	UCS 500M4	N/A	0800-45
Injection Clamp	C Clamp	EMTest	Cap. Coupling Clamp	N/A	0105-09

Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

Injection Line	Test Number	Injection Method	Level	Stated Criteria	Comments / DUT Response	Pass / Fail	Filename	Picture
Power line - Differential Mode	1	Direct Inject	500 V	B	No degradation of performance after test.	Pass		Yes
Power line - Differential Mode	2	Direct Inject	1000 V	B	No degradation of performance after test.	Pass		
Power line - Common Mode	3	Direct Inject	500 V	B	No degradation of performance after test.	Pass		
Power line - Common Mode	4	Direct Inject	1000 V	B	No degradation of performance after test.	Pass		
Power line - Common Mode	5	Direct Inject	2000 V	B	No degradation of performance after test.	Pass		

Deviations from Standard: **None**

Electrical Fast Transient (burst) Immunity Photographs

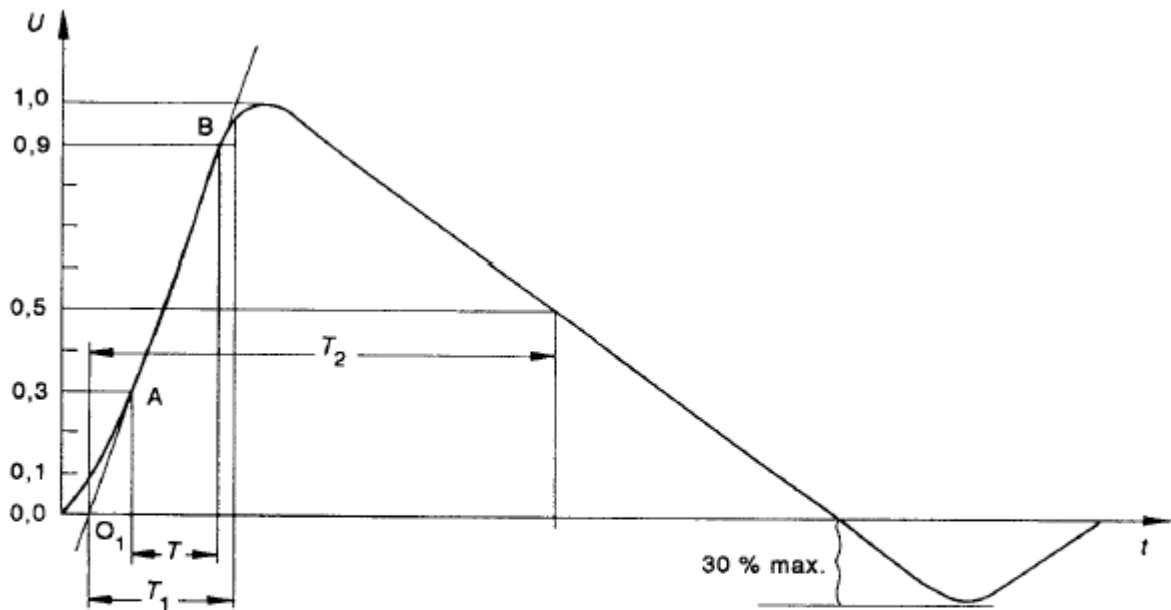


Surge Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed on a non-conductive table. Each device is placed on the tabletop 10 cm from its neighboring device. The excess cable length was serpentine (not coiled) on the tabletop. The power lines subjected to the transient were plugged directly into the generator. I/O's that were subjected to the surge transient were listed on the surge data sheet.

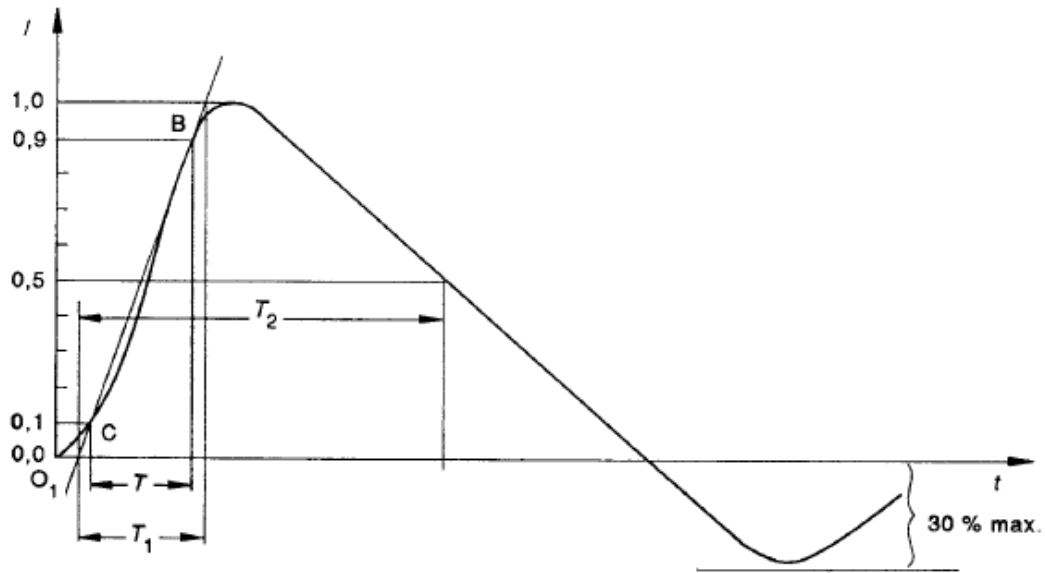
The waveform of the transient can be seen in the following figures.



Front time: $T_1 = 1,67 \times T = 1,2 \mu\text{s} \pm 30 \%$

Time to half-value: $T_2 = 50 \mu\text{s} \pm 20 \%$

Figure: Surge Open Circuit Waveform



Front time: $T_1 = 1,25 \times T = 8 \mu\text{s} \pm 20 \%$
 Time to half-value: $T_2 = 20 \mu\text{s} \pm 20 \%$

Figure: Surge Short Circuit Waveform

The DUT and the AE were operated in the modes specified by the client while the susceptibility was measured.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	1 kV DM, 2 kV CM

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The surge immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Surge Immunity Results

Test Standard: EN61000-4-4:2006(IEC61000-4-5:2005)

Surge Immunity:DUT performed to Criteria B

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

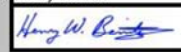
Surge Immunity Data Sheet

ElectroMagnetic Investigations, LLC

Surge Test Sheet

Revision 08

Job Reference Number:	SEN20130502	Temperature (°F):	70	Device Under Test (DUT):	Model 819
Test Date:	4-May-2013	Relative Humidity (%):	30	Serial Number:	515183
Location:	Hillsboro	Barometric Pressure:	30	Voltage/Freq:	230 V 50 Hz
				Test Operator:	Henry Benitez



Product Standard:	EN55024:2010(CISPR 24Ed2:2010)
Test Standard:	EN61000-4-5:2006(IEC 61000-4-5:2005) ±1 kV peak DM - AC ±2 kV peak CM - AC

	Equipment	Manufacturer	Model Number	Calibration Due	Serial Number
Generator	UCS	EMTest	UCS 500M4	N/A	0800-45

Support Equipment	Manufacturer	Model Number	Serial Number	In test area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

Injection Line	Test Number	Injection Method	Level	Stated Criteria	Comments / DUT Response	Pass / Fail	Filename	Picture
AC Power Line PC	1	Direct Inject	500 V	B	No degradation of performance observed	Pass	N/A	Yes
AC Power Line PC	2	Direct Inject	1000 V	B	No degradation of performance observed	Pass	N/A	
AC Power Line PC	3	Direct Inject	2000 V	B	Display flickers, but returns to normal operation.	Pass	N/A	

Deviations from Standard: None

Surge Immunity Photographs



RF Conducted Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed on a non-conducting surface 10 cm above a ground plane. Each device is placed on the tabletop 10 cm from its neighboring device. The cables were serpentine 3 cm above the ground plane. Any cables not being tested were fitted with a decoupling device. Power entered the DUT and the AE through a coupling decoupling network which was bonded to the ground plane.

The DUT and the AE were operated in the modes specified by the client while the susceptibility was measured.

The RF field was calibrated with a 150 Ω calibration jig as specified within IEC 61000-4-6. The power required to produce the required field strength was recorded for playback when the DUT is placed within the test fixture.

The power lines of the DUT were tested with the appropriate CDN. The power passed through the CDN and the RF was coupled onto the power line.

The I/O cables greater than 3 m were tested with either a CDN designed for the specific I/O or a current clamp. The I/O specific CDN was placed in series with the system and tested like the power CDN. The clamp was placed around the I/O line being tested and placed as close to the DUT as possible, but no more than 30 cm away.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	10 Vrms, 150 kHz to 80 MHz

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The RF conducted immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Conducted Immunity Results

Test Standard: EN61000-4-6:2009(IEC61000-4-6:2008Ed.3)

Radiated Immunity:DUT performed to Criteria A

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Conducted Immunity Photographs





Voltage Sag and Interrupts Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area

The DUT and the AE were operated in the modes specified by the client while the susceptibility was monitored.

During the voltage sag immunity, the mains were subjected to the specified percent voltage levels less than the rated voltage for the specified duration. Each specified sag percentage, and time were recorded with the performance of the DUT.

During the voltage interruption, the mains were reduced to less than five percent the nominal voltage for the specified duration. The specified duration was recorded with the performance of the DUT.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System (Version)	Windows 7
Exercising Software (version)	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	>95% dip, 10 mS, Perf. B; 30% dip, 500 mS, Perf. C; >95% drop, 5 S, Perf. C

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The voltage sag and interrupts immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Voltage Sag and Interrupts Immunity Results

Test Standard: EN61000-4-11:2004(IEC61000-4-11:2004Ed.2)

Voltage Sag and Interrupts Immunity:DUT performed to Criteria B

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Flat Ribbon 37	Yes	1m	No	No	819	Termination Box
75 Ohm coaxial	Yes	2m	No	No	Video Camera	819

Voltage Sag and Interrupts Immunity Data Sheet

ElectroMagnetic Investigations, LLC

Dips, Interrupts Test Sheet

Revision 08

Job Reference Number: SEN20130502	Temperature (°F): 70	Device Under Test (DUT): Model 819
Test Date: 3-May-2013	Relative Humidity (%): 30	Serial Number: 515183
Location: Hillsboro	Barometric Pressure: 30	Voltage/Freq: 230 V 50 Hz
		Test Operator: Ryan Benitez

Product Standard:	EN55024:2010(CISPR 24Ed2:2010)
	EN61000-4-11:2004(IEC61000-4-11:2004Ed.2)
	>95% drop, 10 mS - Perf. B
	30% dip 0.5 S - Perf. C
Test: Standard:	>95% drop, 5 S - Perf. C

	Equipment	Manufacturer	Model Number	Calibration Due	Serial Number
Generator	UCS	EMTest	UCS 500M4	N/A	0800-45

Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensaray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

Injection Line	Test Number	DIP	Time	Stated Criteria	Comments / DUT Response	Pass / Fail	Filename	Picture
Power line	1	100% 0 V	10 ms	B	No degradation of performance observed	Pass		Yes
	2	30% 161 V	500 ms	C	No degradation of performance observed	Pass		
	3	100% 0 V	5 second	C	Computer restarted. Product worked after test.	Pass		

Deviations from Standard: None

Voltage Sag and Interrupts Immunity Photographs



Magnetic Field Immunity Information

The client provided the test modes, configurations, and operational settings for the DUT and any supporting equipment.

The DUT and the AE that is designated to be placed in the measurement area were placed 10 cm from its neighboring device.

The DUT and the AE were operated in the modes specified by the client while the susceptibility was measured.

The field was calibrated to a uniform field as per the requirements within IEC61000-4-8. The power required to produce this field was recorded for playback when the DUT is placed near the magnetic coil.

The DUT and its system was exposed to the magnetic field in the x-axis, the y-axis, and the z-axis. This was accomplished by moving the transmitting magnetic coil along the 3 orthogonal planes of the DUT system.

Device Under Test	Model 819
Functional Description of DUT	16-channel H.264 PCIe encoder multifunctional audio/video codec capable of simultaneous capture from 16 video and 16 audio inputs
Serial Number	515183
I/O Ports Populated for test	1) Model 819 Interface 2) Video Camera
Clock Frequencies (>9kHz)	27 MHz
Modes of Operation	Receiving video signals
Operating System	Windows 7
Exercising Software	819 Demo Application Version 1
Power Supply Voltage, Frequency	120 V 60 Hz / 230 V 50 Hz
Test Level	3 A/m

Purpose

The purpose of the testing is to determine if the Model 819 is compliant to electromagnetic immunity limits as specified by EN55024:2010(CISPR24ED.2:2010) to support compliance to the European Union EMC Directive 2004/108/EC.

The magnetic field immunity test was performed using the parameters above. If any work was done to investigate a worst-case setup, the worst-case setup would be listed.

DUT Modifications

No modifications were done to the DUT. No EMI suppression was added to the cabling. The DUT was tested as delivered to EMI.

Magnetic Field Immunity Results

Test Standard: EN61000-4-8:2010(IEC 61000-4-8:2009Ed.2)

Magnetic Field Immunity:DUT performed to Criteria A

Cables

Type of Cable	Shield?	Length (m)	Ferrite?	Shipped with Product?	Connection 1	Connection 2
Audio cable	No	6 Feet	N/A	No	EUT	iPod
Headset	No	8 Feet	N/A	No	EUT	Headset

Magnetic Field Immunity Data Sheet


ElectroMagnetic Investigations, LLC

Magnetic Immunity Test Sheet

Revision 08

Job Reference Number: SEN20130502
 Test Date: 6-May-2013
 Location: Hillsboro

Temperature (°F): 70
 Relative Humidity (%): 30
 Barometric Pressure: 30

Device Under Test (DUT): Model 819
 Serial Number: 515183
 Voltage/Freq: 230 V 50 Hz
 Test Operator: Ryan Benitez


Product Standard: EN55024:2010(CISPR 24Ed2:2010)
 EN61000-4-8:2010(IEC 61000-4-8:2009Ed.2)
 3 A/M, 50 Hz & 60 Hz
 Test Standard: Performance A

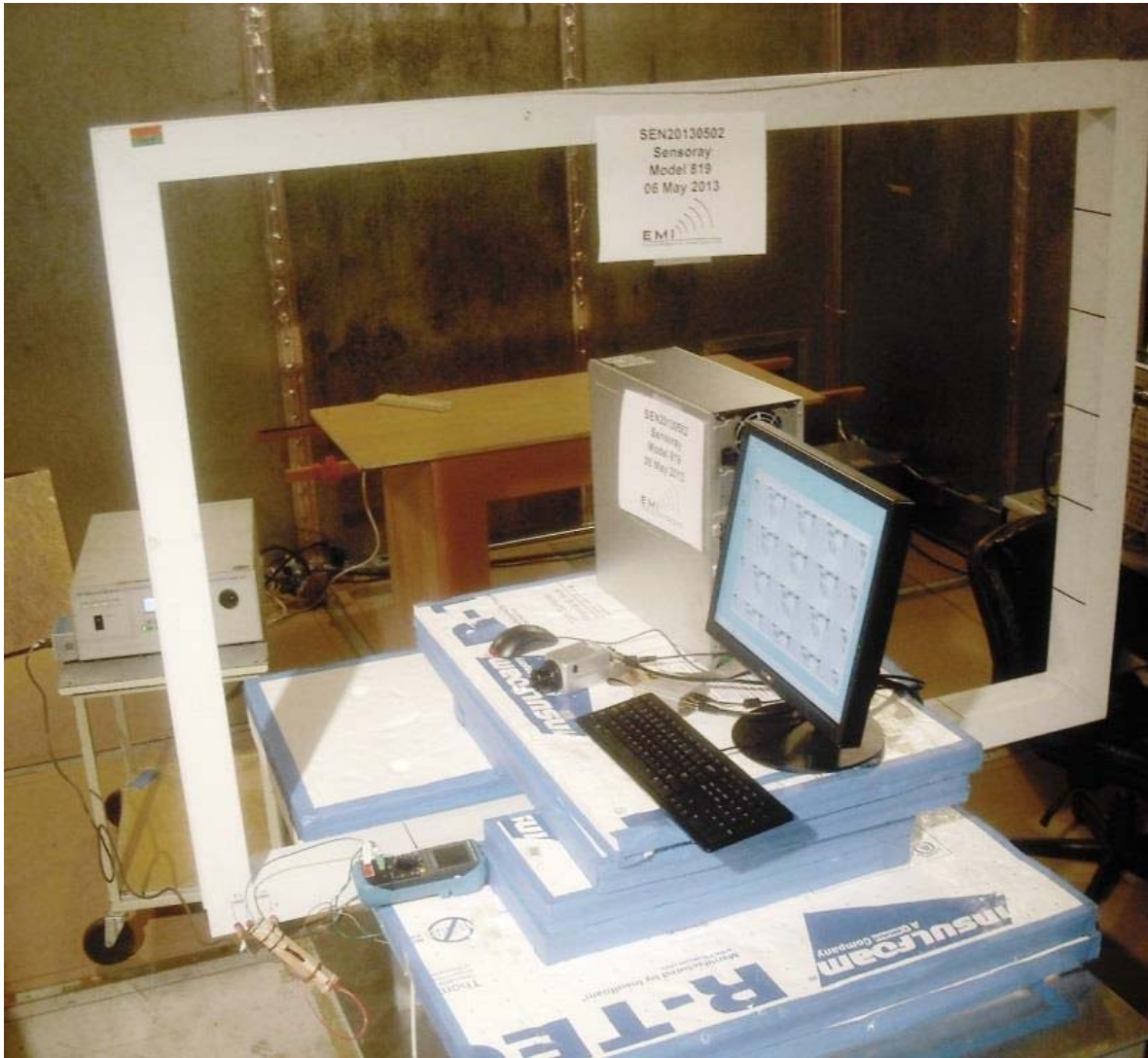
	<u>Equipment</u>	<u>Manufacturer</u>	<u>Model Number</u>	<u>Calibration Due</u>	<u>Serial Number</u>
Generator	AC Source	N/A	N/A	N/A	N/A
Current Loop	Mag1	EMI	N/A	N/A	N/A

Support Equipment	Manufacturer	Model Number	Serial Number	In Test Area
Computer	HP	DC7900	C1292386	Yes
Keyboard	Dell	KB213P	A00	Yes
Mouse	MicroSoft	Wheel Mouse Optical	4335427-1	Yes
Termination Box	Sensoray	817TA	None	Yes
Camera	Samsung	SCC-B2335	ZAPL6B2Z301157P	Yes
Monitor	Sony	SDM-S204	9200283	Yes

DUT Face Tested	Field	Frequency	Current	Voltage	Comments / DUT Response	Criteria	Pass / Fail	Picture
Front to back	3 A/m	60 Hz	105.1 mA	10.7 Vac	No degradation of performance observed	A	Pass	Yes
Side to side	3 A/m	60 Hz	105.1 mA	10.7 Vac	No degradation of performance observed	A	Pass	
Top to bottom	3 A/m	60 Hz	105.1 mA	10.7 Vac	No degradation of performance observed	A	Pass	Yes
Front to back	3 A/m	50 Hz	112.3 mA	11.3 Vac	No degradation of performance observed	A	Pass	
Side to side	3 A/m	50 Hz	112.3 mA	11.3 Vac	No degradation of performance observed	A	Pass	Yes
Top to bottom	3 A/m	50 Hz	112.3 mA	11.3 Vac	No degradation of performance observed	A	Pass	

Deviations from Standard: None

Magnetic Field Immunity Photographs



Appendix A: Performance Criteria

During the immunity testing, the Device under test is observed for variances beyond what is considered normal. The client is ultimately responsible for the compliance of the DUT and its supporting system. However, ElectroMagnetic Investigations tries to indicate to the client the performance of the product. In the case where the referenced standard specifies the acceptable deviations, the performance criteria noted within this report corresponds to it. In the case that the customer specifies the acceptable performance, ElectroMagnetic Investigations simply reports as per the test plan.

In general, the test performance criteria follows the pattern listed.

Performance Criteria A

- The DUT does not have any noticeable deviations in its performance before, during or after the application of the EMC test.
- If a range of performance is specified as normal operation, the DUT did not have any readings outside of this range before, during or after the application of the EMC test.

Performance Criteria B

- The DUT does not have any deviations of performance before or after the application of the EMC test, but during the application a deviation is noted that is not considered normal operation. When the EMC test is paused or completed the DUT recovered on its own and did not require any user intervention to return it to normal operation.
- If a range of performance is specified as normal operation, the DUT's performance was outside of this range during the application of the test, but recovered on its own and operated within its normal range after the application of the EMC test.
- No permanent damage occurred to the DUT or any AE as a result of the disturbance.

Performance Criteria C

- The DUT was operating normally before the application of the EMC test, but during the application, the DUT stopped operating normally, and did not recover after the application of the EMC test until an operator intervened. This includes but is not limited to:
 - Power cycling the DUT,
 - Restarting the exercising software on the DUT, and

-
- Unplugging and replugging the DUT or any AE.
 - The act of “recovering” the DUT must be something that could be accomplished by the customer with little training.
 - No permanent damage occurred to the DUT or any AE as a result of the disturbance.

Performance Criteria D

- The DUT was operating normally before the application of the EMC test, but could not be made to function normally after the completion of the test.
- The recovery of the DUT took significant expertise to return to normal operation.
- There was permanent damage to the DUT during the application of the EMC test.