

# ENERGY STAR\* for Computer Servers Version 2.0 Test Report

**Manufacturer's EPA Partner name:**

Bytespeed LLC

**Address:**

3131 24<sup>th</sup> Ave S.

Moorhead, MN 56560

**Product Description:**

1 Socket Server

**Product Family Name/Brand:**

Accel

**Product Model Number:**

R1-12RP-R

**Report Number:**

BytespeedFMESCR022616-1a

**Date Test Completed:**

~~February 24, 2016~~

March 2, 2016

ADC Eco Smart  
FM Lab

1900 Prairie City Rd.  
Folsom, CA 95630

EPA Lab Code:  
1108769



**Did SUT Meets all applicable ENERGY STAR\* ver 2.0 Program Requirements – Yes**



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## Report Review

To ensure the quality and accuracy of this document, the contents and test data have been thoroughly reviewed by the following qualified personnel from the Intel ASMO ADC Folsom Laboratory.

Tested By:	Robert Nielsen ADC Eco Smart FM Lab Technician <del>February 26, 2016</del> March 2, 2016	Signature :
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Test Approved:	Stephen Eastman Technical / Quality Manager <del>February 26, 2016</del> March 2, 2016	Signature :
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For more information, visit <http://www.energystar.gov/>

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# 1 System Under Test

## 1.1 System Under Test (SUT) Configuration

The SUT was tested as a product family with multiple configurations tested. Below is a list of all tested hardware for the configurations tested. The “Category” columns were defined by EPA as part of the spec for the 5 configuration needed for a Product Family under Computer Servers. These “Category” columns show what components were tested to define each tested configuration.

Table 1 System Under Test (SUT) Configuration

Component	Qty	Manufacturer	Model	Serial # & Notes	Category <sup>1</sup>					
					LE Perf	HE Perf	Typ Cfg	Min Pwr	Max Pwr	w/ APA
<b>Total System</b>	1	Byte Speed	Accel R1-12RP-R	Serial # 2015-12-9863	ALL					
<b>Chassis</b>	1	Intel	R1304		ALL					
<b>Chassis Fan 1</b>	2	Nidec*	V40W12BGA5-07A01	Front	X	X	X	X	X	
<b>Chassis Fan 2</b>	1	Delta*	FFB0412UHN	Front	X	X	X	X	X	
<b>Power Supply</b>	2	Delta*	DPS-500WB-1 A	80 Plus Gold <a href="http://www.plugloadsolutions.com/psu-reports/DELTA%20ELECTRONICS.%20INC.%20DPS-500WB%20X%20450W%20SQ-502%20Report.pdf">http://www.plugloadsolutions.com/psu-reports/DELTA%20ELECTRONICS.%20INC.%20DPS-500WB%20X%20450W%20SQ-502%20Report.pdf</a>	X	X	X	X	X	
<b>Motherboard</b>	1	Intel	S1200V3RPM		ALL					
<b>LAN</b> (On motherboard)	2	Intel	I210 Gigabit LAN	EEE = Yes, 1 GB/s each	ALL					
<b>Processor 1</b>	1	Intel	Xeon E3-1231 v3	4 Cores, 3.8 GHz	X		X	X		
<b>Processor 2</b>	1	Intel	Xeon E3-1271 v3	4 Cores, 4.0 GHz		X			X	
<b>Memory</b>	4	Kingston*	KVR16LE11/8I	Total Memory = 32 GB	16	16	32	8	32	
<b>Hard Disk Drive 1</b>	4	Western Digital*	WD2000FYYZ	Total Size = 8 TB (each drive 2 TB)	X	X	X	X	X	
<b>DVD / CD-RW 1</b>	1	Teac*	DV-28S-AZ3		X	X	X	X	X	
<b>BIOS Version</b>	S1200RP.86B.03.02.0003									
<b>O/S</b>	Microsoft* Windows* Server 2012									

## 1.2 ENERGY STAR\* for Computer Servers Version 2.0 SUT Category

Summary of data that affects category definition for Energy Star for Computer Servers Version 2.0 based on Section 3.6 – Table 3.

Table 2 SUT Category definition

Category	B
Max Possible # of Installed Processors	1
Managed Server	Yes
<b>Base Idle State Power Allowance</b>	<b>57</b>



### 1.3 Other System Characteristics

ENERGY STAR\* for Computer Servers requires a few other system characteristics to be reported

Table 3 Other System Characteristics

Power Management Feature	Setting
Product Type	1 Socket Server (not Blade or Multi-Node)
Form Factor	1U Rack Mount
Available Processor Sockets	1
Available DIMM Slots / Max Memory Capacity	4 / 32GB
ECC and/or Fully Buffered DIMMs	ECC UDIMM
Available Expansion Slots	1
Minimum # of Hard Drives	1
Maximum # of Hard Drives	4
Redundant Power Supply Capable?	Yes
Minimum # of Power Supplies	1
Maximum # of Power Supplies	2
Input Power Range (AC or DC)	100VAC – 127VAC & 200VAC – 240VAC
Operating Systems Supported	Microsoft* Windows* Server 2012
Installed Operating System for Testing	Microsoft* Windows* Server 2012

### 1.4 Power Management Features

Below is a list of the Power Management Features included in this Computer Server that help the server to save power.

Table 4 Power Saving Features

Power Management Feature	Setting
CPU Power and Performance	Balanced Performance
Dynamic Voltage and Frequency Scaling	Enhanced Intel SpeedStep® Technology
Processor or Core Reduced Power States	Processor C6 State Enabled
Power Capping	End User Enabling required with Intel Node Manager
Variable Speed Fan Control Based on Power or Thermal Readings	Yes
Operating System Power Plan	Balanced
PCI Link State Power Management	Moderate power savings
USB Selective Suspend	Enabled



## 2 Test & Support Equipment and Setup

The ASMO ADC Folsom Laboratory has three distinct hardware setups. The setup used for this test was Setup # 1. The specific equipment information and calibration dates for the setup used during this testing are listed below.

### 2.1 Test and Support Equipment

Table 5 **Setup #1 - Test Equipment**

Equipment Type	Manufacturer	Model Number	Calibration # / Serial Number	Calibration Date	Calibration Due
AC Source	Chroma*	61603	61-6353	11/12/2015	11/11/2016
Power Analyzer	Yokogawa*	WT500	61-6815	02/27/2015	02/26/2016
Temp, Humidity device	Fluke*	1620a	61-7046	03/16/2015	03/14/2016
AC Measurement Test Fixture	Chroma*	A662003	A66200300122	N/A	N/A
Network Routing Switch	Netgear*	GS105	1FD1755N00BD6	N/A	N/A
LCD Display	VeiwSonic VX2270SMH-LED*	VS15052	TFA142042628	N/A	N/A
USB Mouse	Dynex*	DX-WMSE	7E15A009338	N/A	N/A
USB Keyboard	Logitech*	Y-UM76A	BT652D55402	N/A	N/A

Table 6 **Other Test Equipment**

Equipment Type	Manufacturer	Model Number	CCN # / Serial Number	Calibration Date	Calibration Due
Temp, Humidity device (SERT Only)	Watchport	(1P) 50000825-01	V73192285	N/A	N/A

## 3 Test Procedure

The test data provided in this report was completed in compliance with the test procedure detailed in ENERGY STAR\* Program Requirements for Computer Servers Version 2.0, Test Method (rev. April 2013).



## 4 Test Results

Results gathered during testing of the documented SUT are as follows.

Table 7 Idle Power Specification Limit Calculation

Configuration	Low End Perf.	High End Perf	Typical Config	Min Power	Max Power
<b>Category</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>	<b>B</b>
<b>Base Idle State Power Allowance</b>	57.0	57.0	57.0	57.0	57.0
Additional Power Supplies	20	20	20	20	20
Internal Storage	24	24	24	24	24
Additional Memory	9	9	21	3	21
Additional Buffered DDR Channel	0	0	0	0	0
Additional I/O Devices	0	0	0	0	0
<b>Final Idle Power Allowance for Tested Configuration</b>	<b>110</b>	<b>110</b>	<b>122</b>	<b>104</b>	<b>122</b>

Table 8 AC Power Measurements

	Low End Perf.	High End Perf	Typical Config	Min Power	Max Power
<b>Idle (Watts)</b>	62.83	61.91	61.71	61.38	63.62

Table 9 Test Conditions

	Low End Perf.	High End Perf	Typical Config	Min Power	Max Power	2.0 Spec
AC Supply Voltage	114.95 V	114.94 V	114.95 V	114.94 V	114.94 V	115V ( $\pm 1\%$ ) <sup>1</sup>
AC Supply Frequency	59.98 Hz	59.98 Hz	59.98 Hz	59.98 Hz	59.98 Hz	60 Hz ( $\pm 1\%$ )
THD - Voltage	0.169 %	0.168 %	0.168 %	0.168 %	0.169 %	< 2% THD <sup>2</sup>
Ambient Temperature	23.6 °C	23.8 °C	23.7 °C	23.6 °C	23.4 °C	23°C $\pm$ 5°C
Relative Humidity	34.6 %	31.7 %	36.2 %	32.6 %	34.7 %	10 – 80 %

Notes:

<sup>1</sup> - For products rated for > 1.5 kW maximum power, the voltage range is  $\pm 4\%$

<sup>2</sup> - <5% for products which are rated for > 1.5 kW maximum power



## 4.1 SERT Results

Results gathered during testing of the documented SUT with performance benchmark – SERT v1.1.0. Results were gathered for each tested Configuration

Table 10 SERT Test Results - Low End Performance

Workload	Worklet	Normalized Peak Performance	Lowest Load Level (Watts)	Highest Load Level (Watts)	$\Sigma$ Normalized Performance	$\Sigma$ Power (Watts)	Efficiency Score
CPU	Compress	6.16	69.3	130.5	15.28	382.4	<b>39.956</b>
	CryptoAES	35.033	69.2	124	87.226	372.6	<b>234.092</b>
	LU	8.012	71.1	134.5	20.272	407.1	<b>49.792</b>
	SOR	5.374	68	115.6	13.407	359.5	<b>37.295</b>
	XMLvalidate	6.047	69.9	133.5	15.082	392.7	<b>38.41</b>
	Sort	5.458	68.7	122.3	13.616	373.5	<b>36.458</b>
	SHA256	5.132	68.4	118.7	12.837	364.9	<b>35.176</b>
Storage	Sequential	25.06	65.1	69.4	37.479	134.5	<b>278.729</b>
	Random	9.22	64	65.5	13.823	129.6	<b>106.689</b>
Hybrid	SSJ	6.666	66	123.3	29.832	707.5	<b>42.166</b>
Memory	Flood2	2.843	106.9	107.7	4.269	214.6	<b>19.891</b>
	Capacity2	12.112	132.3	133.2	70.593	1,193.60	<b>59.141</b>
Idle	Idle	n/a	61.3	61.3	n/a	61.3	n/a

Table 11 SERT Test Results - High End Performance

Workload	Worklet	Normalized Peak Performance	Lowest Load Level (Watts)	Highest Load Level (Watts)	$\Sigma$ Normalized Performance	$\Sigma$ Power (Watts)	Efficiency Score
CPU	Compress	6.425	73.3	138.5	15.985	404.9	<b>39.475</b>
	CryptoAES	36.409	72.6	131.8	90.38	393.4	<b>229.728</b>
	LU	8.503	75.7	145.4	21.464	435.7	<b>49.264</b>
	SOR	5.675	71.1	123.9	14.161	380.6	<b>37.208</b>
	XMLvalidate	6.332	73.7	142.3	15.864	417.1	<b>38.033</b>
	Sort	5.775	71.8	129.9	14.412	394.4	<b>36.541</b>
	SHA256	5.402	71.6	125.7	13.476	384.4	<b>35.056</b>
Storage	Sequential	25.088	66.2	70.6	37.555	136.8	<b>274.577</b>
	Random	9.181	64.9	66.6	13.781	131.5	<b>104.802</b>
Hybrid	SSJ	6.857	67.3	130.8	30.565	738	<b>41.414</b>
Memory	Flood2	2.846	109.4	112.4	4.269	221.8	<b>19.247</b>
	Capacity2	12.819	137.7	140.4	73.819	1,246.20	<b>59.235</b>
Idle	Idle	n/a	62.5	62.5	n/a	62.5	n/a





Table 12 SERT Test Results - Typical Configuration

Workload	Worklet	Normalized Peak Performance	Lowest Load Level (Watts)	Highest Load Level (Watts)	∑ Normalized Performance	∑ Power (Watts)	Efficiency Score
CPU	Compress	6.165	70.9	131.7	15.375	387.9	39.638
	CryptoAES	35.734	71	127.4	88.806	383.9	231.342
	LU	8.061	72	134.5	20.337	411	49.483
	SOR	5.378	68.9	116.4	13.429	363.4	36.955
	XMLvalidate	6.041	71.2	134.8	15.117	397.7	38.015
	Sort	5.477	70.3	124.2	13.66	381.2	35.839
	SHA256	5.095	69.8	120.1	12.745	371	34.355
Storage	Sequential	24.981	65.9	70.5	37.554	136.4	275.423
	Random	9.231	64.7	66.3	13.834	130.9	105.675
Hybrid	SSJ	6.888	66.6	127.2	30.787	727.7	42.311
Memory	Flood2	3.994	109.7	110.2	6.002	219.9	27.293
	Capacity2	16.885	133.2	134.6	110.426	1,205.90	91.572
Idle	Idle	n/a	61.7	61.7	n/a	61.7	n/a

Table 13 SERT Test Results - Minimum Power

Workload	Worklet	Normalized Peak Performance	Lowest Load Level (Watts)	Highest Load Level (Watts)	∑ Normalized Performance	∑ Power (Watts)	Efficiency Score
CPU	Compress	4.741	67	123.4	11.772	354.8	33.178
	CryptoAES	22.864	66	114.9	56.834	332.2	171.101
	LU	7.973	70.4	133.6	20.144	403.7	49.896
	SOR	5.373	67.6	115.3	13.401	357.1	37.527
	XMLvalidate	5.763	68.9	132.7	14.362	384.7	37.333
	Sort	5.486	68.1	121.9	13.68	372	36.779
	SHA256	5.075	67.7	118.3	12.692	363.6	34.901
Storage	Sequential	24.955	64.8	68.9	37.43	133.7	279.911
	Random	9.199	63.8	65.3	13.792	129.1	106.868
Hybrid	SSJ	5.119	64.2	114.9	22.797	649.3	35.113
Memory	Flood2	1.032	97.9	98.9	1.55	196.8	7.876
	Capacity2	6.502	124.4	129.2	35.233	1,129.00	31.207
Idle	Idle	n/a	60.9	60.9	n/a	60.9	n/a



Table 14 SERT Test Results - Maximum Power

Workload	Worklet	Normalized Peak Performance	Lowest Load Level (Watts)	Highest Load Level (Watts)	∑ Normalized Performance	∑ Power (Watts)	Efficiency Score
CPU	Compress	6.421	73.1	138.8	15.943	405.1	39.355
	CryptoAES	36.649	73.2	132.9	91.106	398.1	228.857
	LU	8.533	75	145.4	21.477	434.1	49.477
	SOR	5.679	71.4	123.2	14.159	381.3	37.131
	XMLvalidate	6.362	75.1	144.3	15.943	423.6	37.633
	Sort	5.787	72.7	130.5	14.439	398.1	36.268
	SHA256	5.392	72.2	126.6	13.435	388.6	34.571
Storage	Sequential	24.94	66.8	71.5	37.483	138.4	270.913
	Random	9.182	65.4	67.1	13.792	132.5	104.099
Hybrid	SSJ	6.987	68	132.6	31.276	754.4	41.457
Memory	Flood2	3.951	111.9	112.9	5.938	224.8	26.417
	Capacity2	18.007	139.7	142.4	115.558	1,266.50	91.24
Idle	Idle	n/a	62.3	62.3	n/a	62.3	n/a

#### 4.2 Temperature & Airflow Testing Results

Table 15 Temperature & Airflow Testing Results

Type of Data	Results	Units
Delta Temperature for Typical or Single Configuration (active – peak)	21.38	°C
Airflow at Peak Temperature Typical or Single Configuration (active – peak)	32	CFM
Airflow at Nominal Temp. Typical or Single Configuration (Idle)	24	CFM
Inlet Air Temp. at Start of Test Typical or Single Configuration (Idle)	22.44	°C
Inlet Air Temp. End Idle Test Typical or Single Configuration (Idle)	22.38	°C
Inlet Air Temp. End Active Test Typical or Single Configuration (active)	22.58	°C

Configuration	Low End Perf.	High End Perf	Typical Config	Min Power	Max Power
Delta Temperature, Exhaust – Peak (active - peak)	25.7°C	24.1°C	21.4 °C	26.9°C	23.1°C
Airflow at Peak Temperature (active - peak)	34 CFM	38 CFM	32 CFM	30 CFM	38 CFM
Airflow at Nominal Temp. (Idle)	24 CFM	24 CFM	24 CFM	24 CFM	24 CFM
Inlet Air Temp. at Start of Test (Idle)	22.6°C	23.2°C	22.4 °C	22.9°C	22.5°C
Inlet Air Temp. End Idle Test (Idle)	22.5°C	22.8°C	22.4 °C	22.5°C	22.7°C
Inlet Air Temp. End Active Test (active)	22.9°C	22.9°C	22.6 °C	23.2°C	22.5°C

**4.3 Additional Idle Power Allowance Calculations**

- Additional Power Supplies = 20 watts per Power Supply
  - Example Calculation – System has 2 redundant power supplies; 1<sup>st</sup> power supply is required, 2<sup>nd</sup> power supply is for redundancy; 1 x 20 = 20 Watts
- Internal Storage (Hard Drives or Solid State Drives) = 8.0 watts per Storage Drive
  - Example Calculation – System has 10 storage drives; 10 x 8 = 80 Watts
- Additional Memory Adder = 0.75 Watt per GB over base of 4GB
  - Example calculation – System has 32 GB of memory; (32 – 4) \* 0.75 = 21 Watts
- Additional Buffered DDR Channel = 4.0 watts per Buffered DDR Channel
  - Resilient Servers Only
  - Installed buffered DDR Channels greater than 8 channels
  - Example Calculation – System has 16 buffered DDR channels; (16 - 8) x 4 = 32 Watts
- Additional I/O Devices –
  - Installed Devices greater than 2 ports of ≥ 1 Gbit, onboard Ethernet
  - < 1 Gbit – No allowance
  - = 1 Gbit – 2.0 Watts per Active Port
  - > 1 Gbit and < 10 Gbit – 4.0 Watts per Active Port
  - ≥ 10 Gbit – 8.0 Watts per Active Port

Table 16 **Additional I/O Devices**

Additional I/O Devices	Allowance	# Installed	Allowance (Watts)
< 1 Gbit	No allowance	0	
= 1 Gbit	2.0 Watts per Active Port	2	0
> 1 Gbit and < 10 Gbit	4.0 Watts per Active Port	0	0
≥ 10 Gbit	8.0 Watts per Active Port	0	0
		Total	0

## 5 SUT Pictures

Picture #1 – System Front



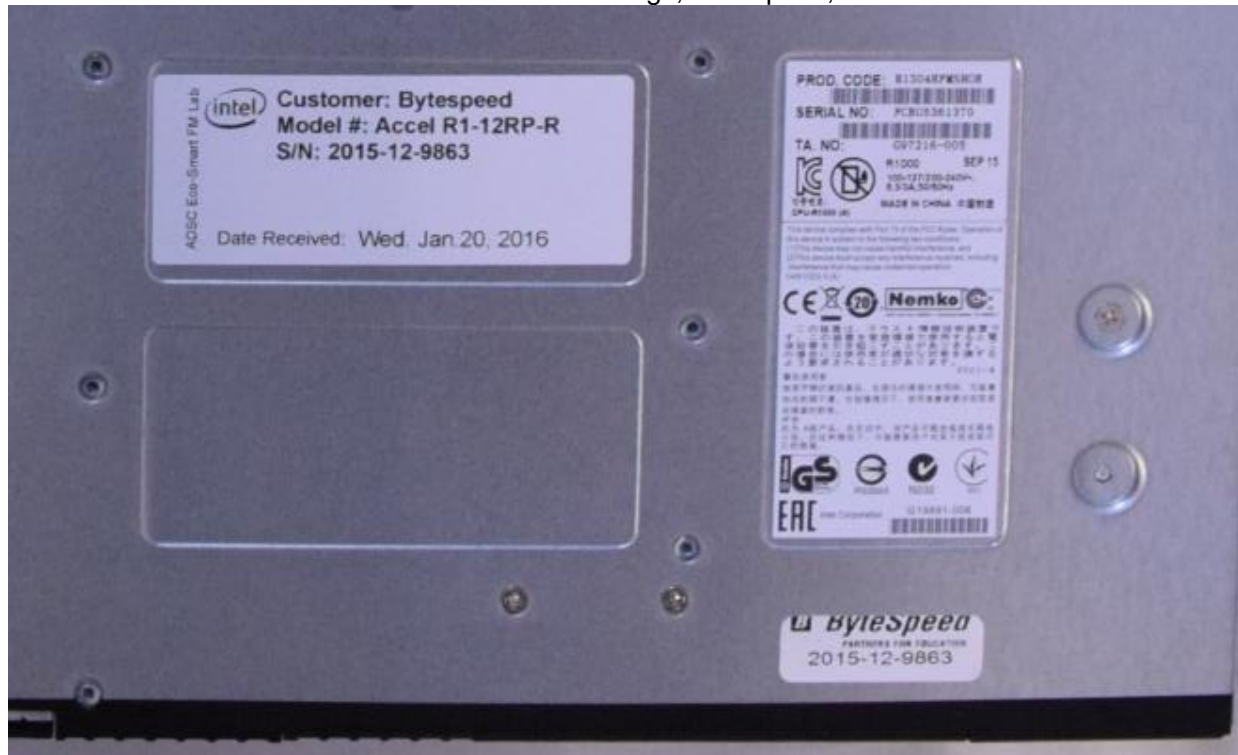
Picture #2 – System Rear



Picture #3 – System Open



Picture #4 – Label / Markings, Nameplate, Serial #



Picture #5 – PSU Label

