

SAMSUNG



Samsung DDR3 and Enterprise
SSD Maximize Efficiency in
HP Servers to Accelerate ROI





The IT Challenge: Optimize Green Data Centers



In this new age of technology pervasiveness and industrial globalization, data centers have become the IT engine of major industries worldwide. Up until now, the cost of bandwidth resulted in an increase in power consumption, prompting a severe escalation in energy bills including cooling costs. From online banking to social media, datacenters face challenges as well as opportunities to rapidly adapt, expand, re-engineer and explore new architectures that help deliver top performance and bandwidth – without exceeding the power envelope.

hp Thermal Logic

REDUCE energy + RECLAIM capacity = EXTEND the life of your data center

With innovative partners such as Samsung, HP Thermal Logic delivers the Converged Infrastructure today.

- **Harness** the efficiency of Samsung Green DDR3 and Enterprise SSD:
 - Reduce: Over 70% reduction in the memory power footprint for BL2x220c G6 servers (*)
 - Extend: 27% more BL460c G6 servers can operate within the same power envelope (up to 6.5kW per 42U rack power savings (**))

(*) When compared to the HP ProLiant BL2x220c G5 Blade server using DDR2 REG PC2-5300 @ 12W per module

(**) When compared to the HP ProLiant BL460c G1/G5 Blade servers using DDR2 FBD PC2-5300 @ 12W per module

Further Benefits:

- RECLAIM: underused power capacity
- Provides 768 watts per rack in SSD power improvements, while enabling up to 80X higher IOPS performance
- Takes full advantage of an Enterprise SSD's tremendous IOPS-per-watt processing power and 4:1 replacement ratio of Hard Drives

HP ProLiant Servers Drive Data Center Efficiency

HP Thermal Logic + Samsung memory/storage solutions: Green Data Centers

HP Thermal Logic is a portfolio of embedded HP technologies, tools and products whose innovation helps to maximize data center efficiency, while accelerating ROI for HP server customers.

HP Thermal Logic helps deliver the data center of the future as part of HP's Converged Infrastructure strategy. The industry is at an inflection point where our technology is coming together to help our clients build the datacenter of the future; and it will be based on Converged Infrastructure. Over the next few months, HP will accelerate innovation, with new standards based solutions in every core area of the data center and beyond. These innovations will deliver a new level of simplicity, integration, and automation to enable our clients to focus on meeting business demand.

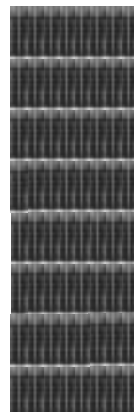
HP Thermal Logic innovation such as "Sea of Sensors", HP Dynamic power capping along with Samsung's innovative Green DDR3 low-voltage memory and Enterprise SSD drives are already delivering the data center of the future today.

With Samsung DDR3 LVDIMMS

Reduce 70% in memory power footprint



42U Rack/64 Blades



Extend 27% more BL460c G6 servers!

Power Savings: 8.5Wx12DIMMs x 64 Blades = 6.5kW/Rack

At 50% load operation (*):

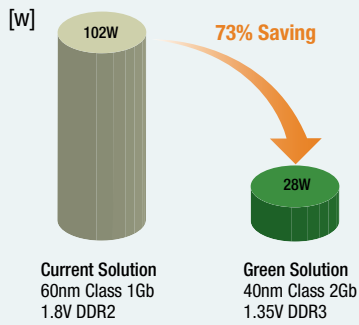
- 6.5kW/375W=17 more servers
- OR
- \$14.2K saving/year/Rack
 - 16.25kW (6.5KW + 9.75KW (cooling factor of 1.5x6.5kW))
 - 16.25kW x 24hrs x 365days x \$0.10/kWh

(*) Blade Servers/42U rack = 64 (128 server nodes), 4 Enclosures/Rack & 16 Servers/Enclosure. 750W per server @ 50% = ~375W;

BL460c G6 =12DIMMs/server

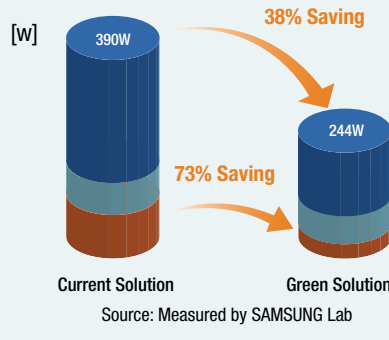
**Samsung's 40nm Class 2Gb 1.35V DDR3:
consumes 73% less power, reduces at least 38% system level power***

48GB Memory PowerSaving Comparison



*Source: Samsung

48GB based Server -System Level Power Saving



Source: Measured by SAMSUNG Lab

■ Other Power Consumption
■ CPU Power Consumption
■ Memory Power Consumption

These new servers utilize Samsung's ultra-low power, green DDR3 memory technology along with Samsung's Enterprise Solid State Drive (SSD) that drive extremely high IOPs output to enable greatly enhanced server performance, higher energy efficiency and power savings, resulting in a faster ROI.

Cool It: Samsung Green DDR3 and Enterprise SSD Solutions

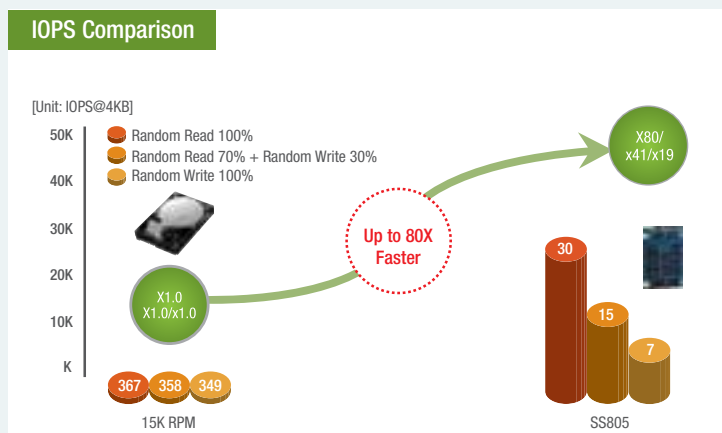
Samsung's Green DDR3 DIMMS, using advanced 40nm class, 1.35V, 2Gb based DRAM technology, offers a broad selection of low voltage dual in-line memory modules (LVDIMMs) ranging from 4GB to 32GB. Tests show that an energy-efficient memory solution uses 73% less power than its predecessor (DDR2), while increasing density, as performance doubles (with bandwidth up to 1333Mbps).

Measurements between a DDR2-based server and a DDR3-based server with Samsung 40 nm 1.35V DDR3 show that power savings at the memory level can translate into at least 38% saving at the server level (*). These savings are considerable in virtualized data center environments where high density memory server configuration can contribute to over 25% of a server's total power consumption.

Solid State Drive Integration Yields Significant Operation Efficiencies

Adding more power efficiency to the Thermal Logic equation, Samsung's 2.5-inch Enterprise Solid State Drives (SSD) enable highly reliable 24x7 performance in data centers and other server environments. Samsung's 3 Gb/sec SATA SSDs process an average of 30,000 read IOPS compared to 570 IOPS for a 15K rpm SAS HDD, while dramatically reduced power requirements. These performance-optimized Samsung Enterprise SSD processes about 22,000 read IOPS *per watt* versus 70 for a comparable 15K SAS or fibre-channel HDD, while consuming 20 percent less power than a typical enterprise HDD.

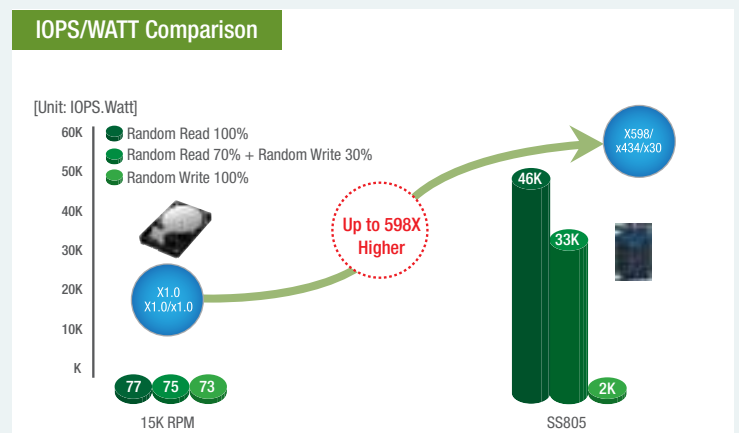
Samsung SSDs perform up to 80X faster than 15K RPM HDDs in IOPS



* SSD performance is based on testing conducted by Samsung Electronics; 15K RPM SAS HDD performance data is based on available specs.

* All results can vary based on test circumstances and preconditions.

In IOPS/Watt, Samsung SSDs up to 598x higher than 15K RPM HDD



* All SSD test results are based on measurements made by Samsung Electronics. Performance results can vary under different test conditions and changes in firmware.

* 15K RPM HDD power consumption data is based on available specs.

* Configuration:
CPU - 1.86Ghz Quad Core / HBA - PERC6.2 / RAM - DDR2 FBDIMM 4GB
OS - Windows 2003 Server / Test Program - IOMETER / Q-depth 32

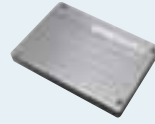
Curbing Emissions: Green IT begins with Green components

With growing government regulations around the world, IT managers must look not only at overall power consumption levels in their data centers and server farms, but also at CO2 emissions. Samsung's advanced Green DDR3 and SSD technology dramatically reduces total cost of ownership and increases ROI, while contributing a lot to saving the planet.

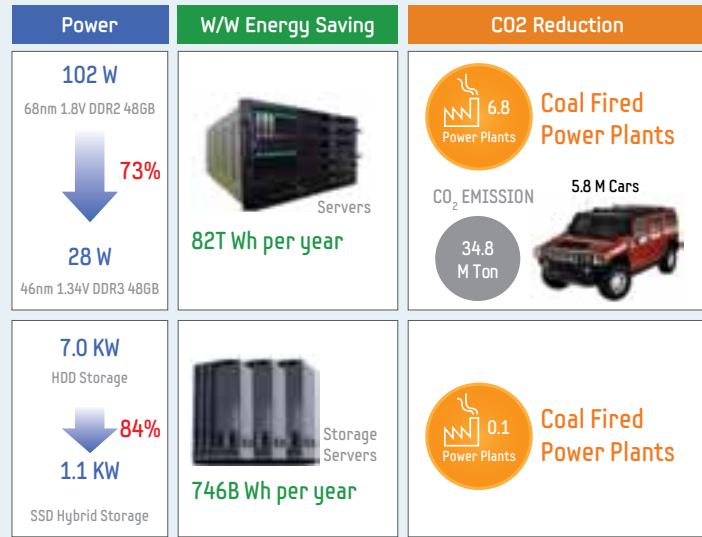
It is estimated that if the 32 million installed servers around the world was replaced with new servers operating with Samsung's Green DDR3 memory, 82 trillion watt hours of electricity could be saved. This would be equivalent to eliminating the need for 7 coal-fired power plants, reducing carbon emissions by 35 million tons or taking 5.8 million cars off the road per year.



46 nano DDR3



Green SSD



Less Energy. More Speed.



Storage Green SSD

- ~80X faster vs. 15K HDD
- < 14th the power
- Almost 600X more efficient
- Replace multiple HDDs
- Less real estate
- Fewer components
- Lower cooling costs
- 50GB and 100GB SSD

Memory Green DDR3

- Lower TCO vs. DDR2
- As high as 90% efficiency/watt
- < 0.6W/GB and 2X faster
- Lower voltage (1.35v)
- > 73% power savings
- Higher density = fewer components per footprint
- Lower cooling costs
- 1GB, 2GB, 4GB, 8GB, 16GB, 32GB DIMMs



HP Servers with Samsung DDR3 and SSD

For DDR3 LVDIMMs:

HP part numbers:

604504-B21 HP 4GB (1x4GB) Single Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit (Intel® Xeon® processors 5600 series)

604506-B21 HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit (Intel® Xeon® processors 5600 series)

604500-B21 HP 4GB (1x4GB) Single Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit (AMD Opteron™ processors 6000 series)

604502-B21 HP 8GB (1x8GB) Dual Rank x4 PC3L-10600 (DDR3-1333) Registered CAS-9 LP Memory Kit (AMD Opteron™ processors 6000 series)

SSDs

60GB

572071-B21 HP 60GB 3.0G SATA SFF (2.5-inch) Midline Solid State Drive 1yr Warranty

570761-B21 HP 60GB 3.0G SATA LFF (3.5-inch) Midline Solid State Drive 1yr Warranty

120GB

572073-B21 HP 120GB 3.0G SATA SFF (2.5-inch) Midline Solid State Drive 1yr Warranty

570763-B21 HP 120GB 3.0G SATA LFF (3.5-inch) Midline Solid State Drive 1yr Warranty



www.samsung.com/DDR3
www.samsung.com/SSD



www.hp.com/go/thermallogic
www.hp.com/products/memory