msi™

Insist on DrMOS

King of Power-saving

MSI King of Power-saving

- **What are the power-saving components and technologies from MSI?**

1. DrMOS
2. APS
3. GreenPower design
4. Hi-c CAP

- **Why should I care about power-saving?**

1. Better earth (Think about it! You can be a hero saving it !)
2. Save $$ on the electricity bill
3. Cool running boards
4. Better overclocking

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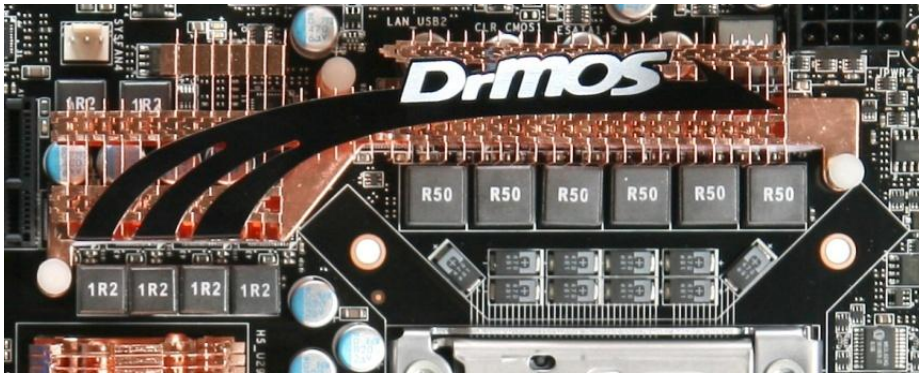
- **Is DrMOS the name of a MSI heatpipe?**



No! DrMOS is the **cool** secret **below the heatpipe**, not the heatpipe itself. Part of the heatpipe covers the PWM where the DrMOS chips are located. (PWM? That is technical stuff, right ? Now you really lost me)

- **Tell me, should I write DRMOS, Dr. MOS or Doctor Mos?**

The name comes from **Dr**iver **MOS**FET. There is only one correct way to write it; "**DrMOS**".

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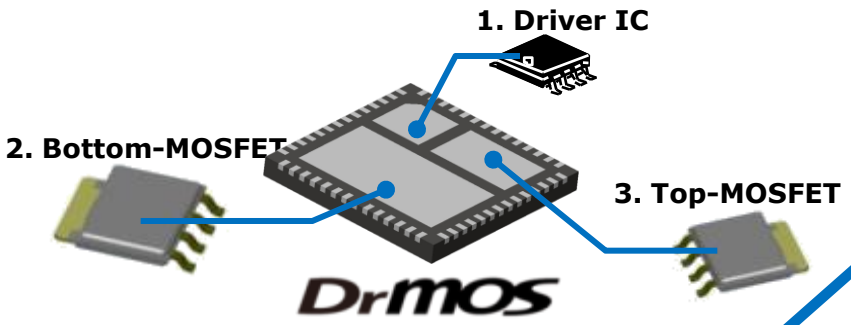
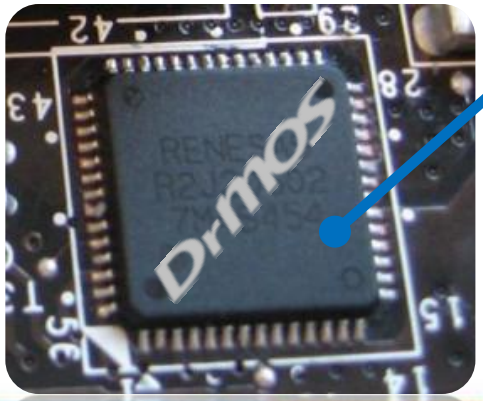
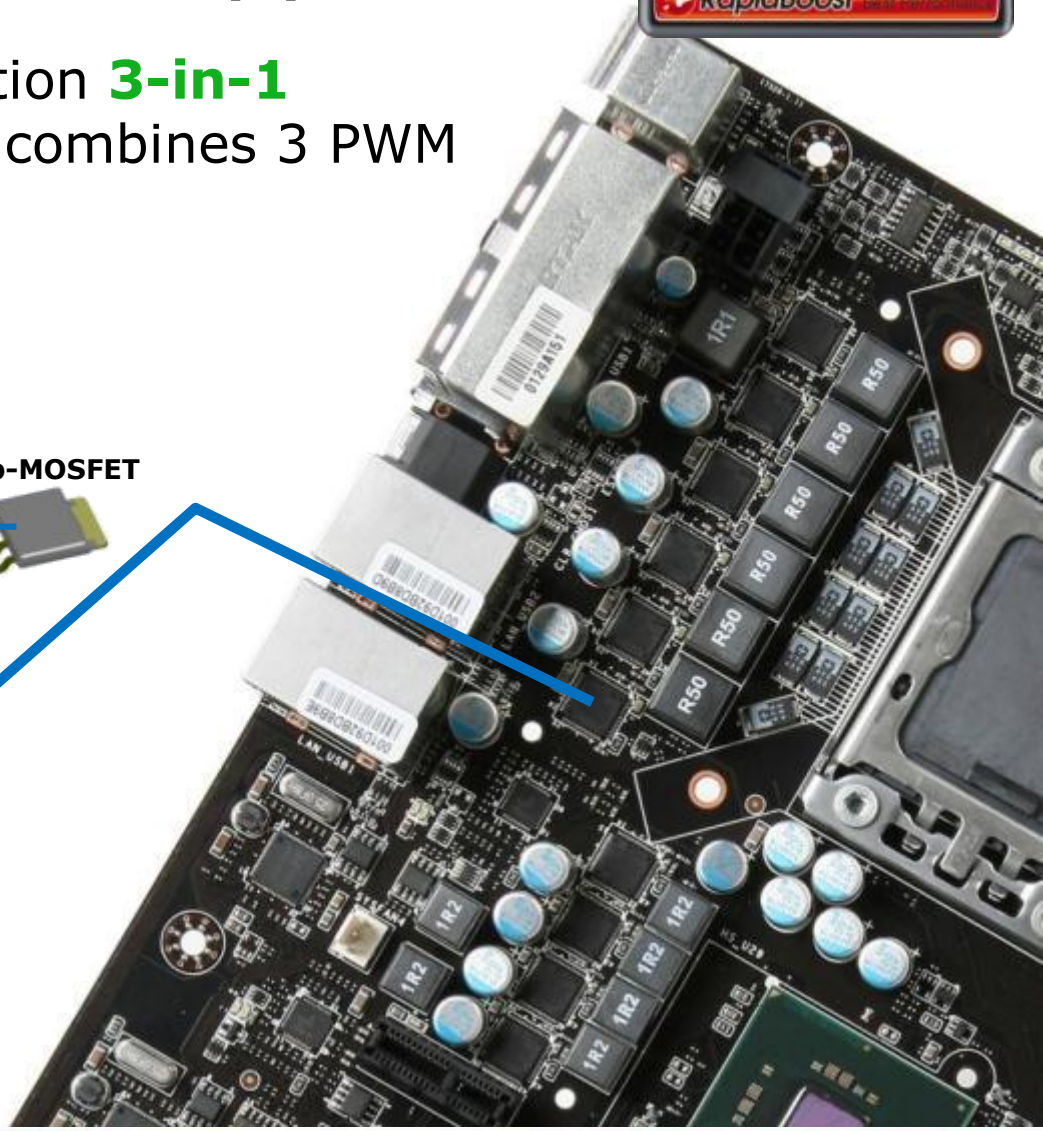
- **So DrMOS is a chip below the heatpipe?**

Yes, DrMOS is the **2nd** generation **3-in-1** integrated **Dr**iver **MOS**FET. It combines 3 PWM components in one. (Like triple core…)







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- **Is MSI the first to use DrMOS on it's products?**

DrMOS is an integrated MOSFET design proposed by Intel in 2004. The first to use a 1st generation Driver Mosfet on a 8-Phase was Asus Blitz Extreme. This 1st generation had some problems and disadvantages. These are all solved in the **2nd generation DrMOS** which we **use exclusive on MSI products**.

- **DrMOS is power efficient and stays cool, but why?**

DrMOS combines 3 components into 1 which makes it more efficient and cool, because;

- No component has 100% power efficiency
- This means more power goes in than comes out
- Wasted power becomes heat

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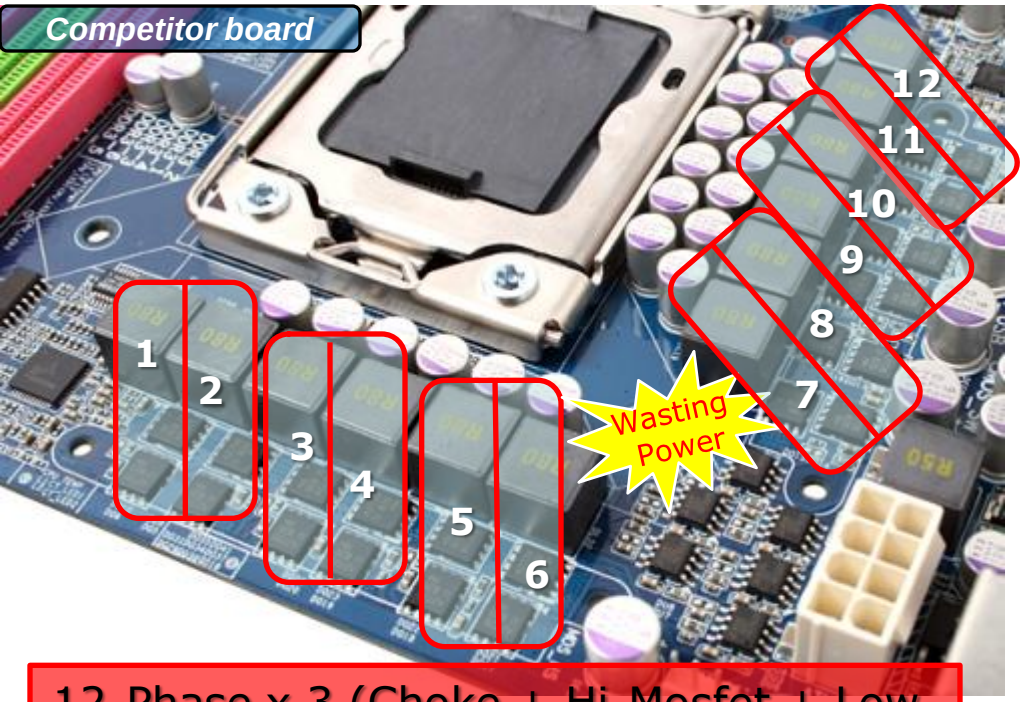
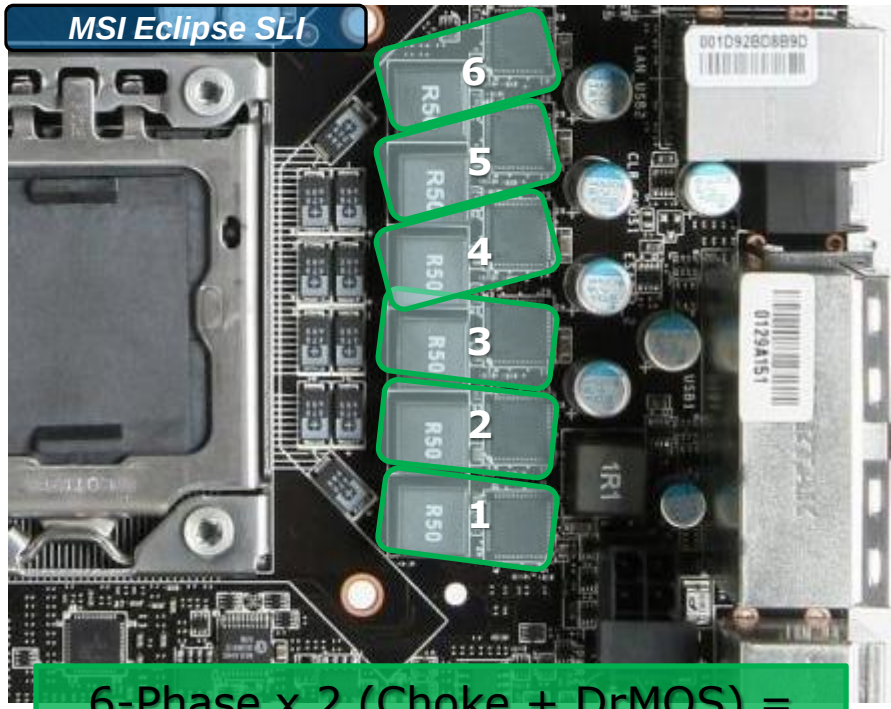
➢ **With DrMOS less is more ! Why should I care?**



12-Phase x 3 (Choke + Hi-Mosfet + Low-Mosfet) = **36 components**



6-Phase x 2 (Choke + DrMOS) = **12 components**

Less components = Less power leakage
Less power leakage = Less heat generated
Less heat = Better cooling
Better cooling = Higher overclocking

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- **MSI uses 5 or 6-Phase DrMOS, so overclocking must suck?**

No! One DrMOS chip provides much more CPU power than Power-PAK MOSFETS used by others. **With DrMOS Less = More!**

tom's hardware about overclocking P45 DrMOS:

"You'd expect the highest stable CPU clock to be reached using the 16-phase power regulator of Asus or Gigabyte, but ***instead we find MSI's 6-phase products taking first and second place.****"*

ANANDTECH about Asus P45 PWM :

"The P5Q3 may report the use of a 16-phase PWM but we know better. Although ***ASUS design engineers have added a lot of extra chokes and MOSFETS, the overall capacity of the power delivery circuit remains comparable*** *to their competitors'...*
*...****we would rather see ASUS concentrate their efforts on designing an entirely new circuit based on a true 6-phase PWM.****"*

bit-tech.net about P45 DrMOS:

Unlike Asus and Gigabyte, who seem more than content with trying to outswing each other in the more-phases-are-better e-peen department, ***MSI manages to do exactly the same as these double figure implementations with just the five phases****."*

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- **Why not include 2oz PCB copper like Gigabyte?**

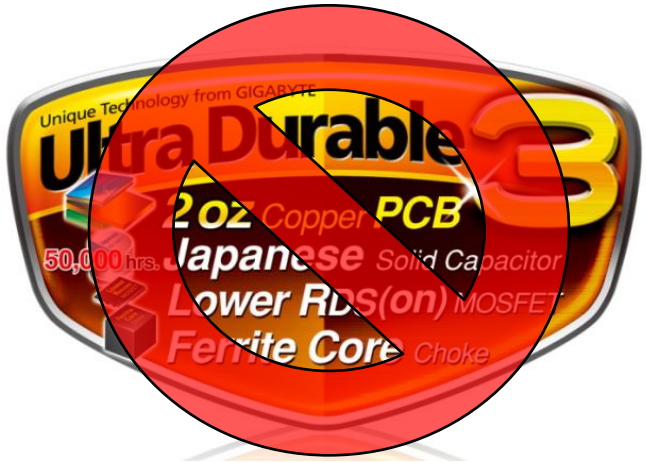
Gigabyte uses many **old generation and power wasting PWM components which generate heat** (powerloss). This heat needs to be spread out (2oz PCB copper) to prevent heat problems.

MSI DrMOS **prevents heat generation** so there is no need to cool the mainboard with 2oz copper. MSI is using **next generation, high quality components** like DrMOS and Hi-c CAP.

tom's hardware

*"**Ultra Durable 3 is a marketing buzzword**"*

*"However, the **Ultra Durable 3 technology**, which incorporates considerably more copper on the inner layers of the printed circuit board paired and high-quality components, **does not make any difference in performance or power efficiency**."*



*"**only MSI's P45 Diamond with its DrMOS** voltage regulator switching **introduces substantial savings**. Again, **Ultra Durable 3 didn't make a difference**."*

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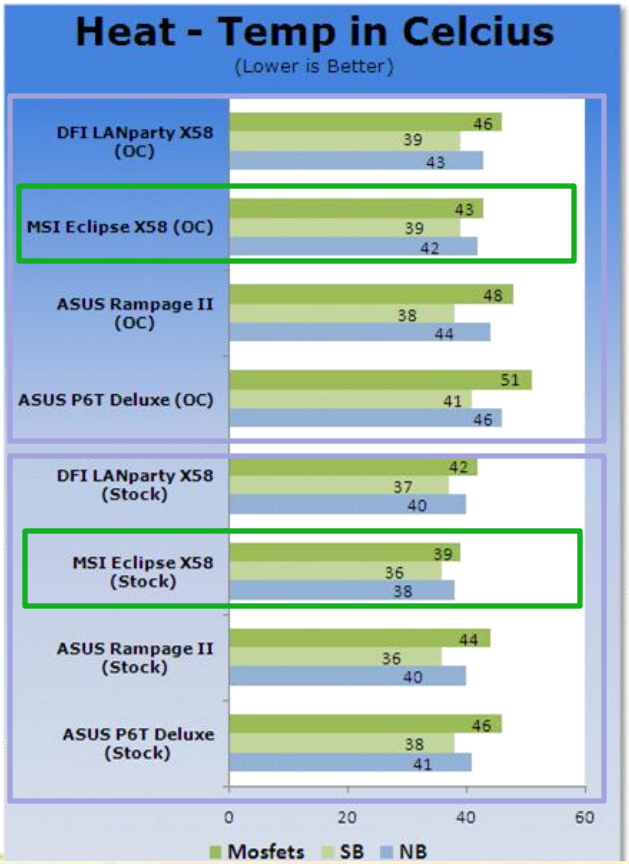
- **Less heat, smaller coolers right?**

Yep! Some MSI mainboards use the small "**DrMOS Touch**" heatsink because you can touch the **cool** DrMOS PWM without burning your fingers! (Own risk and own fingers, we aren't well insured!)



about P45 Platinum with DrMOS:

*"It was **cool to the touch** regardless of how long the system had run or how much overclocking I did.. **This was the coolest running board I've seen in some time**"*

about Eclipse SLI with DrMOS:

*"Using DrMOS, this has allowed MSI to cool the board down quite a bit. In fact, it **is the coolest running X58 we've tested so far**."*

about DKA790GX Platinum with DrMOS:

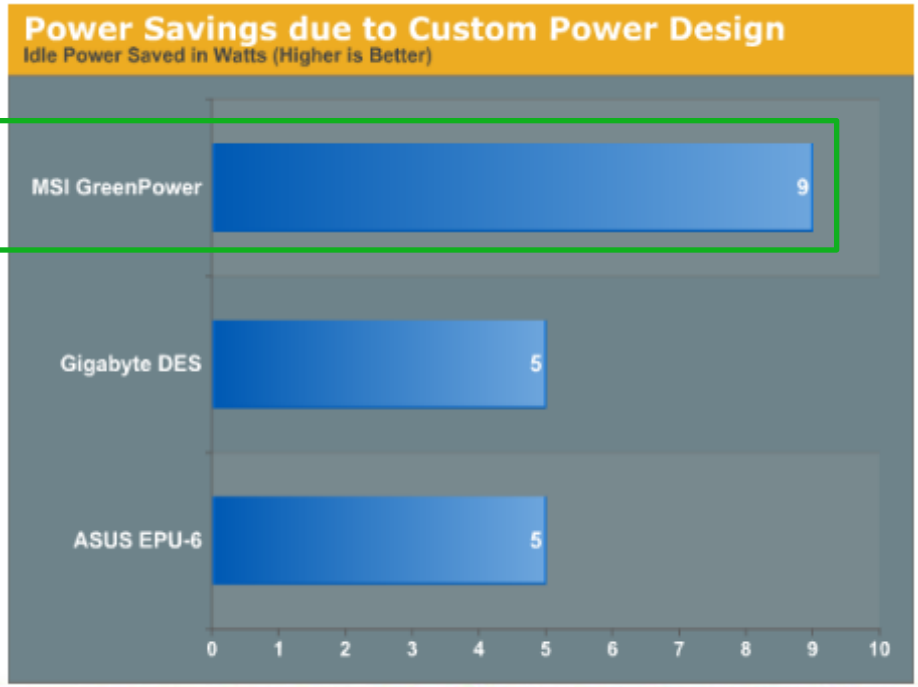
*"**It seems that in work PWM at DKA790GX Platinum is noticeably cooler** than Gigabyte solution even with Gigabyte massive full-pipe system."*

Anandtech (USA)

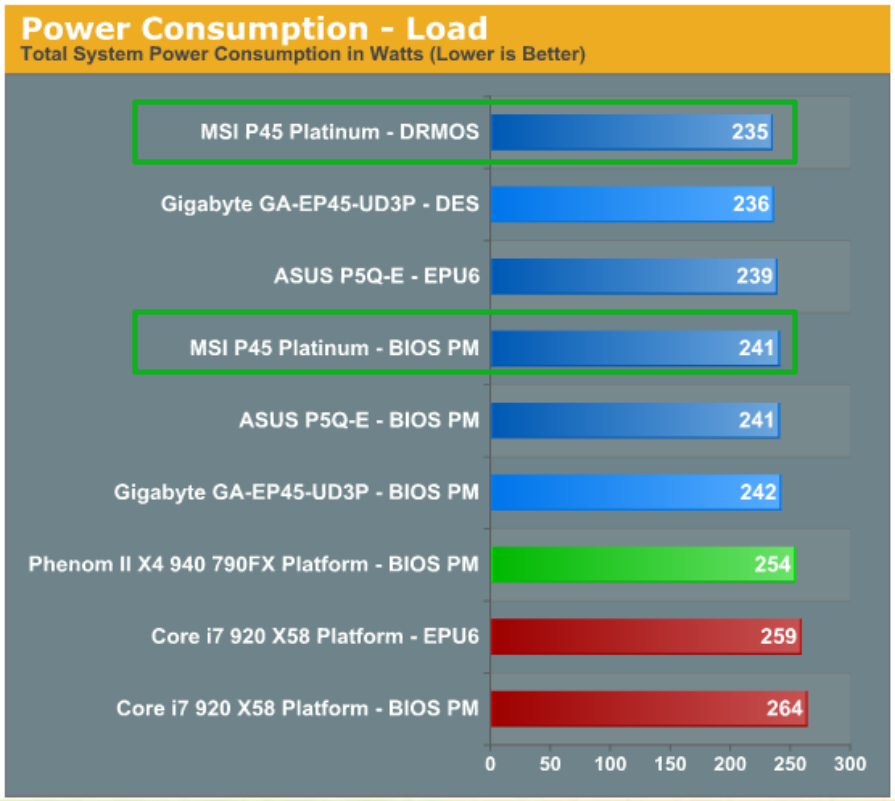
*"Our idle numbers with the power saving numbers have MSI in the lead, **something we have noticed across their DRMOS product lines**."*

ANANDTECH

*"The **MSI Greenpower system provides the greatest power savings** compared to the ASUS EPU-6 and Gigabyte DES designs at present."*



*"A six-phase power delivery design is utilized for the processor, half that of the Gigabyte and ASUS boards. However, this did **not adversely affect the overclocking capabilities of the board**."*



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- **DrMOS was Intel's idea, what about AMD?**

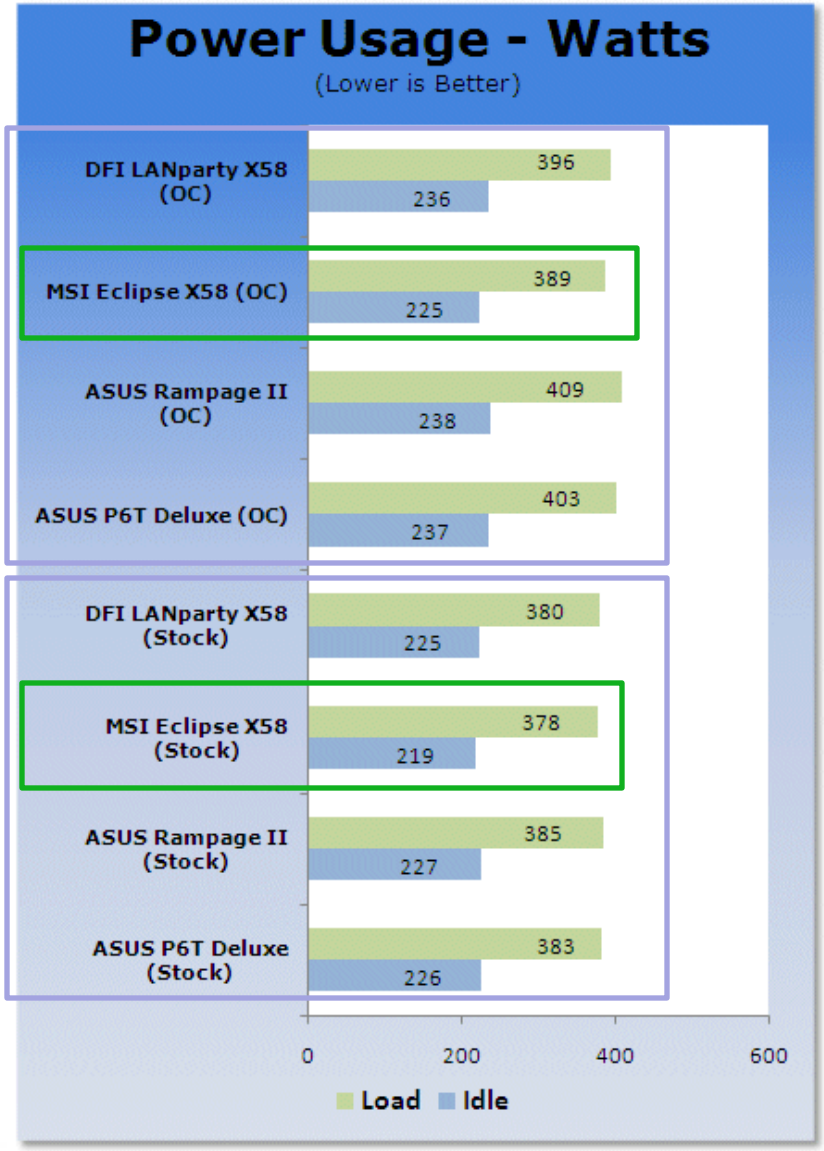
  Both the MSI "**DKA790GX Platinum**" and "**DKA790GX**" AM2+ mainboards **use DrMOS** technology. In 2009 more mainboards for the AMD platform will use DrMOS.

- **Why is DrMOS not used on all MSI mainboards?**

  DrMOS is more expensive compared to traditional Power-PAK MOSFETS. However, **we will expand the DrMOS product range**.

Q2 2008	June	DrMOS introduction in the high-end P45 segment	-P45 Diamond -P45(D3) Platinum
Q3 2008	July	DrMOS entered the mainstream segment	-P45 NEO2 series
	August	First AMD based DrMOS mainboard	-DKA790GX Platinum -DKA790GX
	September	First DrMOS VGA card launched	-N9600GT Diamond
Q4 2008	November	DrMOS on a microATX mainboard	-G45M Digital
	December	With Eclipse SLI we expand DrMOS to the 2-Phase QPI and Chipset.	-Eclipse SLI -X58 Platinum
Q1 2009	February	First AM3 board with DrMOS	-790GX-GD70

Tweaktown (Australia)



*"DFI's Digital Voltage system is more efficient over most other voltage systems, but it's **still not as efficient as MSI's DrMOS which keep their cool exceptionally well**."*

*"MSIs first dive into the green PC market is extremely impressive. ...**The new Driver Mosfets manage to help keep the boards' key components at cooler temperatures than any of the competitor's boards**, showing just how well this new technology can work."*

*"..MSI's X58 **Eclipse is able to reduce its power more than ASUS** is capable of with its EPU setup..."*

TweakTown
Technology content trusted by users all around the world

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➢ Is MSI APS the same as EPU and DES ?

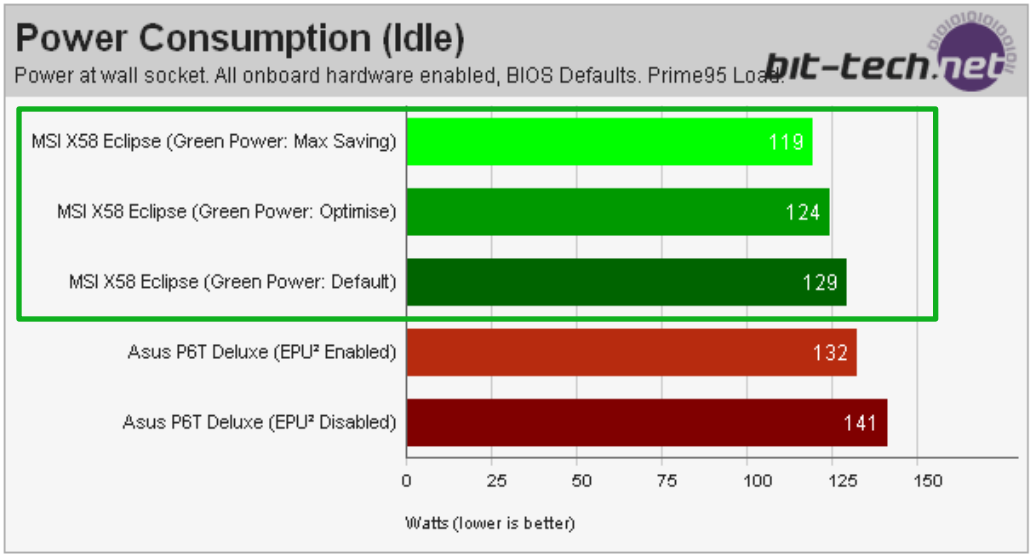
APS (Active Phase Switching) is more efficient. APS does not only switch the CPU PWM but **also the QPI-, Chipset-** & **Memory-Phases** and it is the **only OS independent phase switching** (BSD / Linux / VMware ESX server)!

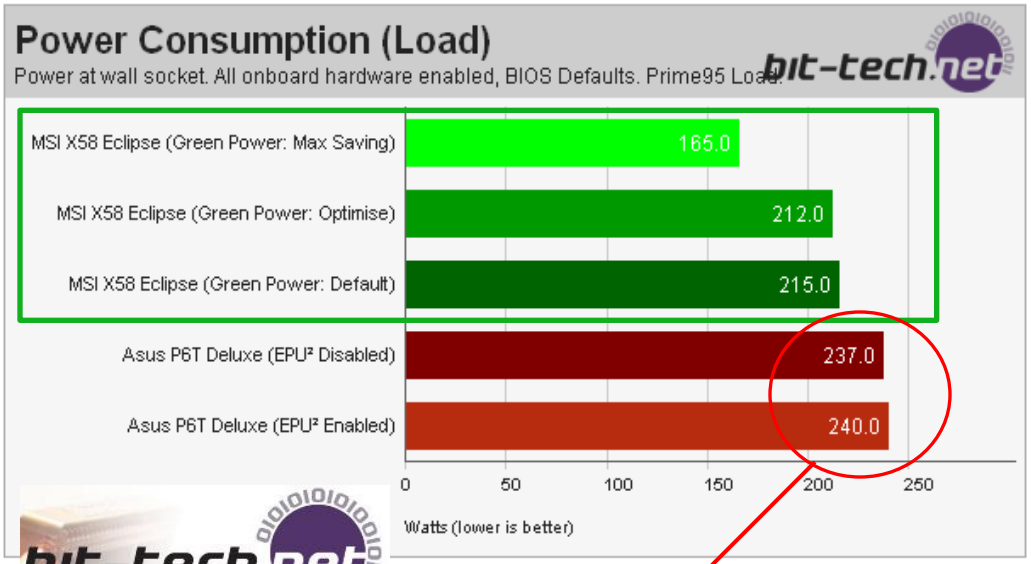
Power Saving Technology	MSI APS	Gigabyte DES	Asus EPU
	Active Phase Switching POWER SAVING	DYNAMIC ENERGY SAVER GIGABYTE	EPU 6 Engine EPU-6 Engine
CPU Phase Switching	**Yes**	Yes	Yes
QPI Phase switching	**Yes**	NO	NO
Chipset Phase switching	**Yes**	NO	NO
Memory Phase switching	**Yes**	NO	NO
OS independent	**Yes** (Works always)	NO (Win only)	NO (Win only)

tom's hardware "*Unlike other solutions, **APS works**"*

bit-tech.net "*The **real-time adjustments are even faster and more acute** than even what Gigabyte offers"*

Bit-tech.net (UK)





"*From the graph, we can see that in general MSI's **DrMOS and Green-Power undercuts the Asus in power use, just like it did on the P45 boards***"

"*Asus' power saving, while all encom-passing and quite fancy on the surface, generally **doesn't work as efficiently as MSI's DrMOS and GreenPower**...*" (about EPU)

"*For the most part we still feel **Asus is playing the numbers game, where "more is better"**, but it neglects to point out it uses smaller ferrite core chokes, which therefore hold less power*" (about 16-Phase)

Notice Asus EPU increases power!

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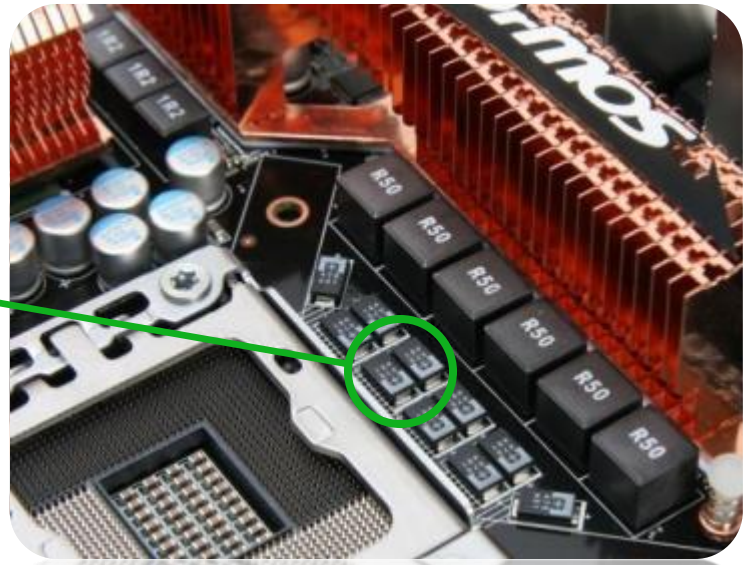
➢ What are Hi-c CAP's?

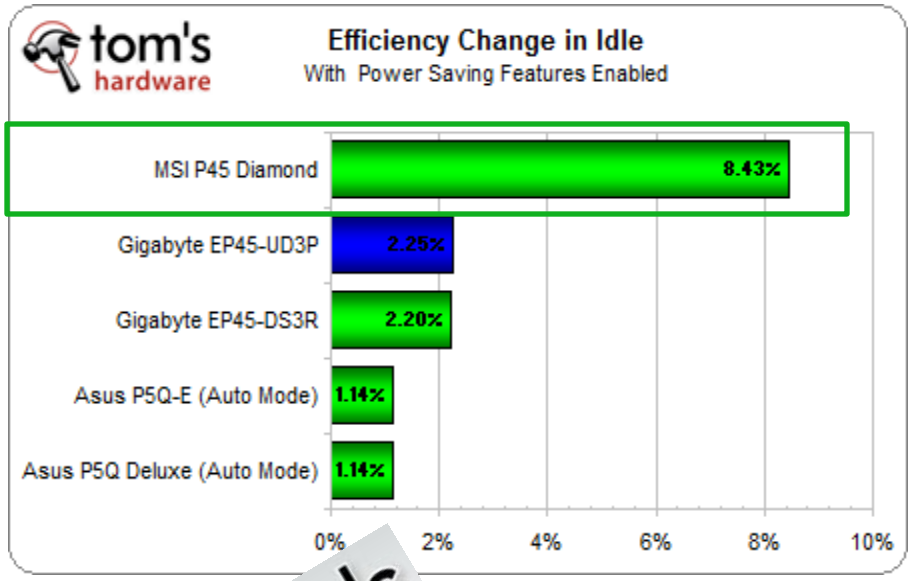
Hi-c CAP's (**Hi**ghly-**c**onductive polymerized **Cap**acitor) are the next generation Solid Capacitors which withstand higher temperatures and allow higher overclocking. These high quality components are used on high-end products like GTX295 VGA cards, Macbook Airs and industrial ITX mainboards. **MSI is the only one to use these next generation capacitors on desktop mainboards**.

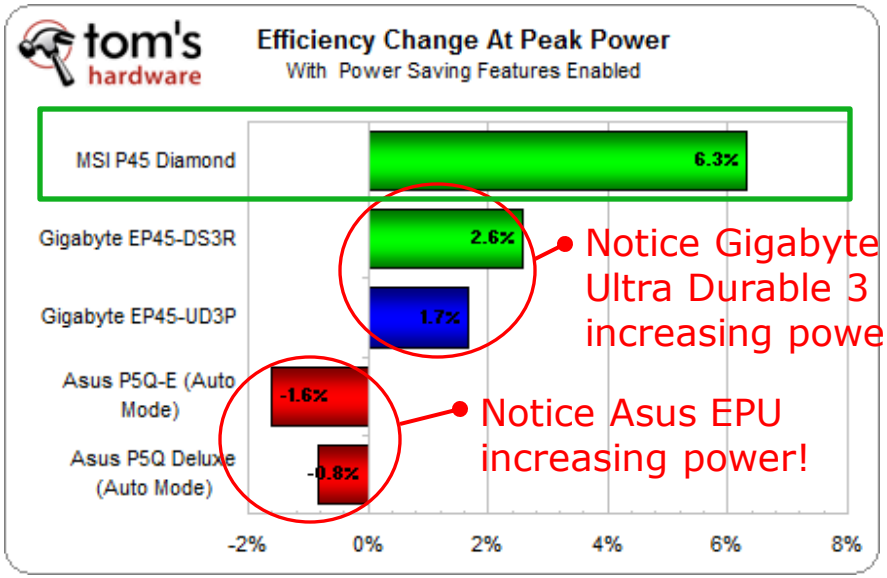


Tom's Hardware (Germany)

"***Only MSI's P45 Diamond showed decreased system power*** *requirements in both idle and peak load conditions*"

"***only MSI's P45 Diamond with its DrMOS*** *voltage regulator switching* ***introduces substantial savings***... ***Again, Ultra Durable 3 didn't make a difference***."





"*..thanks to MSI's implementation of* ***voltage regulators*** *and* ***dynamic switching****, the P45 Diamond is* ***by far the most energy-efficient motherboard in this review***"

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- **Where does MSI's GreenPower design fit in?**

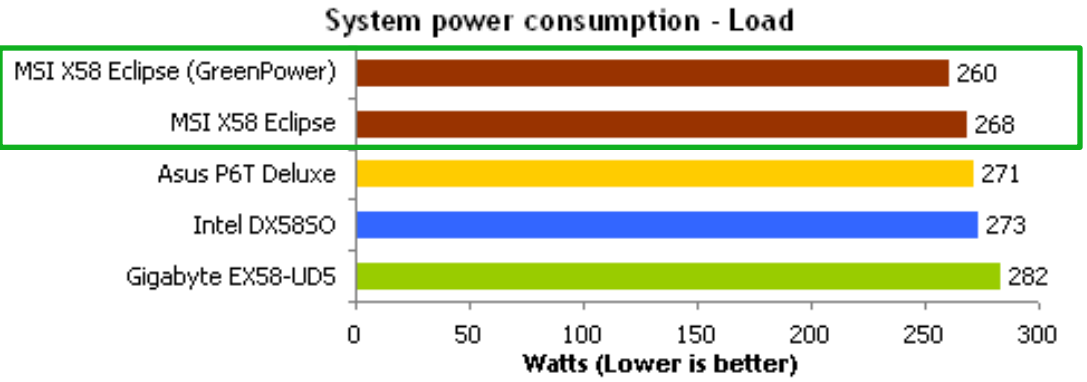
GreenPower design is the name of the advanced power circuit design on our PCB. MSI R&D engineers **avoid power leakage** and **all unused functions can be checked and automatically switched off** even if we only save 0.01 Watt.

- **If I use GreenPower Genie, do I save more power?**

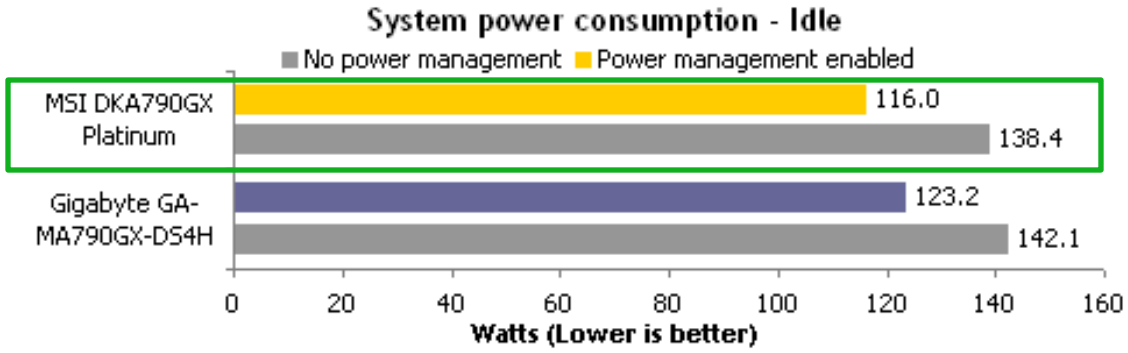
GreenPower Genie is **only for real-time monitoring the power usage**. GreenPower Center uses these values to adjusts fan speeds. This based on increased power usage before heat actually increases. It does not contribute to extra power saving. (But if you want to believe it does, please go ahead !)

The Tech Report

*"**MSI's GreenPower** Genie power savings software **actually works**, allowing the Eclipse to undercut the power consumption of most of the Core i7 boards we've tested."*



*"**the Eclipse still consumes less power than the other boards when under load**. The EX58-UD5, on the other hand, has the highest power consumption of the lot."*



*"The **DKA790GX Platinum proves more frugal** than the DS4H at both idle and under load."*

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- **Why are media using the wrong terms (*driver mos, greenpower genie, vrm switch, voltage regulator switching*) to describe the benefits of DrMOS & APS ?**

  We didn't yet brainwash the media enough. ☺

- **The powersaving revolution just started !**

  Many magazines and websites also test the mainboard power consumption and measure generated heat. More and more people are aware that 12- and 16-Phase are just marketing stories. They also know that bigger heatpipes or extra 2oz copper layers are only needed to fix heat problems, not to prevent them.

  The time of old fashioned power wasting components is behind us, **MSI leads the industry with next generation high quality components**!

Where to find DrMOS, APS or Hi-c CAP?

For best power-saving and cool running mainboards Insist on DrMOS!

Model name	Memory	HeatPipe	Firewire	DrMOS	APS	Hi-c CAP	Easy Button	OC Tool	ATI Crossfire	Nvidia SLI
Eclipse Plus	DDR3	STS	•	•	•	•	•	**OC Dial**	•	NF200
Eclipse SLI	DDR3	STS	•	•	•	•	•	OC Switch	•	•
X58 Platinum	DDR3	STS	•	•	•		•	OC Switch	•	•
X58 Pro	DDR3	STS	•	•	•		•	OC Switch	•	•
P45 Diamond	DDR3	Liquid	•	•	•	•		Jumper	•	
P45D3 Platinum	DDR3	Circu	•	•	•			Jumper	•	
P45 Platinum	DDR2	Circu	•	•	•			Jumper	•	
P45-8D	DDR2+3	•	•	•		•	•	OC Switch		
P45 Neo2-FIR	DDR2	•	•	•	•		•	OC Switch	•	
P45 Neo2-FR	DDR2	•		•				Jumper	•	
P45 Neo3-FIR	DDR2	•	•		•			OC Switch		
P45D3 Neo3-FI	DDR3	•	•		•			OC Switch		
P45 Neo3-FR	DDR2	•			•			OC Switch		
P45C Neo-FIR	DDR2+3		•		•			OC Switch		
P45D3 Neo-F	DDR3				•			OC Switch		
G45M Digital	DDR2		•	•	•					
790GX-GD70 (AM3)	DDR3	STS	•	•	•		•	**OC Dial**	•	NF200
DKA790GX Platinum	DDR2	Circu	•	•			•	OC Switch	•	
DKA790GX	DDR2	•		•			•	OC Switch	•	

HKEPC Hardware (Hong Kong)

The Power-PAK MOSFET temperature used by Asus and Gigabyte is much higher than the **cool DrMOS temperature used by MSI**.

	Power-PAK MOSFET	MSI DrMOS
Idle	51.7c	36.6c
Full Load	71.4c	55.6c

"採用65 奈米制程，整合Driver、High-Side 及 Lower Side 的DrMOS ，其工作溫度比一般傳統MOSFET 更低，我們找來同樣採用六相供電的P45 主機板作對比，在閒置時溫度為51.7c ，但DrMOS 則低至36.6c ，把一顆Core 2 Extreme QX9770 完全負載，傳統MOSFET 溫度約為71.4c ，而DrMOS 則只有55.6c ，效果令人滿意，同時意味著其轉換效率比傳統MOSFET 高。"

HKEPC Hardware

"為挽回高階主機板市場，MSI P45 Diamond 用料和設計絕對是不惜功本，高效率的DrMOS 整合式MOSFET 、超低ESR 值的Hi-c CAP 電容，這些用料均未曾用於桌面主機板產品中，以往只是伺服器主機板的專利。省電技術再不是ASUS 、 GIGABYTE ， MSI GreenPower 雖然來的有點晚，但在技術上卻不輸對手，效果令人滿意。"

Insist on DrMOS !

For max power-saving, coolest temperatures and the best performance:

Insist on DrMOS!

Media quotes & sources

P07 - Tom's Hardware / 11-way P45 motherboard shootout / http://www.tomshardware.com/reviews/intel-p45-motherboard,2001.html
P07 - Anandtech.com / Asus P5Q preview / http://www.anandtech.com/showdoc.aspx?i=3309&p=1
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P09 - HardOCP / MSI P45 Platinum review / http://www.hardocp.com/article.html?art=MTUxNSwsLGhlbnRodXNpYXN0
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P12 - TweakTown / MSI Eclipse SLI Core i7 Motherboard / http://www.tweaktown.com/reviews/1734/1/msi_x58_eclipse_sli_core_i7_motherboard/index.html
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P12 - TweakTown /ASUS EPU 6 vs. MSI DrMOS vs. GIGABYTE DES Advanced / http://www.tweaktown.com/articles/1587/asus_epu_6_vs_msi_drmos_vs_gigabyte_des_advanced/index.html
P13 - Bit-Tech.net / MSI P45 Platinum review / http://www.bit-tech.net/hardware/2008/06/20/msi-p45-platinum/1
P13 - Tom's Hardware / Power-saving motherboards: fact or fiction / http://www.tomshardware.com/reviews/energy-efficient-motherboard,2067.html
P14 - Bit-Tech.net / Asus P6T Deluxe / http://www.bit-tech.net/hardware/motherboards/2008/12/02/asus-p6t-deluxe/1
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P17 - Tom's Hardware / Ultra Durable 3: Extra Copper, Benchmarked / http://www.tomshardware.com/reviews/gigabyte-ultra-durable,2094.html
P17 - Tom's Hardware / 11-way P45 motherboard shootout / http://www.tomshardware.com/reviews/intel-p45-motherboard,2001.html
P19 – Tech-report.com / X58 Round-up (Asus, GBT, MSI) / http://www.techreport.com/articles.x/15908/1
P19 - Tech-report.com / MSI DKA790GX Platinum review / http://www.techreport.com/articles.x/16159
P21 – HKEPC / MSI P45 Diamond review / http://www.hkepc.com/1477/page/6#view