



# CUDA GPU actual power consumption in Pattern Matching

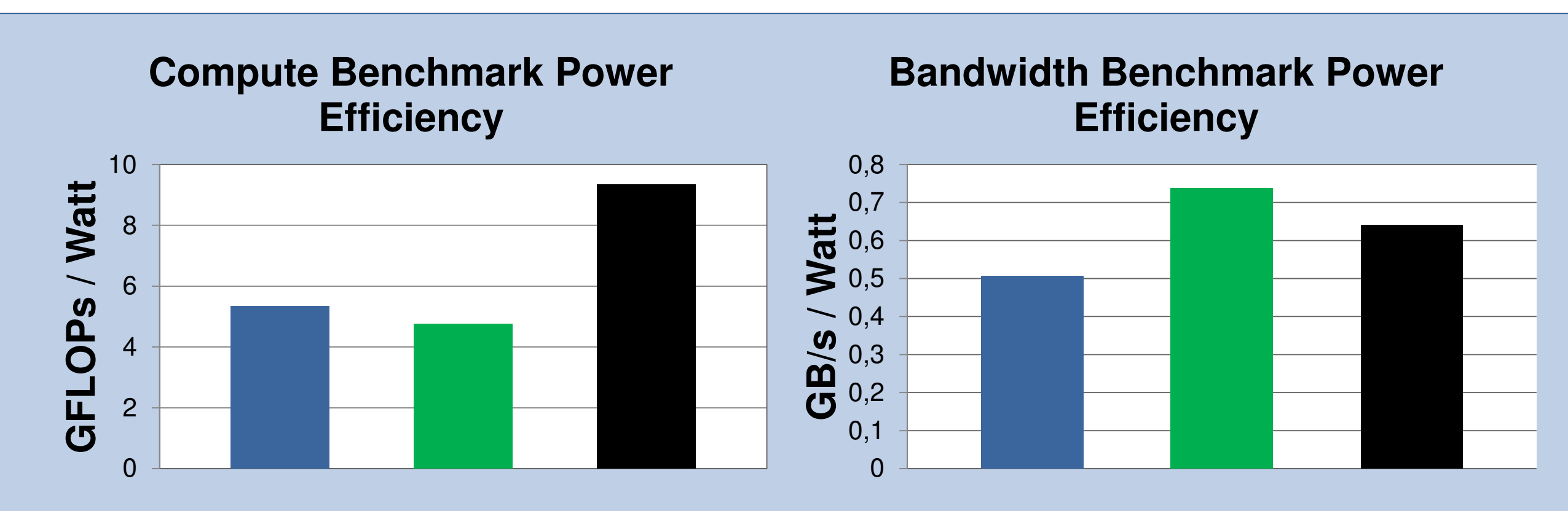
Tobias Skoglund (HPC, UU), Ian Wainwright (HPC), Maya Neytcheva (UU)

## Purpose of Investigation

The purpose of the investigation is to clarify the relation between specified max power and actual power consumption under typical signal processing loads using different CUDA architectures.

## Bandwidth and Compute Benchmark

Nvidia's SDK bandwidth test and Nvidia supplied high GFLOPs utilization code produce data for extreme cases of bandwidth and compute bound calculations.



Test number	Test length	# of tests	Pattern length	# of patterns	SCALINGS
1	128	5000	32	16	0
2	128	5000	32	32	0
3	256	5000	32	32	0
4	512	5000	32	16	0
5	512	5000	32	32	0
6	512	5000	32	16	1
7	512	5000	32	16	32
8	512	5000	64	16	0
9	512	5000	128	16	0
10	512	5000	256	16	0
11	512	5000	256	1	0
12	512	50000	512	2	0
13	256	50000	256	1	0

GT 240

GTX 480

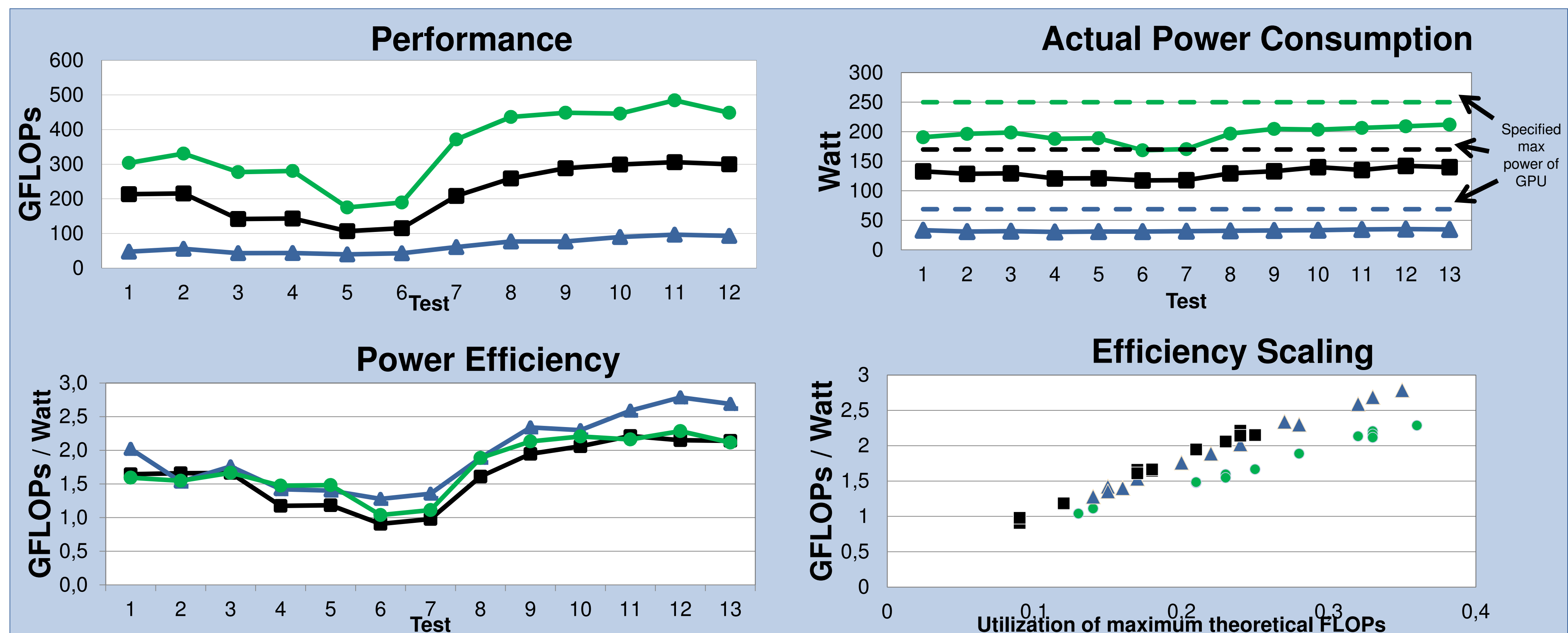
GTX 560

## Conclusions

- Between 50 - 80 % of theoretical peak power is used.
- High utilization means high power efficiency. **Optimized code saves power!**
- Power consumption is fairly constant irrespective of load for the investigated algorithm.
- A peak of 2.8 GFLOPs / Watt is achieved in a typical signal processing algorithm.
- The Power Efficiency and Efficiency Scaling does not vary with CUDA architecture.

## Pattern matching

PM matches patterns from a library to a signal. Once the optimal pattern has been found, amplitude scaling is performed to find the minimal error between the pattern and signal. The matching is done using the mean square error metric.

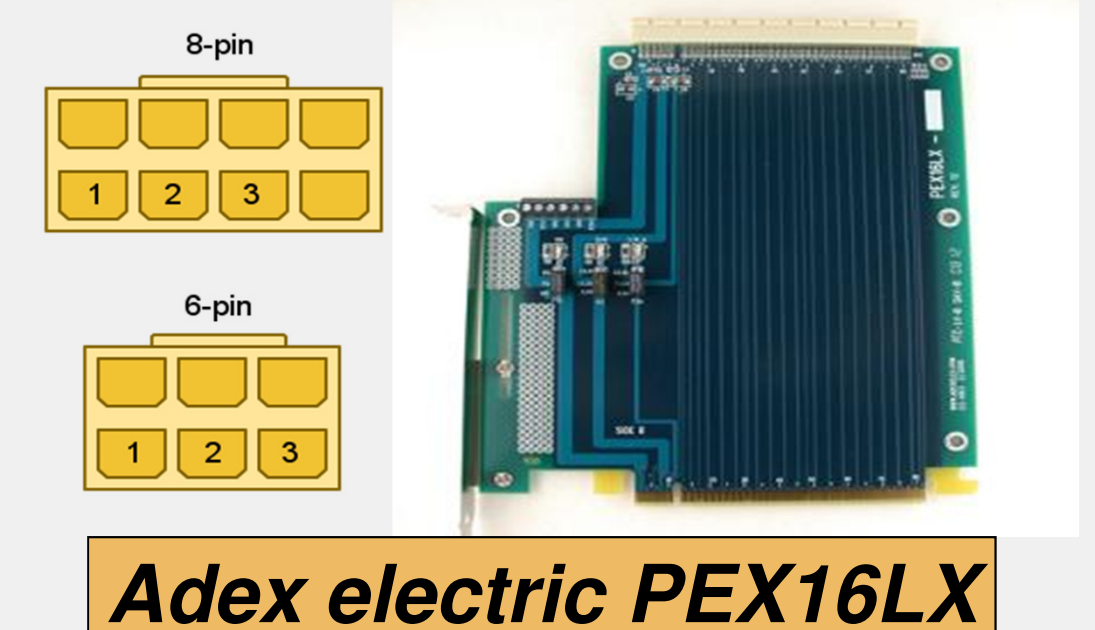


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[www.hpcsweden.se](http://www.hpcsweden.se)  
[info@hpcsweden.se](mailto:info@hpcsweden.se)

## Power Measurement Verification and Equipment

	Idle power	Peak power achieved	Specified maximum
GTX 480	43.3	224.6	250
GTX 560 Ti	26.2	173.5	170
GT 240	7.72	43.7	69

**Equipment:**  
 PCI-Express extender card with attached Multimeter.  
 Current sensing clamp meter.



Adex electric PEX16LX