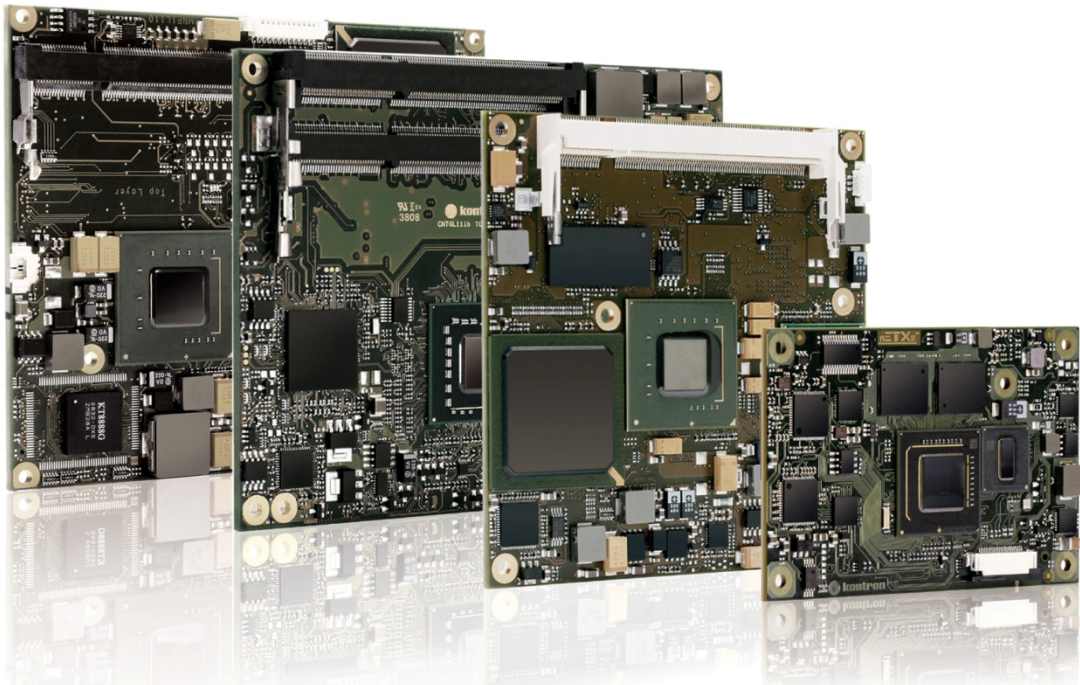


» Kontron Application Note «



ETX® 3.0

**COM Express™ basic
ETXexpress®**

**COM Express™ compact
microETXexpress®**

**COM Express™ ultra
nanoETXexpress**

Related Product
Subject
Usage
Document Name
Revision

Kontron COM Express™ Modules
Performance Benchmarks and Power Consumption
Confidential
KEMAP054.docx
111

» Table of Contents «

1	User Information	1
1.1	About This Document	1
1.2	Copyright Notice	1
1.3	Trademarks	1
1.4	Standards	1
1.5	Warranty	2
1.6	Technical Support	2
2	Naming clarification	3
3	Test Setup	4
3.1	Memory	4
3.2	Hardware setup	4
3.3	Software Setup	4
3.4	Benchmark utilities	5
3.5	BIOS settings	5
3.6	Power Consumption measurement	5
4	COM Express™ benchmark results	6
4.1	COM Express™ CPU benchmark: SiSoft Sandra Arithmetic bench - MIPS	6
4.2	COM Express™ CPU benchmark: SiSoft Sandra Arithmetic bench - MFLOPS	7
4.3	COM Express™ Memory benchmark: SiSoft Sandra Memory bandwidth	8
4.4	COM Express™ CPU benchmark: Cinebench R10 - Rendering single core	9
4.5	COM Express™ CPU benchmark: Cinebench R10 - Rendering multi core	10
4.6	COM Express™ Graphics Benchmark: Cinebench R10 - OpenGL	11
4.7	COM Express™ Graphics Benchmark: Futuremark 3DMark®05	12
5	COM Express™ Performance Ranking	13
6	COM Express™ Power Consumption	14

6.1	COM Express™ Power Consumption: WinXP Full Load	14
6.2	COM Express™ Power Consumption: WinXP Idle (CPU Low Speed)	15
6.3	COM Express™ Power Consumption: WinXP Idle (CPU Max Speed)	16
6.4	COM Express™ Power Consumption: WinXP Standby S1	17
6.5	COM Express™ Power Consumption: WinXP SuspendtoRAM S3	18
6.6	COM Express™ Power Consumption: WinXP Off State S5	19
7	COM Express™ Performance per Watt ranking.....	20
8	Additional Benchmarks	21
8.1	MadOninon 3DMark®2001 SE	21
8.2	Futuremark 3DMark®06	22
8.3	SuperPi 1M	23
9	Notes	24
10	Appendix A: CPU Overview	25
10.1	Intel®	25
10.2	AMD	25
11	Appendix A: Document Revision History	26

1 User Information

1.1 About This Document

This document provides information about products from Kontron Embedded Modules GmbH and/or its subsidiaries. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within is supplied “as-is” and is subject to change without notice.

For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

1.2 Copyright Notice

Copyright © 2003–2009 Kontron Embedded Modules GmbH

All rights reserved. No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language or computer language, in any form or by any means (electronic, mechanical, photocopying, recording, or otherwise), without the express written permission of Kontron Embedded Modules GmbH.

DIMM-PC®, PISA®, ETX®, ETXexpress®, microETXexpress™, X-board®, DIMM-IO® and DIMM-BUS® are trademarks or registered trademarks of Kontron Embedded Modules GmbH. Kontron is trademark or registered trademark of Kontron AG.

1.3 Trademarks

The following lists the trademarks of components used in this board.

- » IBM, XT, AT, PS/2 and Personal System/2 are trademarks of International Business Machines Corp.
- » Microsoft is a registered trademark of Microsoft Corp.
- » Intel is a registered trademark of Intel Corp.
- » All other products and trademarks mentioned in this manual are trademarks of their respective owners.

1.4 Standards

Kontron Embedded Modules GmbH is certified to ISO 9000 standards.

1.5 Warranty

This Kontron Embedded Modules GmbH product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron Embedded Modules GmbH will at its discretion decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron Embedded Modules GmbH will not be responsible for any defects or damages to other products not supplied by Kontron Embedded Modules GmbH that are caused by a faulty Kontron Embedded Modules GmbH product.

1.6 Technical Support

Technicians and engineers from Kontron Embedded Modules GmbH and/or its subsidiaries are available for technical support. We are committed to making our product easy to use and will help you use our products in your systems.

Please consult our Web site at <http://www.kontron.com/support> for the latest product documentation, utilities, drivers and support contacts. Consult our customer section <http://emdcustomersection.kontron.com> for the latest BIOS downloads, Product Change Notifications and additional tools and software. In any case you can always contact your board supplier for technical support.

2 Naming clarification

COMexpress™ defines a Computer-On-Module, or COM, with all components necessary for a bootable host computer, packaged as a super component. Interfaces will provide a smooth transition path from legacy parallel interfaces to LVDS (Low Voltage Differential Signaling) interfaces. These include the PCI bus and parallel ATA and PCI Express and Serial ATA.

- » ETXexpress® modules are Kontron's COMexpress™ modules in basic form factor (125mm x 95mm)
- » microETXexpress® modules are Kontron's COMexpress™ modules in compact form factor (95mm x 95mm)
- » nanoETXexpress® modules are Kontron's COMexpress™ modules in the future ultra form factor (55mm x 84mm)

3 Test Setup

Kontron Embedded Modules GmbH provides benchmark results with common benchmark utilities free to use for everyone to compare the modules performance. The power consumption is measured in an open system at standard ambient temperature during the test setup described here.

3.1 Memory

During benchmark test the module is equipped with the maximum amount of memory modules. For power consumption measurements only one memory module is used. microETXexpress® modules usually drive one memory module in single channel memory mode, chipsets on basic form factor ETXexpress® usually can drive two memory modules in dual channel memory mode (except ETXexpress®-PM with 915GM Chipset). Memory modules used during tests:

- » Kontron 512MB DDR1 (Part No. 97007-5120-00-0)
- » Kontron 1024MB DDR2 (Part No. 97011-1024-00-0)
- » Kontron 1024MB DDR3 (Part No. 97016-1024-00-0)

Note: The performance test shows the maximum performance in dual channel memory mode. For benchmark results in single channel mode with only one equipped memory please contact your local sales or support team if necessary.

3.2 Hardware setup

According to the form factor and used module different Kontron Evaluation Baseboards had to be used. Additional to the module and memory the following basic hardware is used during test:

- » Kontron ETXexpress® Evaluation Board with GBit Ethernet (Part No. 38100-0000-00-1) (default)
- » Kontron ETXexpress® Evaluation Board with 10/100 MBit Ethernet (Part No. 38100-0000-00-0)
- » Kontron nanoETXexpress Evaluation Board (Part No. 34101-0000-00-0)
- » Enermax Liberty 400W ATX 2.0 Power Supply
- » Standard SATAII harddisk with 7200 rpm
- » Module specific heatspreader mounted on the module
- » Active Cooling solution mounted on the heatspreader

3.3 Software Setup

- » Microsoft Windows XP Professional with ServicePack 2 or 3
- » Module specific chipset, graphics and Ethernet driver
- » For CPU full load test during power consumption measurement:
 - Intel® Thermal Analysis Tool TAT at 100% load on all available cores
 - Prime95 32bit configured in 'In-Place large FFT's' Torture Test mode

3.4 Benchmark utilities

To guarantee a correct comparison between the different combinations of CPU and chipset/system controller hub some benchmark utilities may not be updated to the latest available revisions. For COM Express™ modules 6 benchmark utilities are used free to download in a demo version from:

- » SiSoftware Sandra Lite XIIc 2008.1.12.34 from <http://www.sisoftware.net>
(this revision is no longer available)
- » Futuremark (MadOnion) 3DMark®2001 with latest revision from <http://www.futuremark.com>
- » Futuremark 3DMark®05 with latest revision from <http://www.futuremark.com>
- » Futuremark 3DMark®06 with latest revision from <http://www.futuremark.com>
- » Maxon Cinebench R10.0 from <http://www.maxon.net>
- » SuperPi with latest revision available at <http://www.xtremesystems.com/superpi/>

All benchmarks are done with program default settings in demo mode.

Note: The benchmark results of different version of Sisoftware Sandra are not fully comparable. Therefore all Benchmarks are done with above mentioned revision.

You can download the used benchmark utilities directly from Kontron's Customer Section

3.5 BIOS settings

Modules are tested with the latest available BIOS revision during test and Manufacturer default settings with following changes:

- » Graphics Memory is set to maximum
- » SATA mode is set to compatible or IDE mode

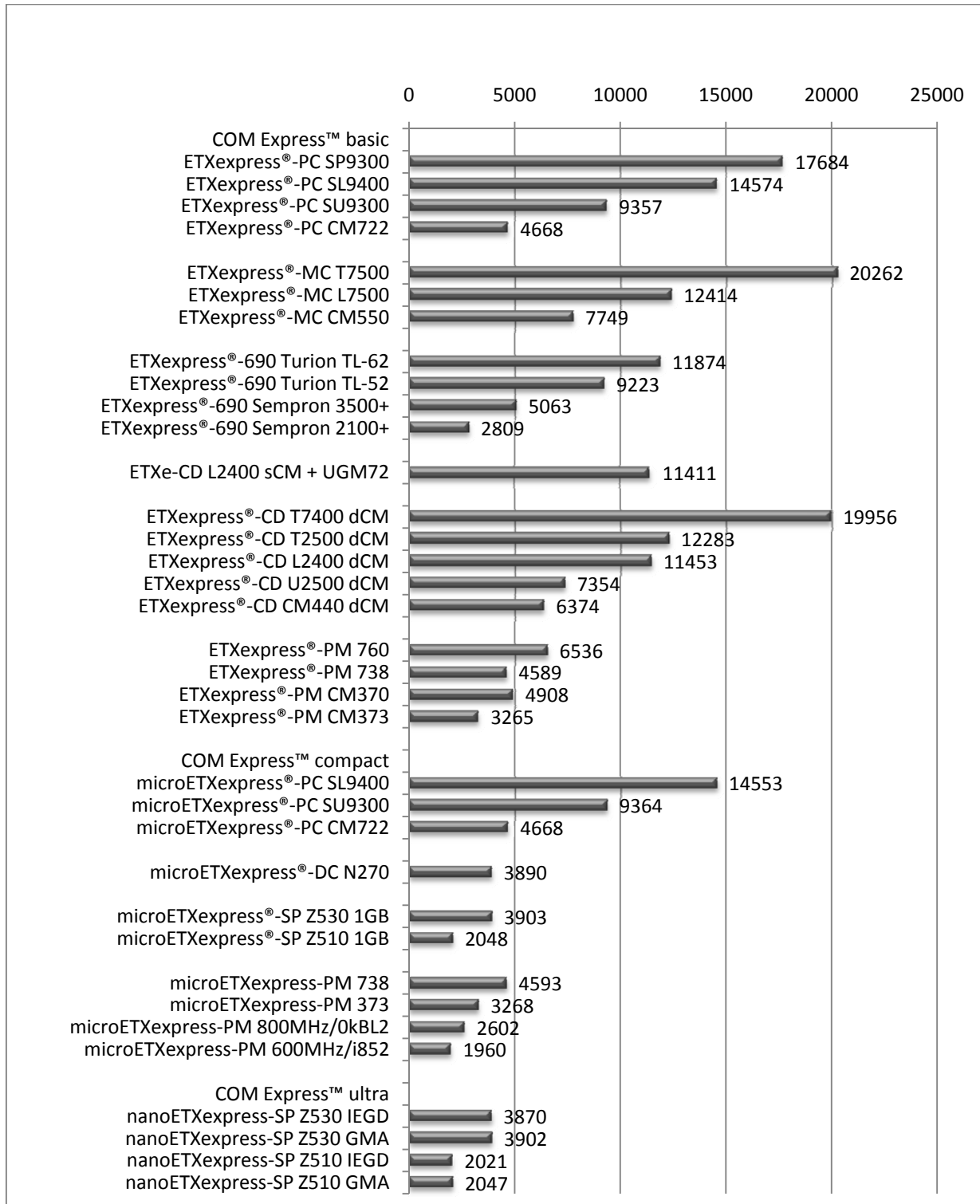
3.6 Power Consumption measurement

The power consumption of a module is measured between ATX power supply and baseboard. The module supply consists of 5VSB on ATX 20 or 24pin connector and 12V supply on 12V_ATX 4pin connector.

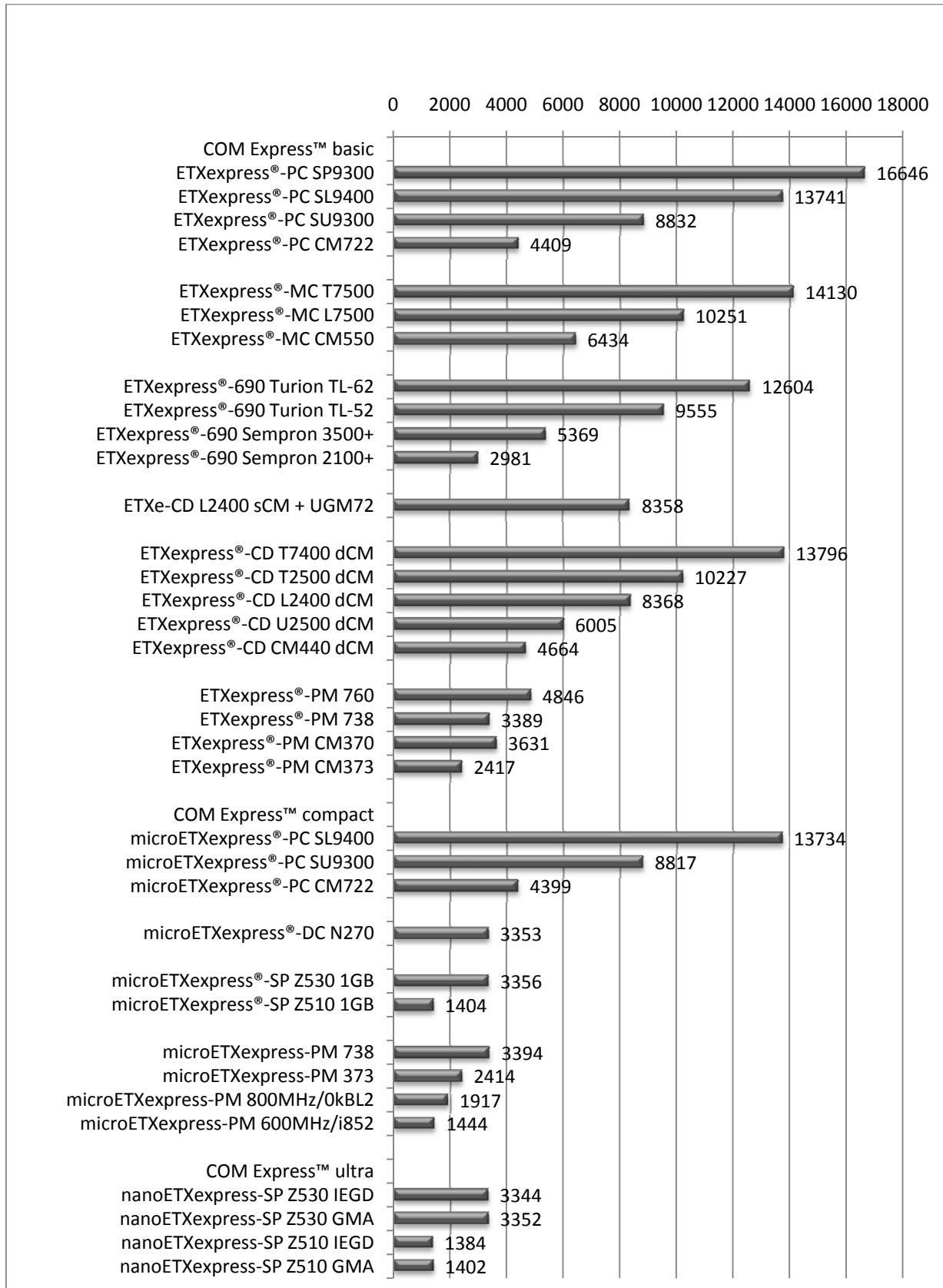
- » Measurements at standard 22-24°C room temperature in a open system
- » Full Load power consumption is measured at 90°C CPU Core temperature
- » Power Consumption for Mouse and Keyboard (USB, ~500mW) is included

4 COM Express™ benchmark results

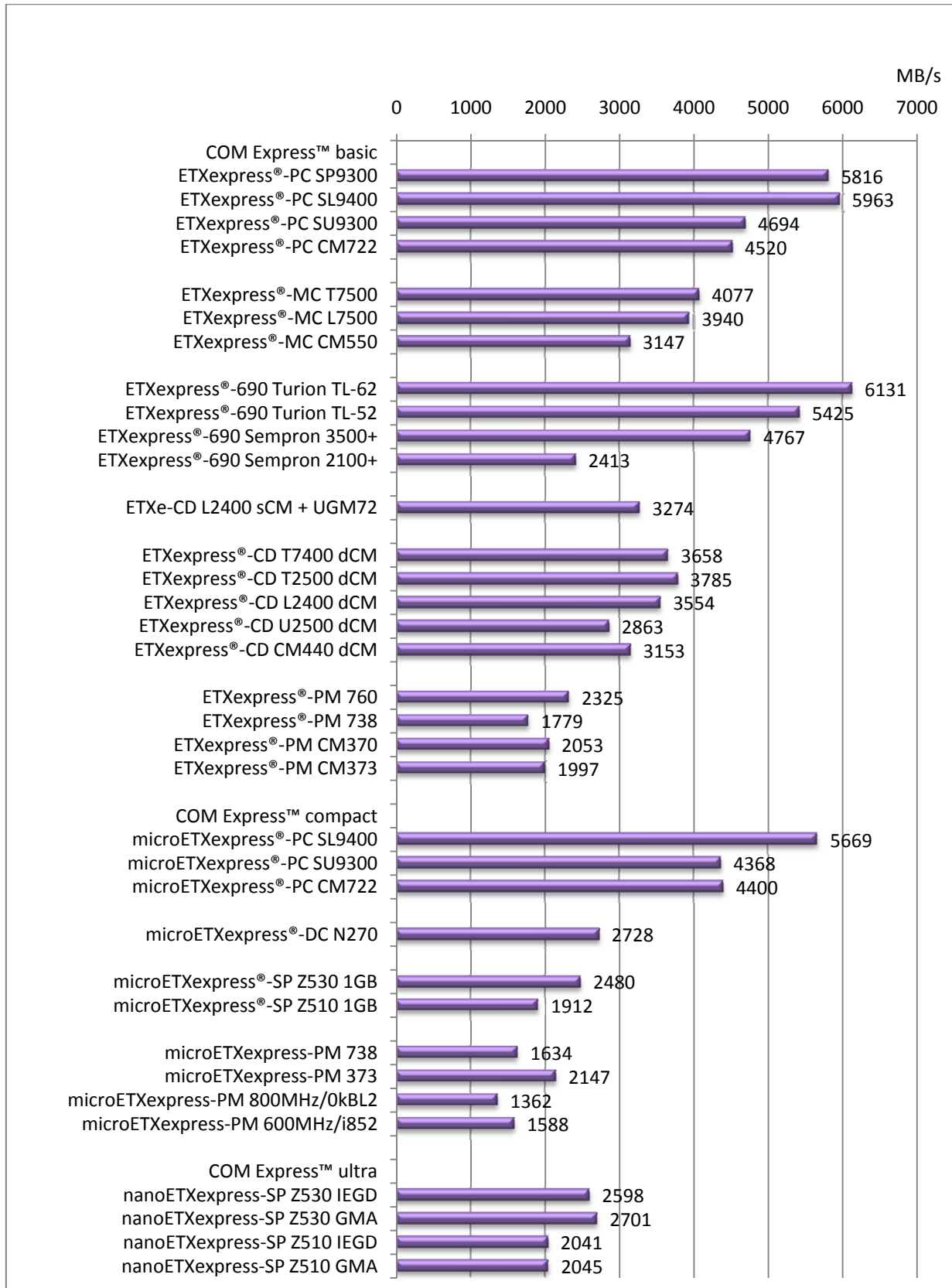
4.1 COM Express™ CPU benchmark: SiSoft Sandra Arithmetic bench - MIPS



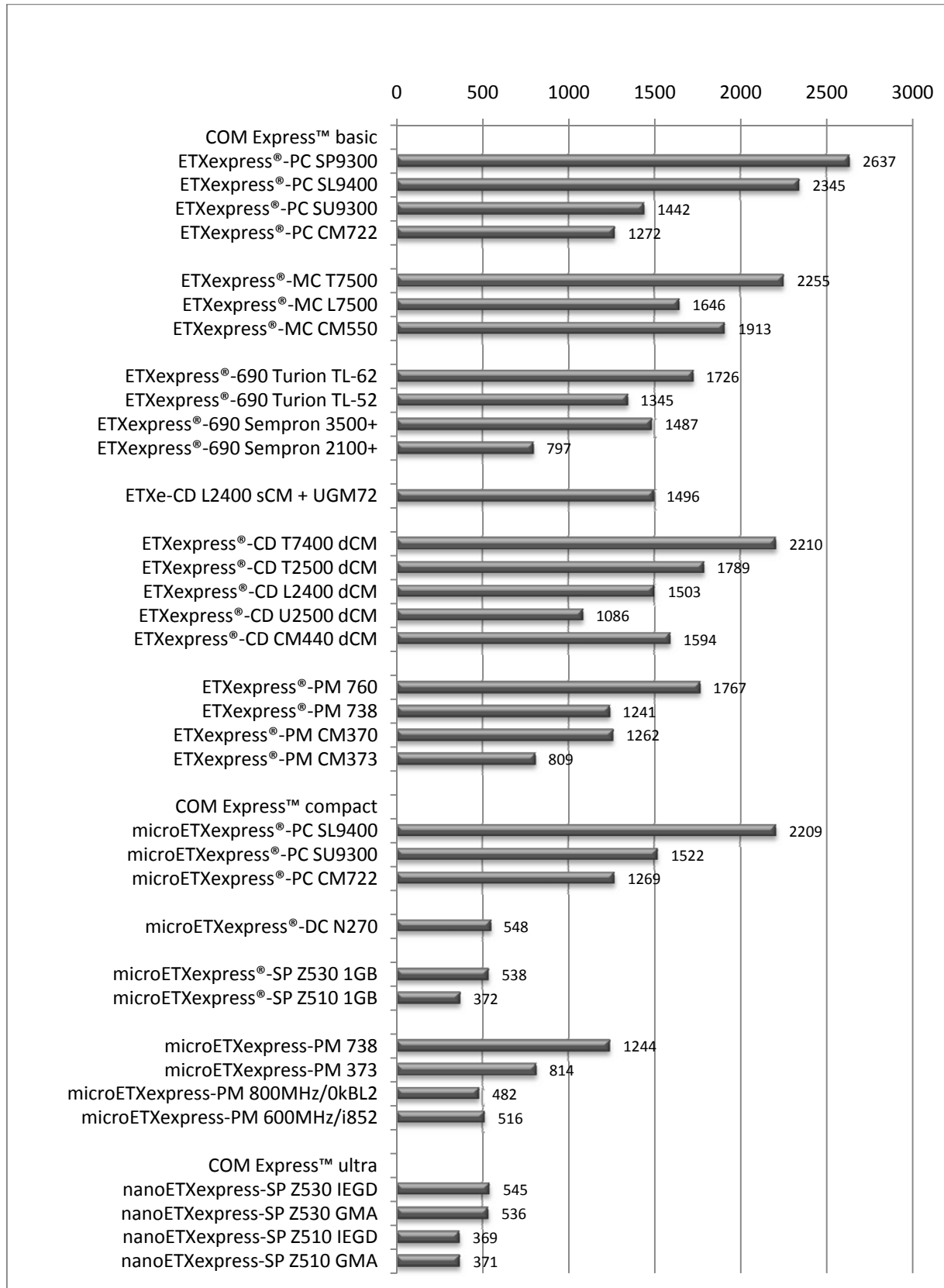
4.2 COM Express™ CPU benchmark: SiSoft Sandra Arithmetic bench - MFLOPS



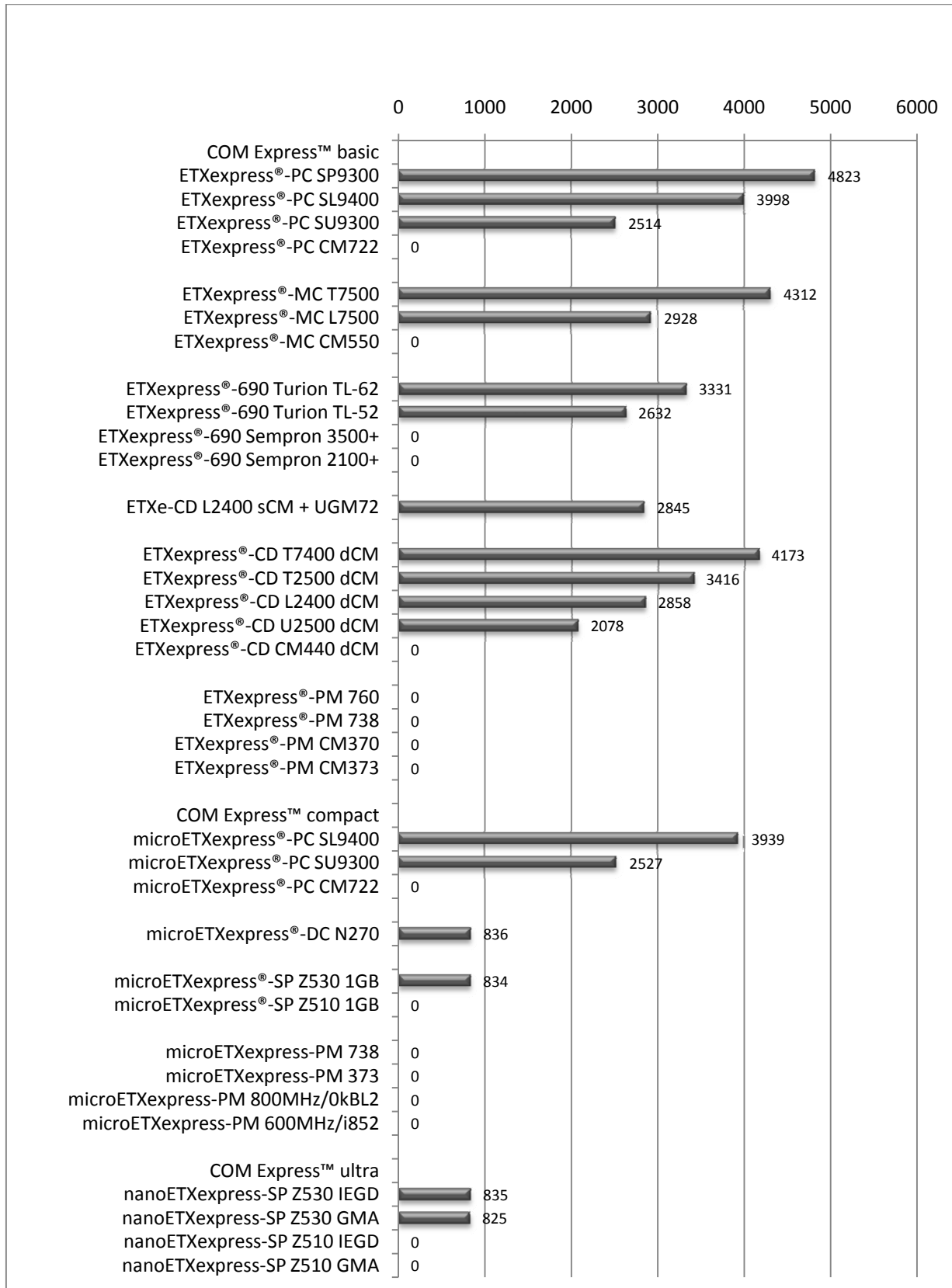
4.3 COM Express™ Memory benchmark: SiSoft Sandra Memory bandwidth



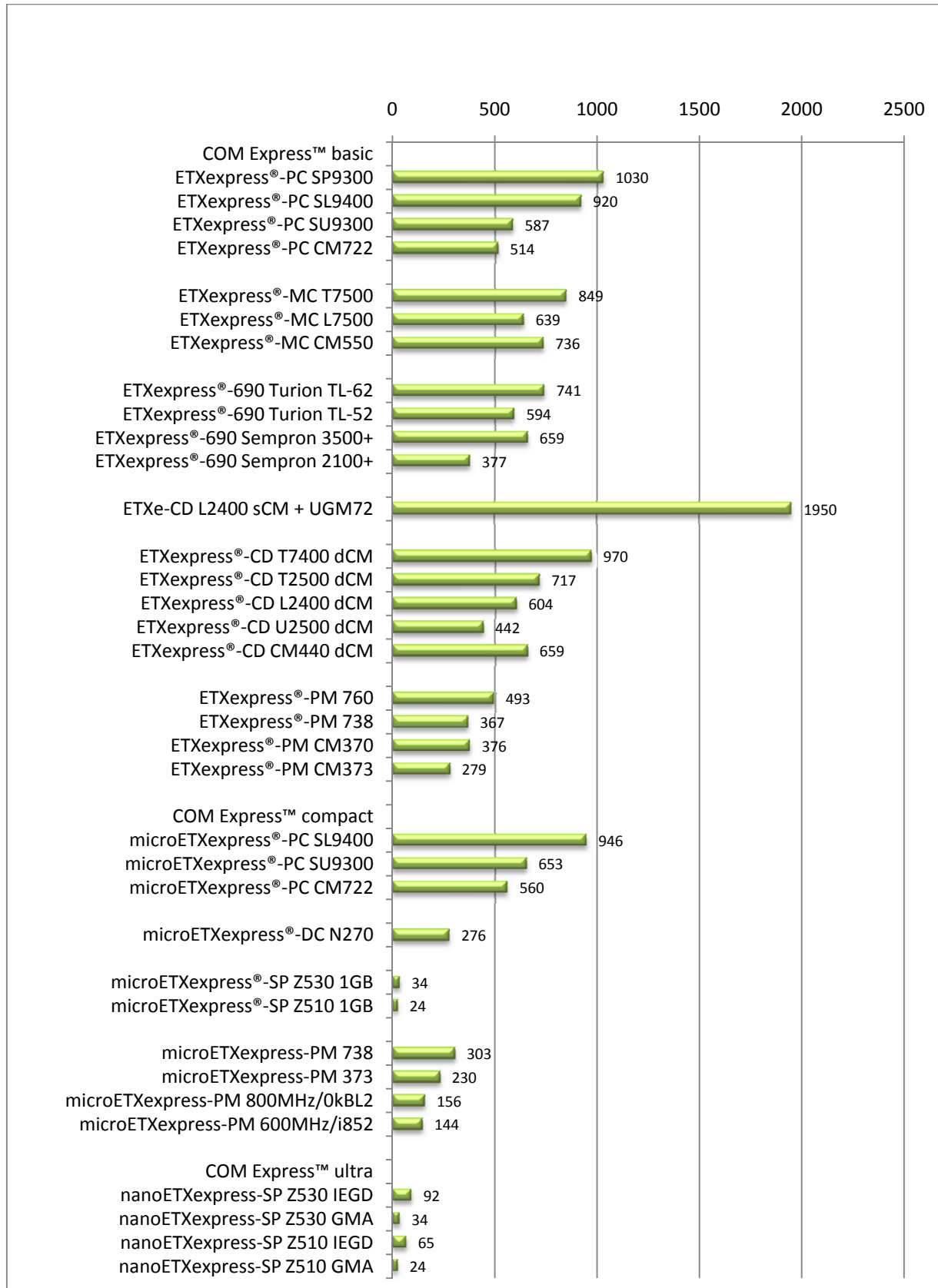
4.4 COM Express™ CPU benchmark: Cinebench R10 - Rendering single core



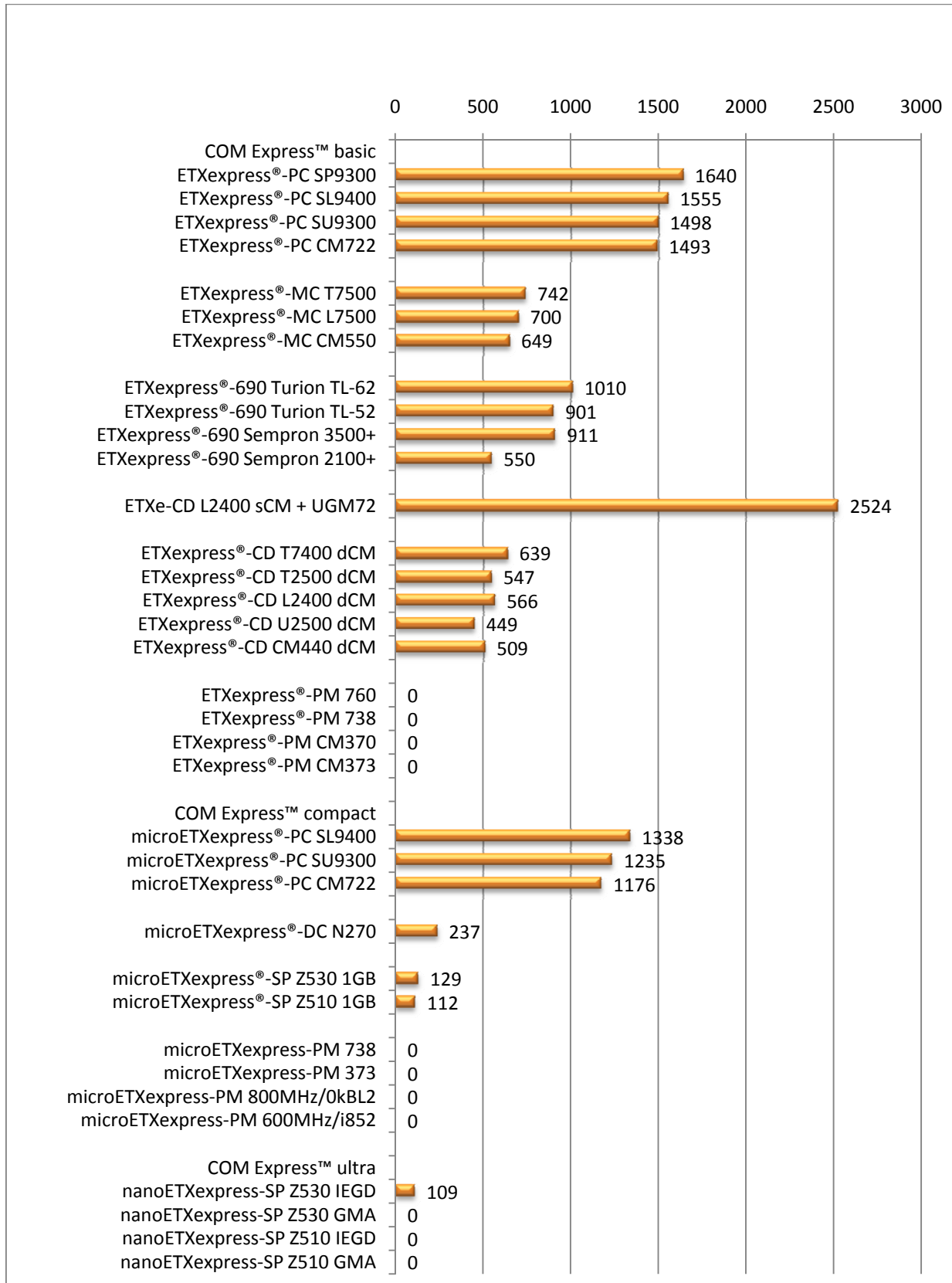
4.5 COM Express™ CPU benchmark: Cinebench R10 - Rendering multi core



4.6 COM Express™ Graphics Benchmark: Cinebench R10 - OpenGL

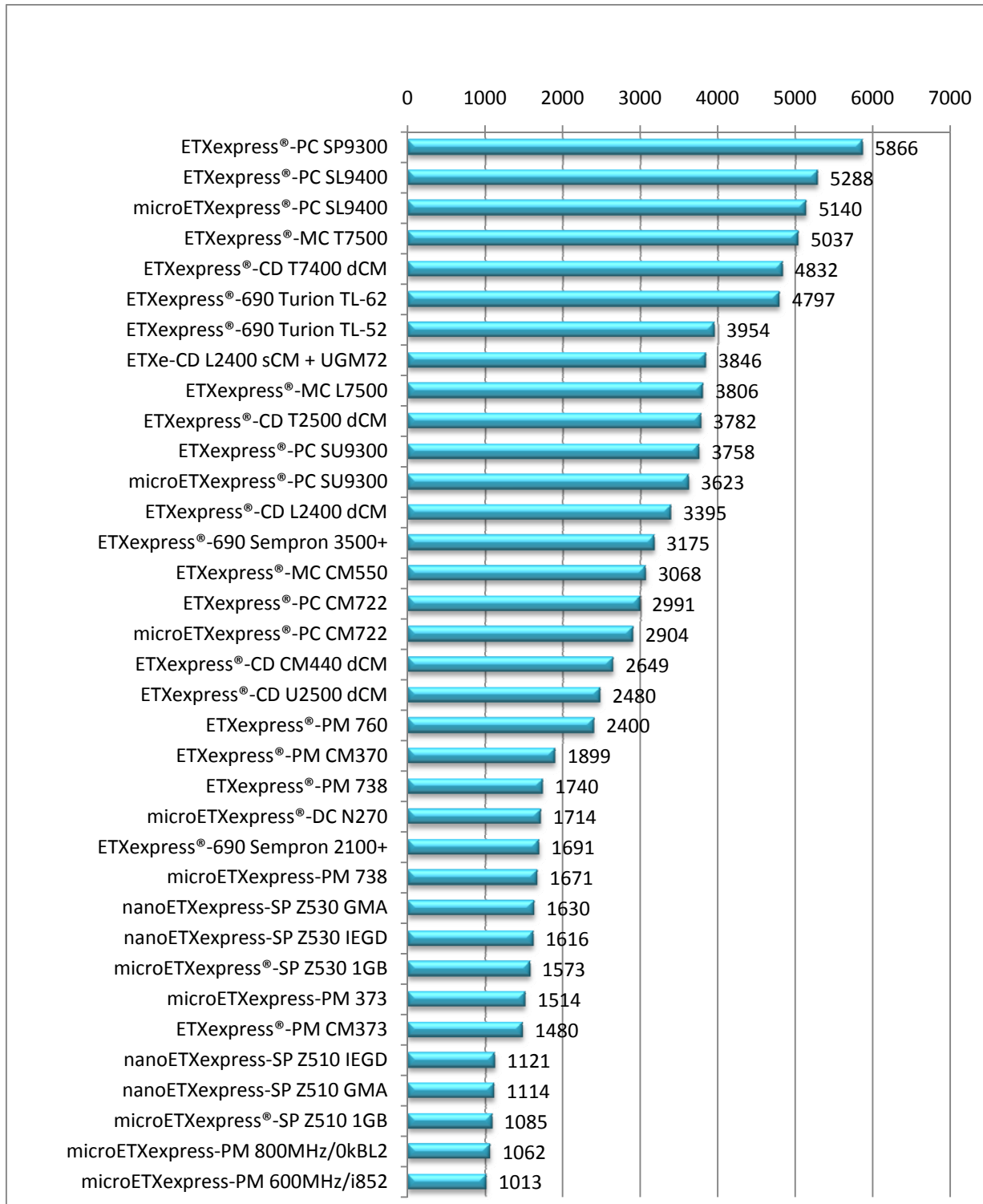


4.7 COM Express™ Graphics Benchmark: Futuremark 3DMark®05



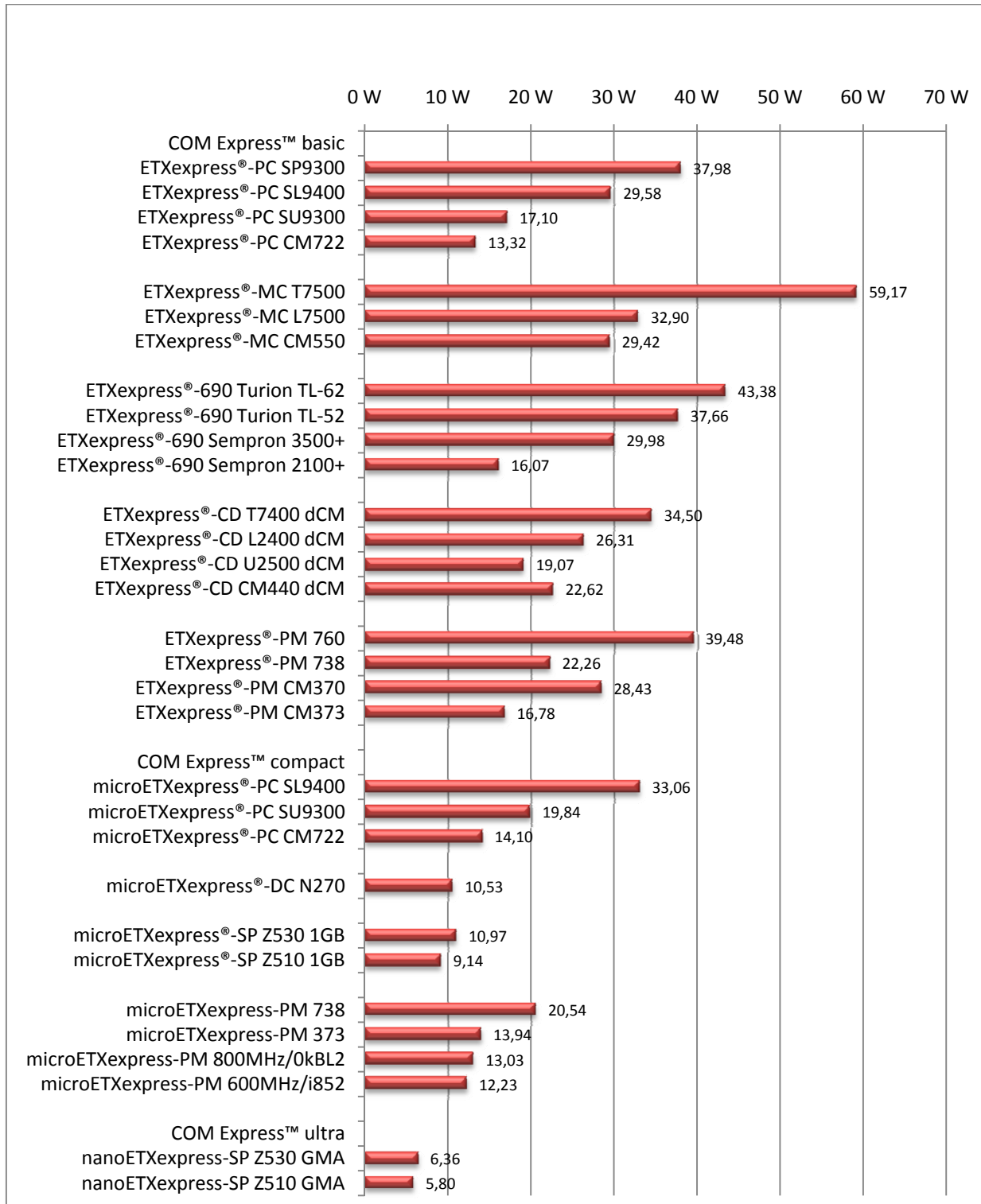
5 COM Express™ Performance Ranking

The 'Performance Index' used for the performance ranking is calculated by (average CPU benchmark results + average Graphic benchmark results + memory benchmark)/3. The diagram below shows the Performance Index.

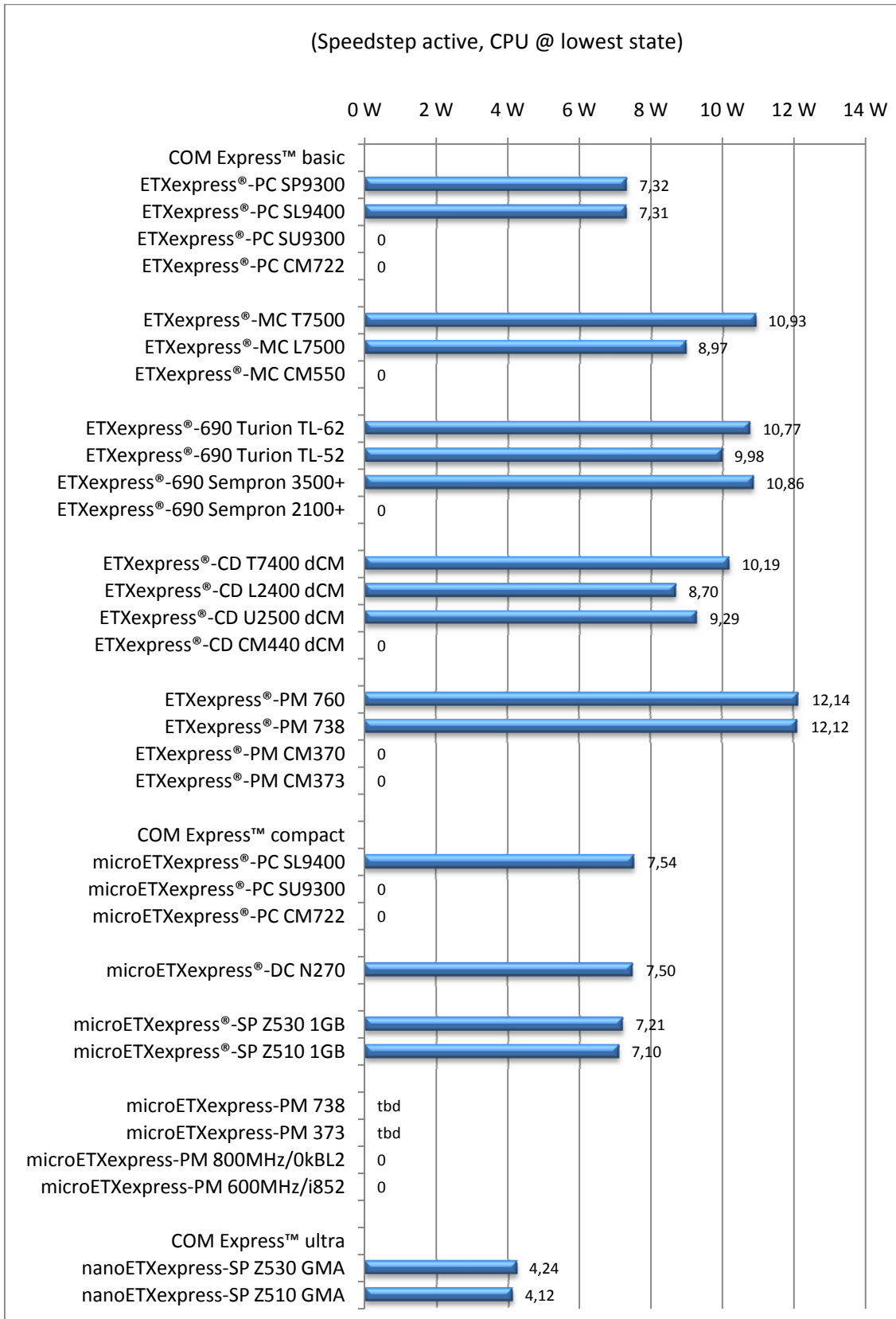


6 COM Express™ Power Consumption

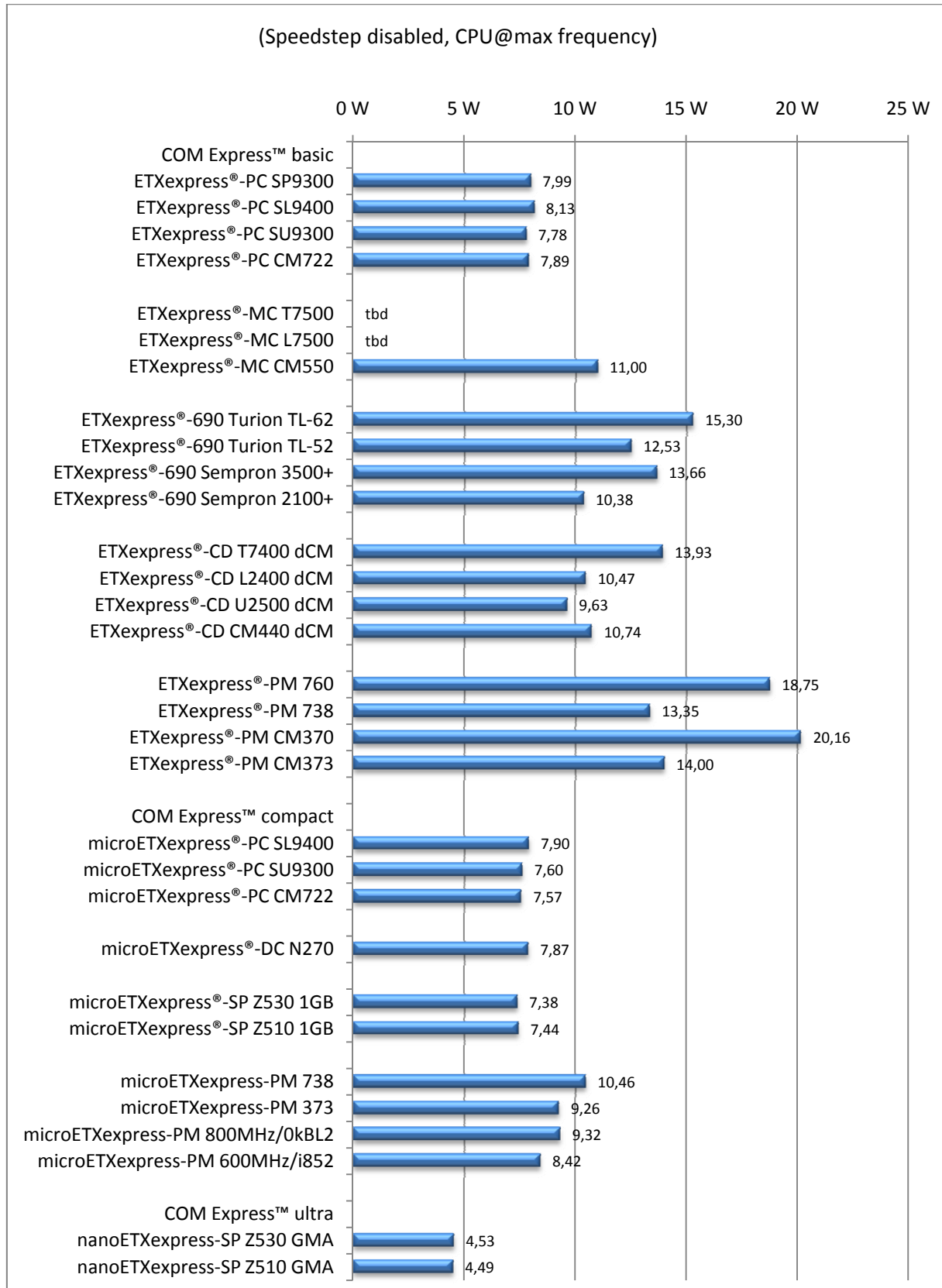
6.1 COM Express™ Power Consumption: WinXP Full Load



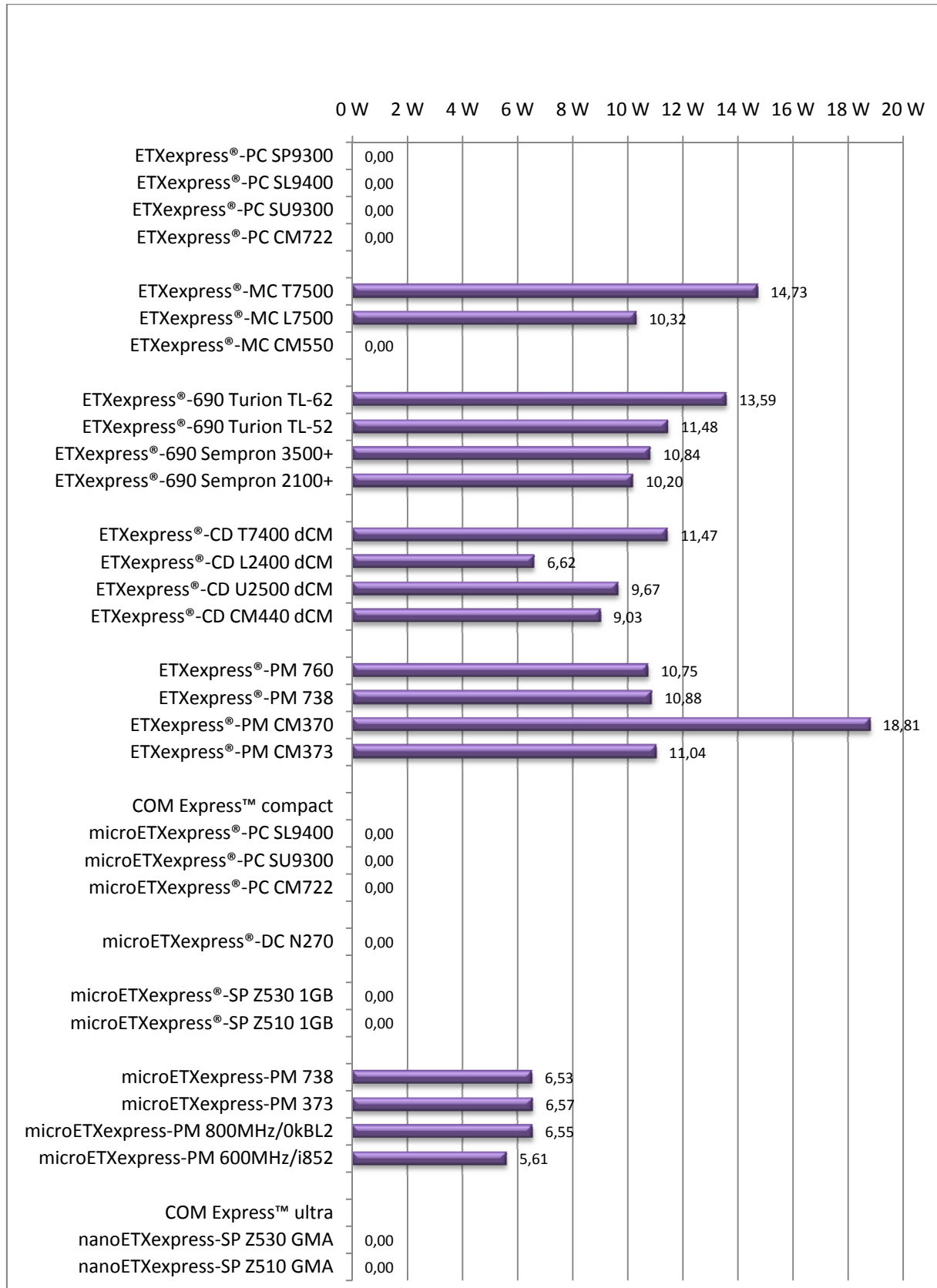
6.2 COM Express™ Power Consumption: WinXP Idle (CPU Low Speed)



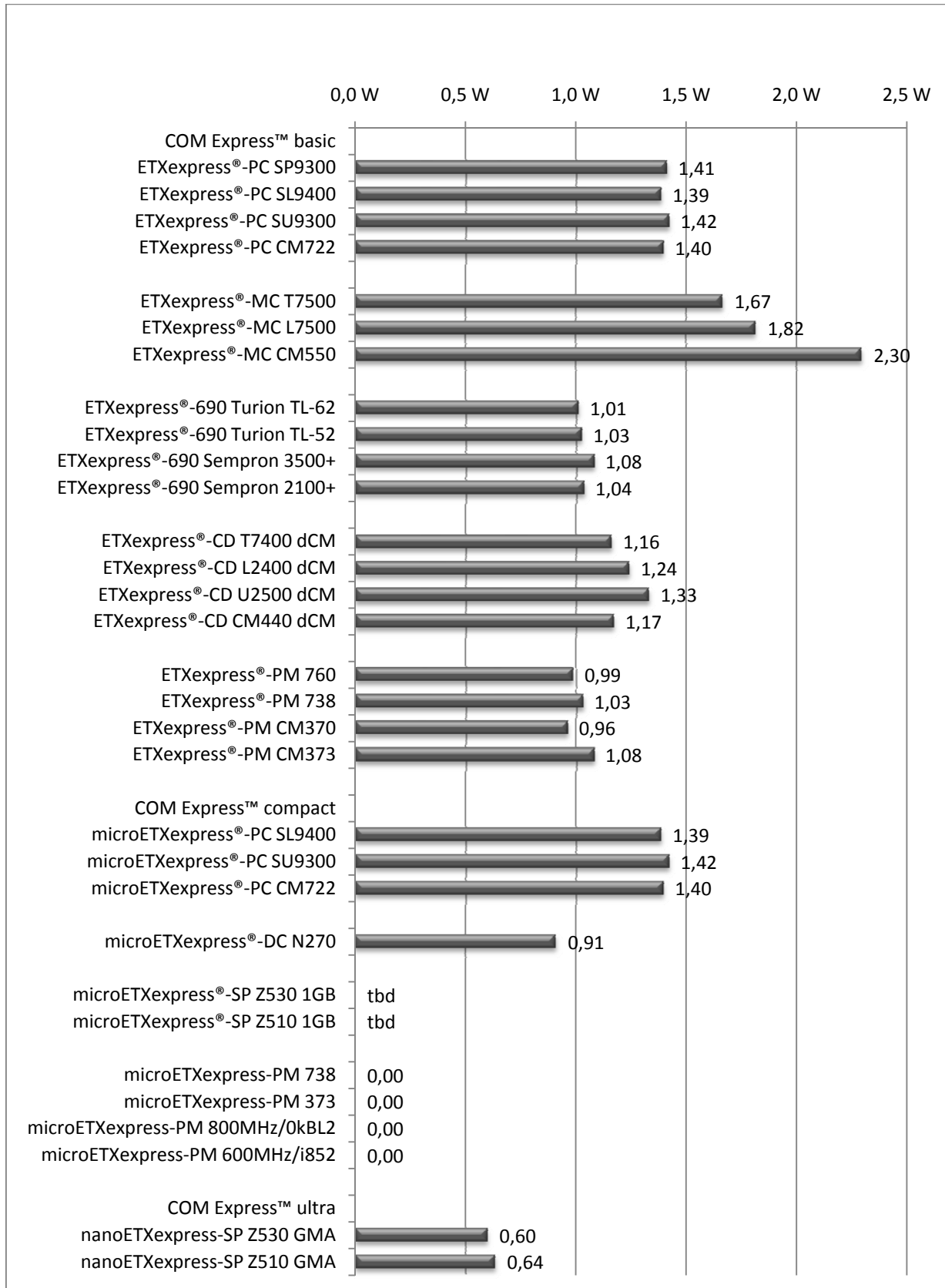
6.3 COM Express™ Power Consumption: WinXP Idle (CPU Max Speed)



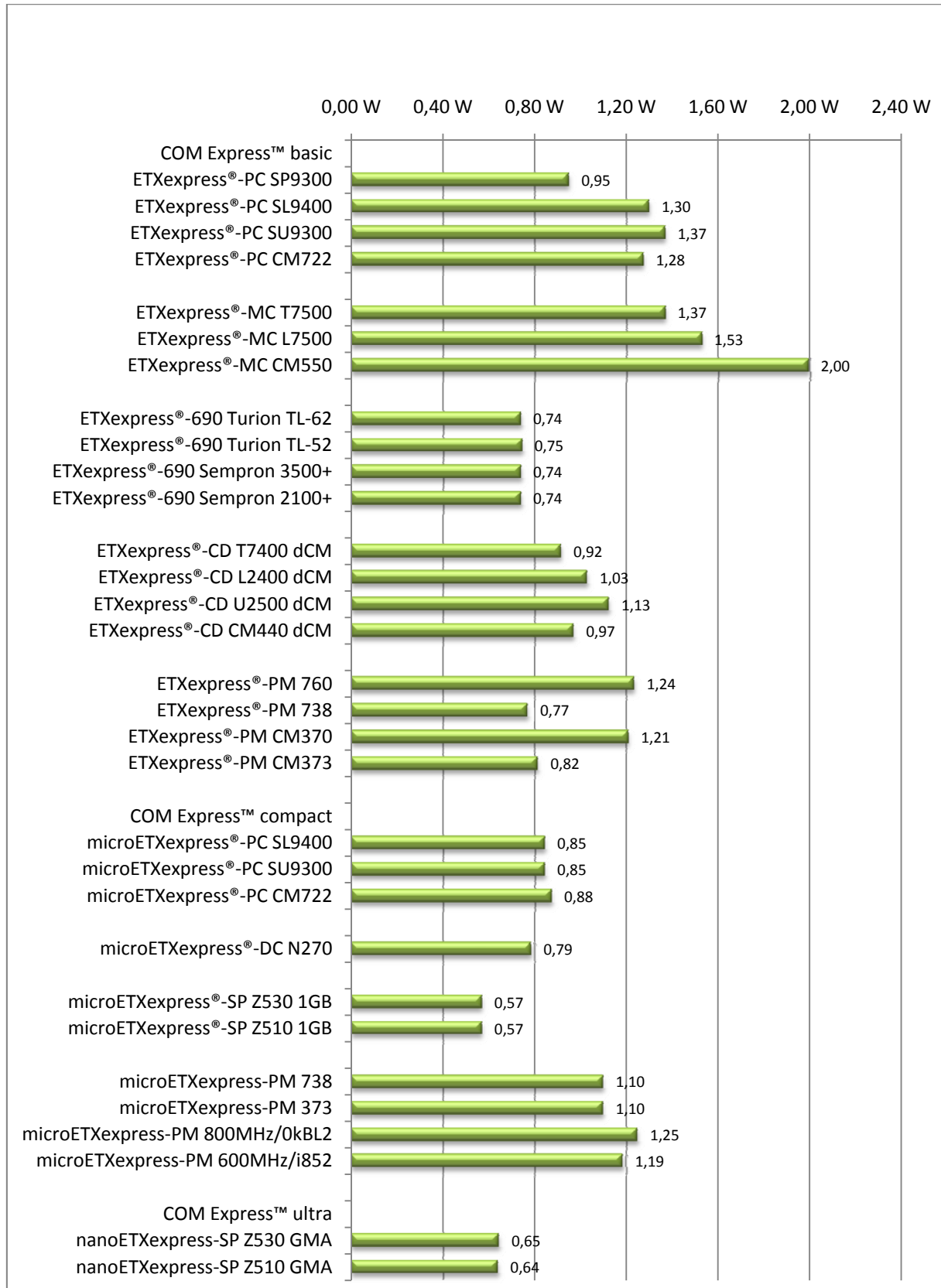
6.4 COM Express™ Power Consumption: WinXP Standby S1



6.5 COM Express™ Power Consumption: WinXP SuspendtoRAM S3

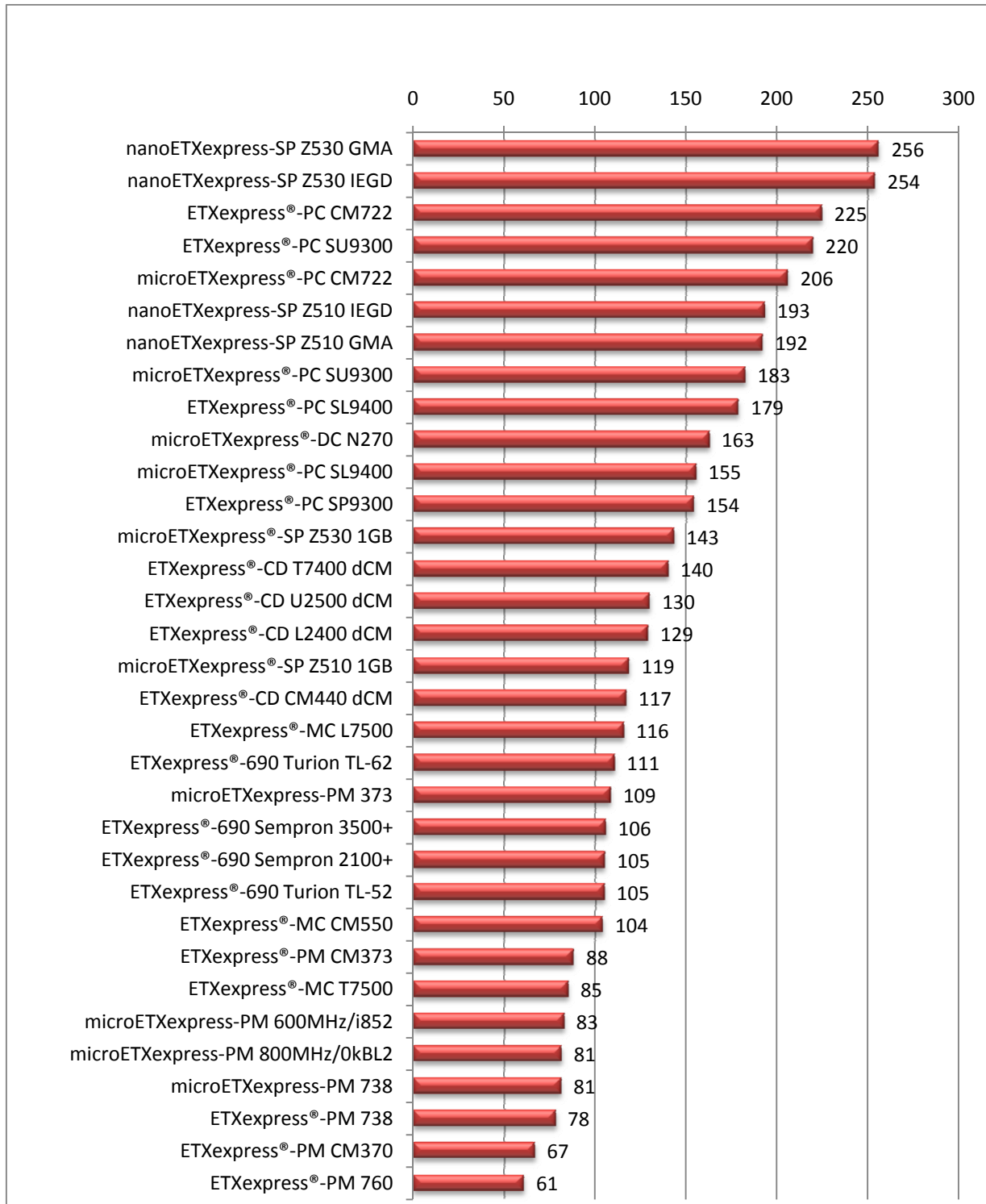


6.6 COM Express™ Power Consumption: WinXP Off State S5



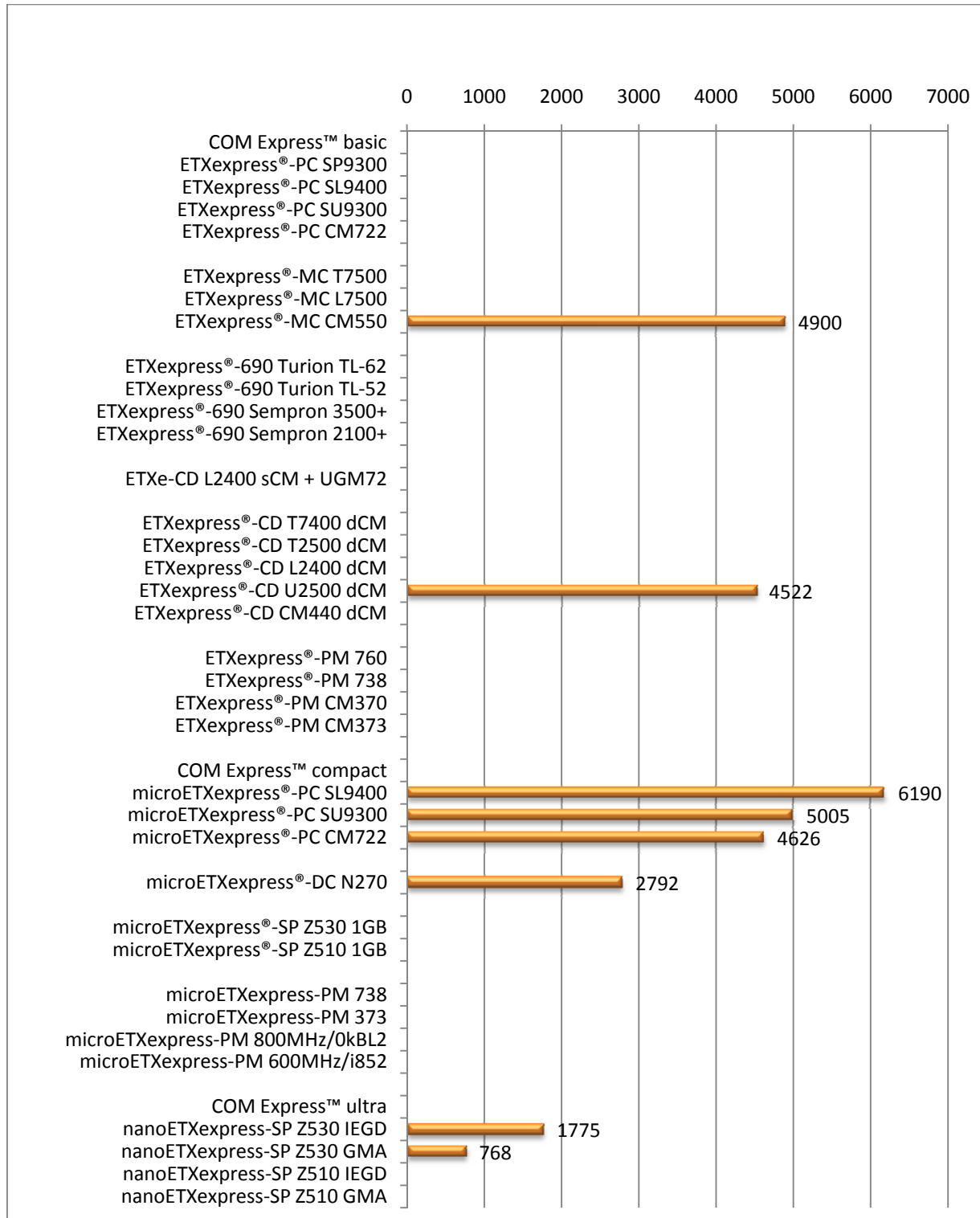
7 COM Express™ Performance per Watt ranking

The performance per watt ranking is calculated dividing the [performance index](#) by the power consumption in WindowsXP Full Load test. The diagram below shows the performance per watt index.

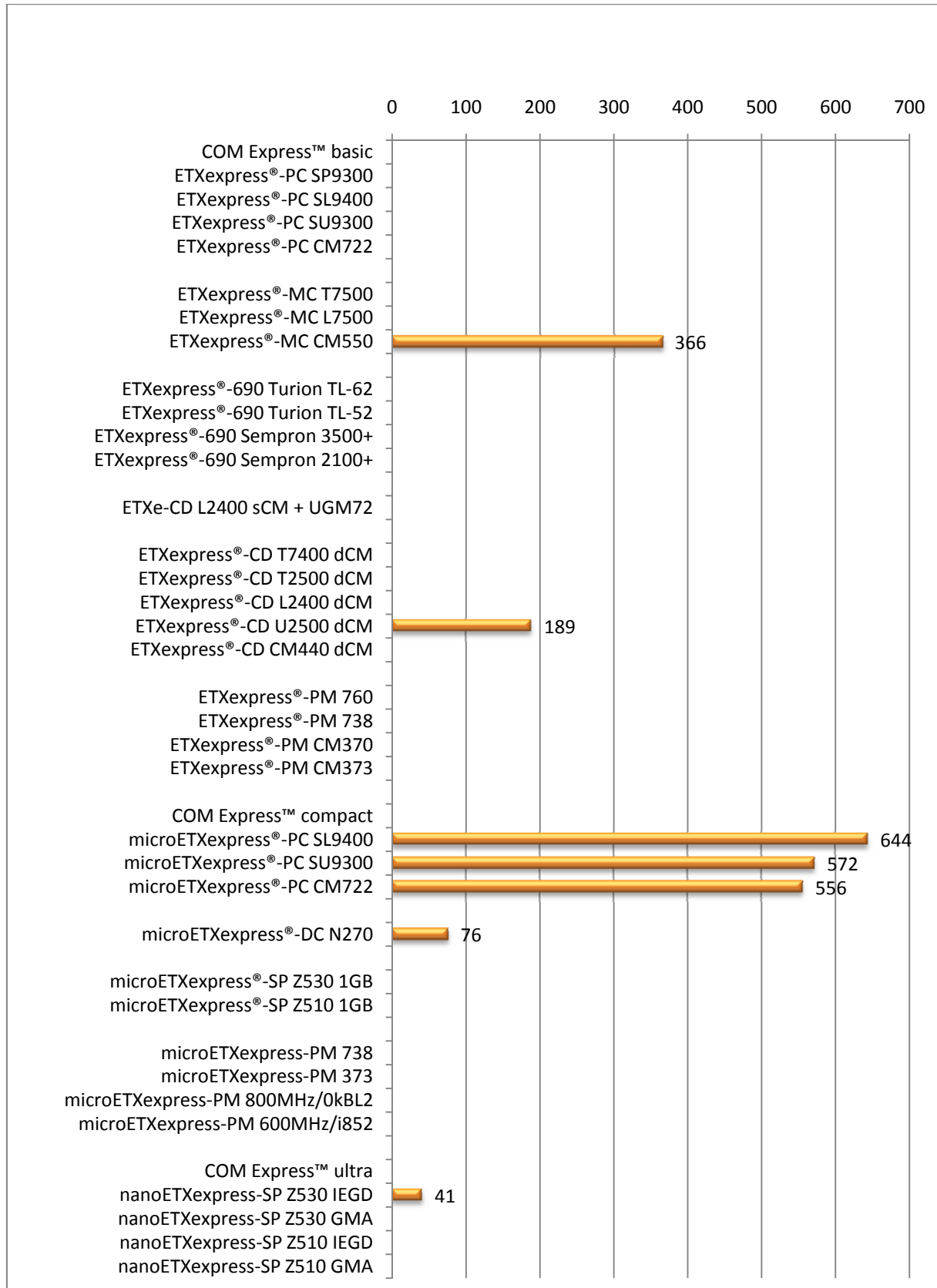


8 Additional Benchmarks

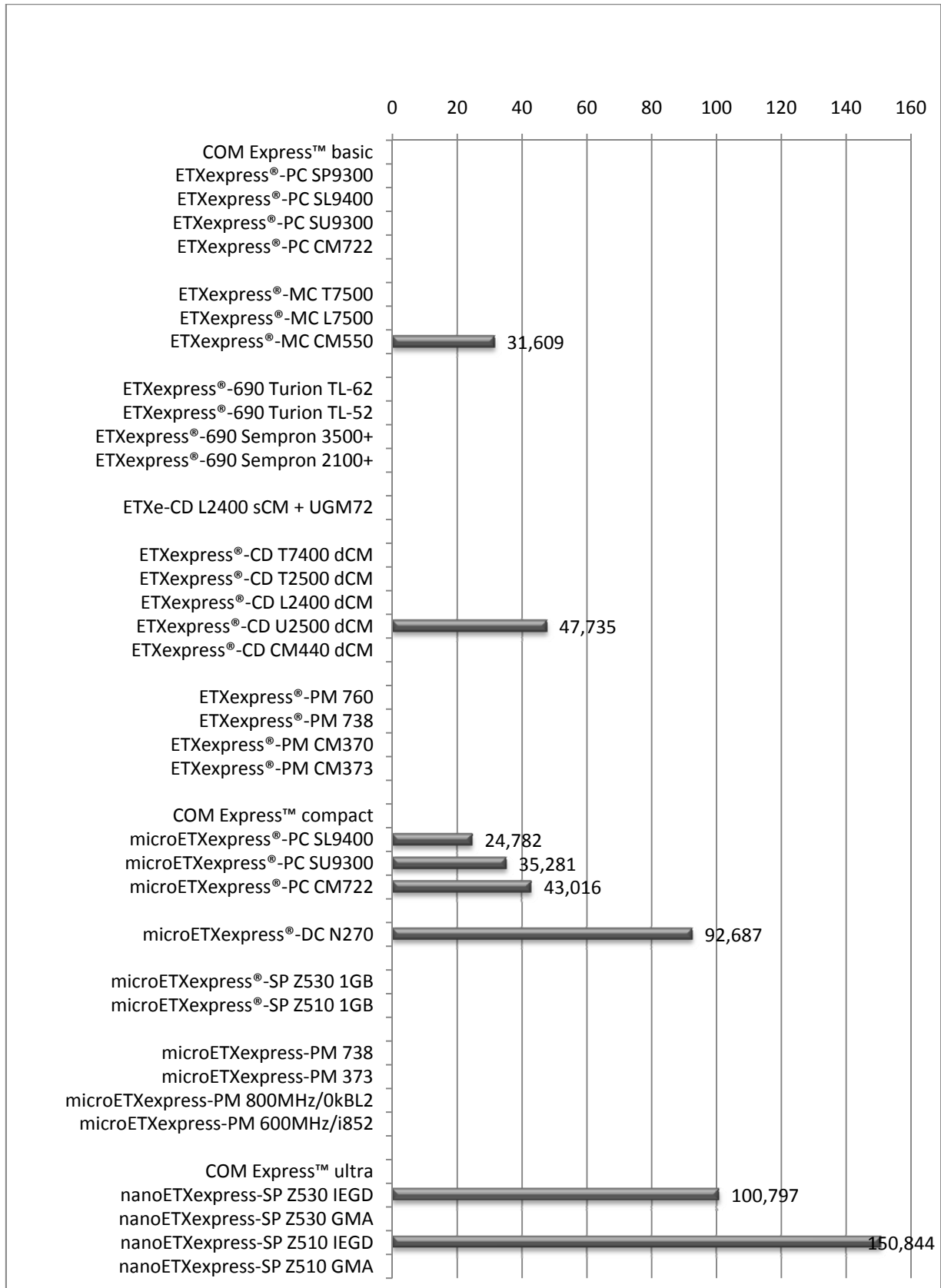
8.1 MadOnion 3DMark®2001 SE



8.2 Futuremark 3DMark®06



8.3 SuperPi 1M



9 Notes

- » dCM: dual Channel Memory. Module is equipped with 2 memory modules
- » GMA: Test is done with Intel® Graphics Media Accelerator driver (standard)
- » IEGD: Test is done with Intel® Embedded Graphics Driver
- » 0: A result of 0 means not supported

10 Appendix A: CPU Overview

10.1 Intel®

CPU	Name	Core	Speed	Cores	Threads	FSB	Cache	Chipset	CPU TDP
T9400	Core2Duo	Penryn	2533 MHz	2	2	1066	6MB L2	GM45	35W
P8400	Core2Duo	Penryn	2266 MHz	2	2	1066	3MB L2	GM45	25W
CM575	CeleronM	Merom	2000 MHz	1	1	533	1MB L2	GM45	31W
SP9300	Core2Duo	Penryn	2266 MHz	2	2	1066	6MB L2	GS45	25W
SL9400	Core2Duo	Penryn	1866 MHz	2	2	1066	6MB L2	GS45	17W
SU9300	Core2Duo	Penryn	1200 MHz	2	2	800	3MB L2	GS45	10W
CM723	CeleronM	Penryn	1200 MHz	1	1	800	1MB L2	GS45	10W
CM722	CeleronM	Penryn	1200 MHz	1	1	667	1MB L2	GS45/GL40	5.5W
T7500	Core2Duo	Merom	2200 MHz	2	2	800	4MB L2	GME965	35W
L7500	Core2Duo	Merom	1600 MHz	2	2	800	4MB L2	GME965	17W
CM550	CeleronM	Merom	1600 MHz	2	2	533	4MB L2	GME965	17W
T7400	Core2Duo	Merom	2166 MHz	2	2	667	4MB L2	945GME	34W
L7400	Core2Duo	Merom	1500MHz	2	2	667	4MB L2	945GME	17W
T2500	CoreDuo	Yonah	2000 MHz	2	2	667	2MB L2	945GME	31W
L2400	CoreDuo	Yonah	1666 MHz	2	2	667	2MB L2	945GME	15W
U2500	CoreDuo	Yonah	1200 MHz	2	2	533	2MB L2	945GME	9W
CM440	CeleronM	Yonah	1866 MHz	1	1	533	1MB L2	945GME	27W
CM423	CeleronM	Yonah	1066 MHz	1	1	533	1MB L2	945GME	5.5W
PM760	PentiumM	Dothan	2000 MHz	1	1	533	2MB L2	915GM	27W
PM738	PentiumM	Dothan	1400 MHz	1	1	400	2MB L2	915GM	10W
CM370	CeleronM	Dothan	1500 MHz	1	1	400	1MB L2	915GM	21W
CM373	CeleronM	Dothan	1000 MHz	1	1	400	512kB L2	915GM 855GME	5.5W
PM738	PentiumM	Dothan	1400 MHz	1	1	400	2MB L2	855GME	10W
CM800	CeleronM	Dothan	800 MHz	1	1	400	512kB L2	852GME	5.5W
CM600	CeleronM	Banias	600 MHz	1	1	400	512kB L2	855GME	-
N270	Atom	Diamondville	1600 MHz	1	2	533	512kB L2	945GSE	2.5W
Z530	Atom	Silverthorne	1600 MHz	1	2	533	512kB L2	US15W	2.2W
Z510	Atom	Silverthorne	1100 MHz	1	1	400	512kB L2	US15W	2.0W

10.2 AMD

CPU	Name	Core	Speed	Cores	Threads	FSB	Cache	Chipset	TDP
TL-62	Turion	Hawk	2000 MHz	2	2			M690	
TL-52	Turion	Hawk	1600 MHz	2	2			M690	
S3500	Sempron	Hawk	1800 MHz	1	1			M690	
S2100	Sempron	Hawk	1000 MHz	1	1			M690	

11 Appendix A: Document Revision History

Revision	Date	Edited by	Changes
110	22-Oct-09	PRO	Initial release
111	10-Dec-09	PRO	Changed doc usage

Corporate Offices

Europe, Middle East & Africa	North America	Asia Pacific
<p>Oskar-von-Miller-Str. 1 85386 Eching/Munich Germany Tel.: +49 (0)8165/ 77 777 Fax: +49 (0)8165/ 77 219 info@kontron.com</p>	<p>14118 Stowe Drive Poway, CA 92064-7147 USA Tel.: +1 888 294 4558 Fax: +1 858 677 0898 info@us.kontron.com</p>	<p>17 Building, Block #1, ABP. 188 Southern West 4th Ring Beijing 100070, P.R.China Tel.: + 86 10 63751188 Fax: + 86 10 83682438 info@kontron.cn</p>

