verdex pro Series Performance and Power Technical Reference

Operating Temperature

PXA270-based verdex pro and verdex COMs

All PXA270-based verdex pro and verdex COMs are built with components rated from at least -25C to 85C. Each COM uses the smaller PXA270(M) model VFBGA which is 13mm x 13mm and rated from -25C to 85C. A verdex-series COM built with components of an industrial operating specification of -40C to 85C is not possible as there is no industrial temperature version of the PXA270 model VFBGA.

PXA255-based basix and connex motherboards

All PXA255-based basix and connex motherboards are built with components rated from 0C to 85C degrees ambient as they are designed for a commercial (so-called nominal) temperature range.

Customers placing a volume order that includes at least 120 basix or connex motherboards may order Gumstix products built with components specified to the extended temperature range specification of -25 C to 85 C degrees ambient. Contact sales for further information. Note that Gumstix, Inc. does not test products at extended temperature ranges.

Basix and connex motherboards built with components of an industrial operating specification of of -40C to 85C are not possible as an industrial temperature version of this PXA255 processor is not available.

Summary

- Rated 0C to 70C: wifistix and netwifimicroSD boards (due to wifi module rating)
- Rated 0C to 85C: basix & connex motherboards,
- Rated -25C to 85C: optional for basix & connex motherboards, standard for verdex motherboards
- Rated -40C to 85C: not available
- Rated -40C to 125C: 80-pin connector.

Component Temp. Rating	**basix**	**connex**	**verdex**	**verdex PRO**	**120-pin connector**	**80-pin connector**	**wifistix and netwifimicroSD-vx**
0C to 70C	-	-	-	·	-	-	standard

0C to 85C	standard	standard	-	·	-	-	-
-25C to 85C	OEM option	OEM option	standard	standard	standard	-	-
-40C to 85C	-	-	-	·	-	-	-
-40C to 125C	-	-	-	·	-	standard	-

Performance Benchmarks: Verdex Pro series

NBench

Summary of nbench results (index relative to K6/233)

CPU clock	Memory Index	Integer Index	Floating Point Index
100MHz Basix COM	0.293	0.303	0.003
200MHz Basix COM	0.560	0.591	0.006
400MHz Basix COM	1.052	1.176	0.012
600MHz Verdex Pro COM	1.525	2.663	0.209

Detail:

	100MHz Basix COM	200MHz Basix COM	400MHz Basix COM	600MHz Verdex Pro COM
NUMERIC SORT	0.36	0.65	1.28	1.67
STRING SORT	0.19	0.39	0.78	1.21
BITFIELD	0.41	0.82	1.63	2.39
FP EMULATION	0.49	0.98	1.94	4.60
FOURIER	0.00	0.01	0.01	0.16
ASSIGNMENT	0.32	0.55	0.92	1.23
IDEA	0.44	0.89	1.78	2.45
HUFFMAN	0.11	0.22	0.43	2.68
NEURAL NET	0.00	0.01	0.01	0.21

LU DECOMPOSITION	0.00	0.01	0.02	0.28

400MHz PXA255-based Gumstix COMs compared to Intel PCs

The nbench CPU benchmarking utility (with floating point tests disabled, since the gumstix CPU has no FPU) yields:

TEST	Iterations/sec.	Old Index	New Index
.	.	Pentium 90	AMD K6/233
NUMERIC SORT	152.44	3 .91	1.28
STRING SORT	10.753	4.80	0.74
BITFIELD	3.6149e+07	6.20	1.30
FP EMULATION	13.023	6.25	1.44
IDEA	393.08	6.01	1.79
HUFFMAN	21.716	0.60	0.19

Baseline: Pentium 90 with 256 KB cache running MSDOS
Baseline: AMD K6/233*, 512 KB L2-cache, gcc 2.7.2.3, libc-5.4.38, Linux 2.0.32

Conclusion: generally about the same speed, or slightly faster, than a 233MHz K6, or about 4-6 times the speed of a Pentium 90.

600MHz PXA270-based Gumstix Verdex Pro COMs compared to Intel PCs

The nbench CPU benchmarking utility (with floating point tests disabled, since the gumstix CPU has no FPU) yields:

TEST	Iterations/sec.	Old Index	New Index
.	.	Pentium 90	AMD K6/233
NUMERIC SORT	198.12	5.08	1.67
STRING SORT	17.469	7.81	1.21
BITFIELD	6.6802e+07	11.46	2.39
FP EMULATION	41.583	19.95	4.60
ASSIGNMENT	1.2438	4.73	1.23
IDEA	538.49	8.24	2.45
HUFFMAN	302.12	8.38	2.68

Baseline: Pentium 90 with 256 KB cache running MSDOS
Baseline: AMD K6/233*, 512 KB L2-cache, gcc 2.7.2.3, libc-5.4.38, Linux 2.0.32

Conclusion: generally about twice as fast as a 233MHz K6, or about 8-10 times the speed of a Pentium 90.

OpenSSL

Using the openssl built-in benchmarking routines, we get the following results for 100, 200, and 400MHz operation:

The numbers in the first set of tables are in 1000s of bytes processed per second.

100MHZ (BASIX COM, LOW POWER USAGE)

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	16 bytes	64 bytes	256 bytes	1024 bytes	8192 bytes
md2	46.26k	101.31k	144.55k	160.86k	167.07k
mdc2	0.00	0.00	0.00	0.00	0.00
md4	393.54k	1376.49k	3971.11k	7629.82k	10345.98k
md5	330.49k	1117.99k	3076.86k	5463.28k	7072.43k
hmac(md5)	436.19k	1412.22k	3587.89k	5863.08k	7192.58k
sha1	305.59k	918.04k	2081.79k	3053.91k	3525.88k
rmd160	281.19k	818.47k	1808.43k	2598.57k	2951.85k
rc4	3063.61k	3465.64k	3574.15k	3606.19k	3603.37k
des cbc	763.32k	800.32k	810.12k	813.40k	813.74k
des ede3	289.23k	295.55k	297.73k	297.64k	296.89k
idea cbc	0.00	0.00	0.00	0.00	0.00
rc2 cbc	656.17k	683.63k	692.14k	692.22k	691.89k
rc5-32/12 cbc	0.00	0.00	0.00	0.00	0.00
blowfish cbc	1548.18k	1709.33k	1754.72k	1767.08k	1772.20k
cast cbc	1340.65k	1463.30k	1500.25k	1505.28k	1497.25k
aes-128__ cbc	776.23k	794.01k	798.96k	800.43k	802.82k
aes-192__ cbc	673.08k	686.98k	689.32k	689.49k	689.56k

aes-256__ cbc	594.05k	605.16k	608.00k	608.94k	609.64k
rsa 512	0.0644s	0.0063s	15.5	157.9	·
rsa 1024	0.3793s	0.0211s	2.6	47.4	·
rsa 2048	2.5150s	0.0760s	0.4	13.2	·
rsa 4096	17.6400s	0.2806s	0.1	3.6	·
dsa 512	0.0606s	0.0746s	16.5	13.4	·
dsa 1024	0.2063s	0.2549s	4.8	3.9	·
dsa 2048	0.7279s	0.8883s	1.4	1.1	·

200MHz (Basix COM, Normal Power Usage)

	16 bytes	64 bytes	256 bytes	1024 bytes	8192 bytes
md2	92.84k	202.82k	288.94k	323.58k	334.76k
mdc2	0.00	0.00	0.00	0.00	0.00
md4	788.33k	2759.13k	8001.96k	15350.00k	20821.33k
md5	664.74k	2241.40k	6160.21k	10982.40k	14188.54k
hmac(md5)	2830.57k	7192.32k	11762.21k	14355.11k	
sha1	612.91k	1834.31k	4166.83k	6142.98k	7099.73k
rmd160	562.54k	1640.66k	3625.56k	5213.78k	5944.66k
rc4	6181.86k	6938.33k	7167.23k	7237.29k	7244.46k
des cbc	1527.21k	1603.73k	1625.26k	1630.47k	1632.94k
des ede3	580.76k	590.63k	595.29k	594.94k	596.81k
idea cbc	0.00	0.00	0.00	0.00	0.00
rc2 cbc	1319.10k	1368.67k	1385.90k	1386.84k	1387.18k
rc5-32/12 cbc	0.00	0.00	0.00	0.00	0.00
blowfish cbc	3093.78k	3420.46k	3513.71k	3538.83k	3549.87k
cast cbc	2693.77k	2931.69k	3002.10k	3016.02k	3022.85k
aes-128 cbc	1554.86k	1591.38k	1604.10k	1602.89k	1605.63k
aes-192 cbc	1350.18k	1375.38k	1386.67k	1386.15k	1387.18k
aes-256 cbc	1191.95k	1213.01k	1220.86k	1219.49k	1220.61k

	sign	verify	sign/s	verify/s
rsa 512	0.0322s	0.0031s	31.1	317.6
rsa 1024	0.1892s	0.0106s	5.3	94.7
rsa 2048	1.2550s	0.0379s	0.8	26.4
rsa 4096	8.8000s	0.1400s	0.1	7.1
dsa 512	0.0306s	0.0375s	32.6	26.7
dsa 1024	0.1029s	0.1256s	9.7	8.0
dsa 2048	0.3646s	0.4417s	2.7	2.3

400MHz (Basix COM, High Performance)

	16 bytes	64 bytes	256 bytes	1024 bytes	8192 bytes
md2	185.77k	405.75k	578.73k	647.85k	668.51k
mdc2	0.00	0.00	0.00	0.00	0.00
md4	1578.55k	5532.71k	15993.17k	30620.34k	41662.57k
md5	1332.86k	4487.17k	12360.96k	22023.85k	28378.84k
hmac(md5)	1749.41k	5669.67k	14406.83k	23486.93k	28868.61k
sha1	1229.43k	3672.77k	8359.42k	12306.43k	14203.12k
rmd160	3286.40k	7262.38k	10411.58k	11905.71k	
rc4	12360.15k	13850.09k	14317.78k	14487.55k	14460.66k
des cbc	3059.32k	3213.85k	3255.30k	3257.96k	3268.61k
des ede3	1163.55k	1182.44k	1192.19k	1195.01k	1191.81k
idea cbc	0.00	0.00	0.00	0.00	0.00
rc2 cbc	2638.79k	2734.94k	2771.11k	2781.18k	2772.68k
rc5-32/12 cbc	0.00	0.00	0.00	0.00	0.00
blowfish cbc	6215.79k	6862.21k	7045.12k	7078.61k	7107.93k
cast cbc	5393.76k	5853.50k	6007.04k	6048.09k	6033.04k
aes-128 cbc	3113.35k	3187.56k	3207.59k	3206.59k	3213.99k
aes-192 cbc	2704.38k	2748.19k	2769.58k	2776.41k	2767.20k
aes-256 cbc	2379.83k	2429.59k	2441.13k	2439.45k	2446.68k

	sign	verify	sign/s	verify/s
rsa 512	0.0162s	0.0016s	61.9	635.0
rsa 1024	0.0946s	0.0053s	10.6	190.2
rsa 2048	0.6269s	0.0190s	1.6	52.7
rsa 4096	4.4033s	0.0700s	0.2	14.3
dsa 512	0.0155s	0.0185s	64.6	54.2
dsa 1024	0.0518s	0.0631s	19.3	15.9
dsa 2048	0.1835s	0.2268s	5.5	4.4

600MHz (Verdex Pro COM)

type	16 bytes	64 bytes	256 bytes	1024 bytes	8192 bytes
md2	282.78k	606.51k	848.45k	942.62k	973.82k
mdc2	0.00	0.00	0.00	0.00	0.00
md4	2634.43k	9420.08k	28310.55k	57254.48k	81504.67k
md5	465.30k	1813.98k	6460.61k	19356.65k	46506.43k
hmac(md5)	3051.44k	10100.94k	26536.94k	44983.44k	56394.60k
sha1	2033.62k	5865.49k	12778.97k	18139.38k	20664.46k
rmd160	1911.88k	5697.61k	12846.38k	18774.12k	21678.96k
rc4	22798.54k	26916.70k	28182.38k	28518.06k	28617.75k
des cbc	5024.72k	5329.48k	5410.50k	5432.96k	5438.73k
des ede3	1865.20k	1913.64k	1926.02k	1929.66k	1931.36k
idea cbc	0.00	0.00	0.00	0.00	0.00
rc2 cbc	4463.39k	4675.36k	4730.57k	4745.66k	4749.73k
rc5-32/12 cbc	0.00	0.00	0.00	0.00	0.00
blowfish cbc	10342.48k	11625.32k	11991.90k	12092.35k	12114.39k
cast cbc	9461.19k	10454.36k	10733.77k	10805.23k	10824.32k
aes-128 cbc	5086.03k	5220.37k	5260.12k	5272.53k	5273.26k
aes-192 cbc	4420.21k	4516.70k	4547.73k	4555.05k	4557.14k
aes-256 cbc	3905.70k	3981.27k	4004.37k	4011.57k	4011.91k

	sign	verify	sign/s	verify/s
rsa 512 bits	0.0051s	0.0004s	197.0	2327.5
rsa 1024 bits	0.0244s	0.0013s	41.0	778.6
rsa 2048 bits	0.1452s	0.0042s	6.9	237.8
rsa 4096 bits	0.9618s	0.0147s	1.0	68.1
dsa 512 bits	0.0046s	0.0052s	217.4	194.1
dsa 1024 bits	0.0127s	0.0149s	79.0	67.1
dsa 2048 bits	0.0407s	0.0503s	24.6	19.9