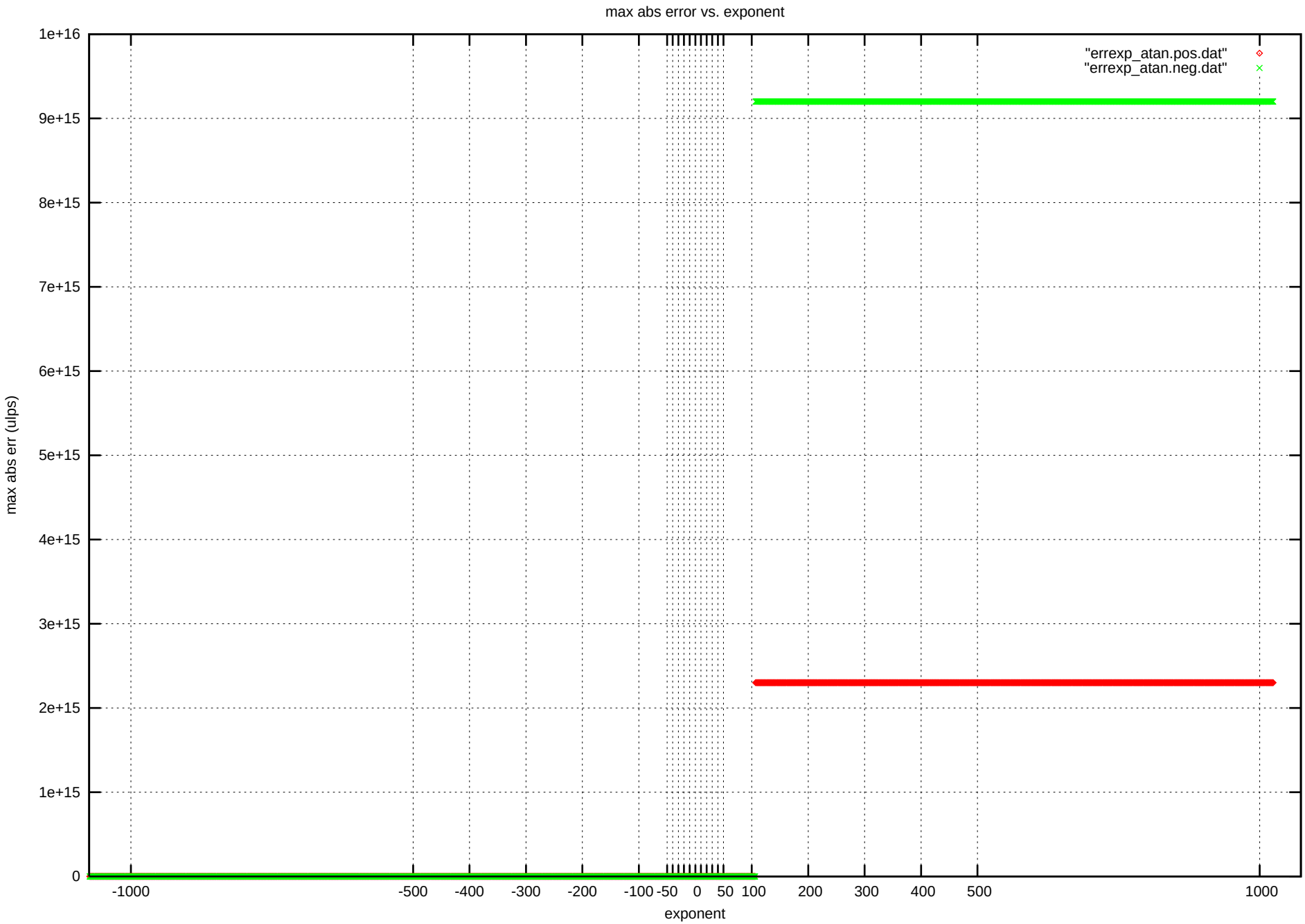
Accuracy Graphs for Scalar and Vector MASS Libraries for Blue Gene/L

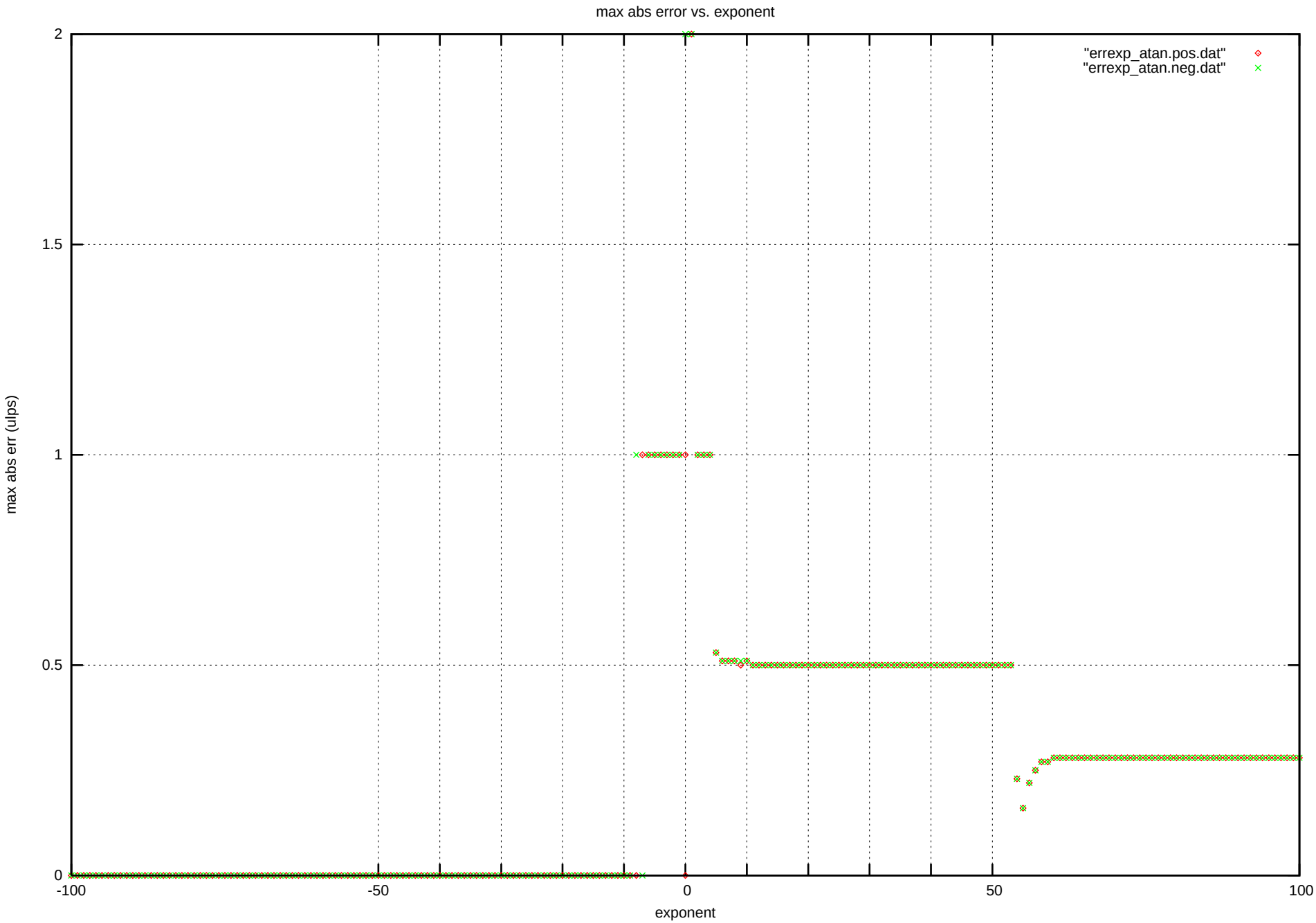
These graphs plot the observed error in ulps vs. the argument for most of the MASS functions. The observed errors were obtained by evaluating the function at 1000 random arguments for each floating-point exponent in the range tested, and comparing to the corresponding system quadruple-precision functions. (Some of the graphs are missing due to problems with the associated Linux quadruple-precision functions.)

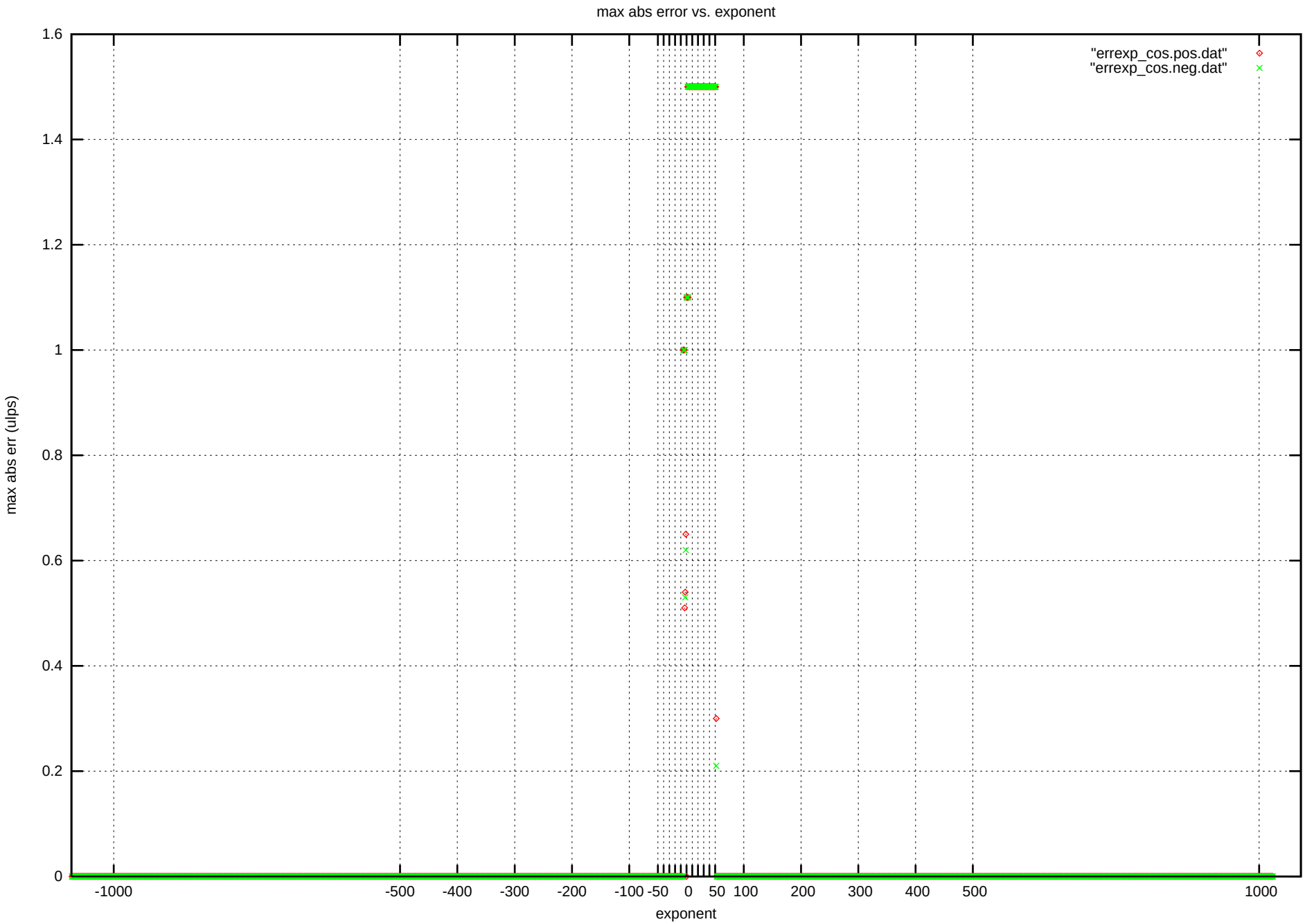
The horizontal axis represents the power-of-two floating-point exponent of the tested arguments. Each point on the graphs represents the maximum observed error for all tested arguments with that exponent. The red points represent positive arguments and the green points, negative arguments. If only a green point appears for a particular exponent, it means the red point is underneath it and not visible.

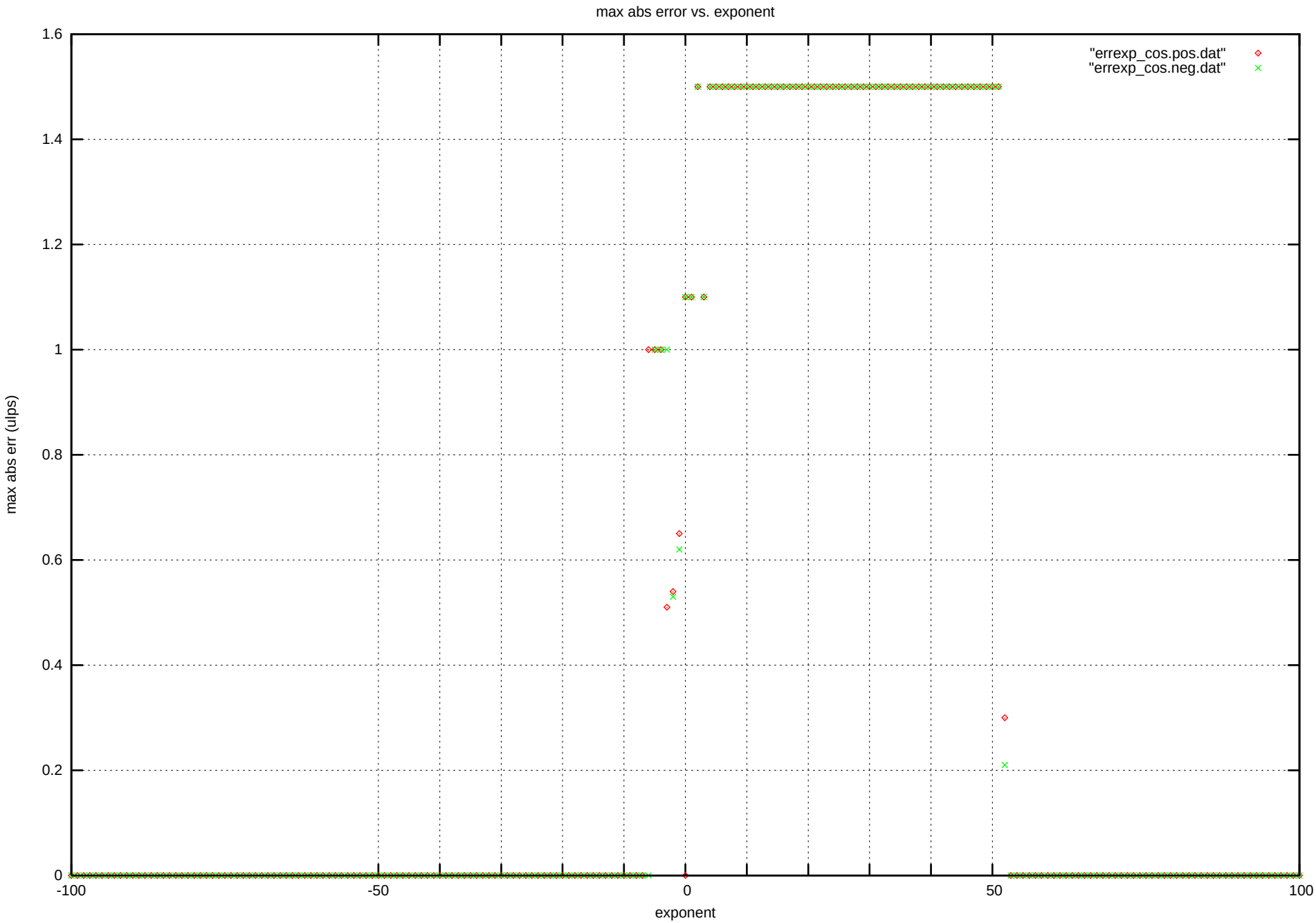
The bookmarks in this document lead to the first graph for the named function. Each function has two graphs: first a wide-range graph, covering the whole floating-point range, followed by a close-up graph, zooming-in on a smaller range. The sincos family of functions has separate graphs for the sin and the cos output.

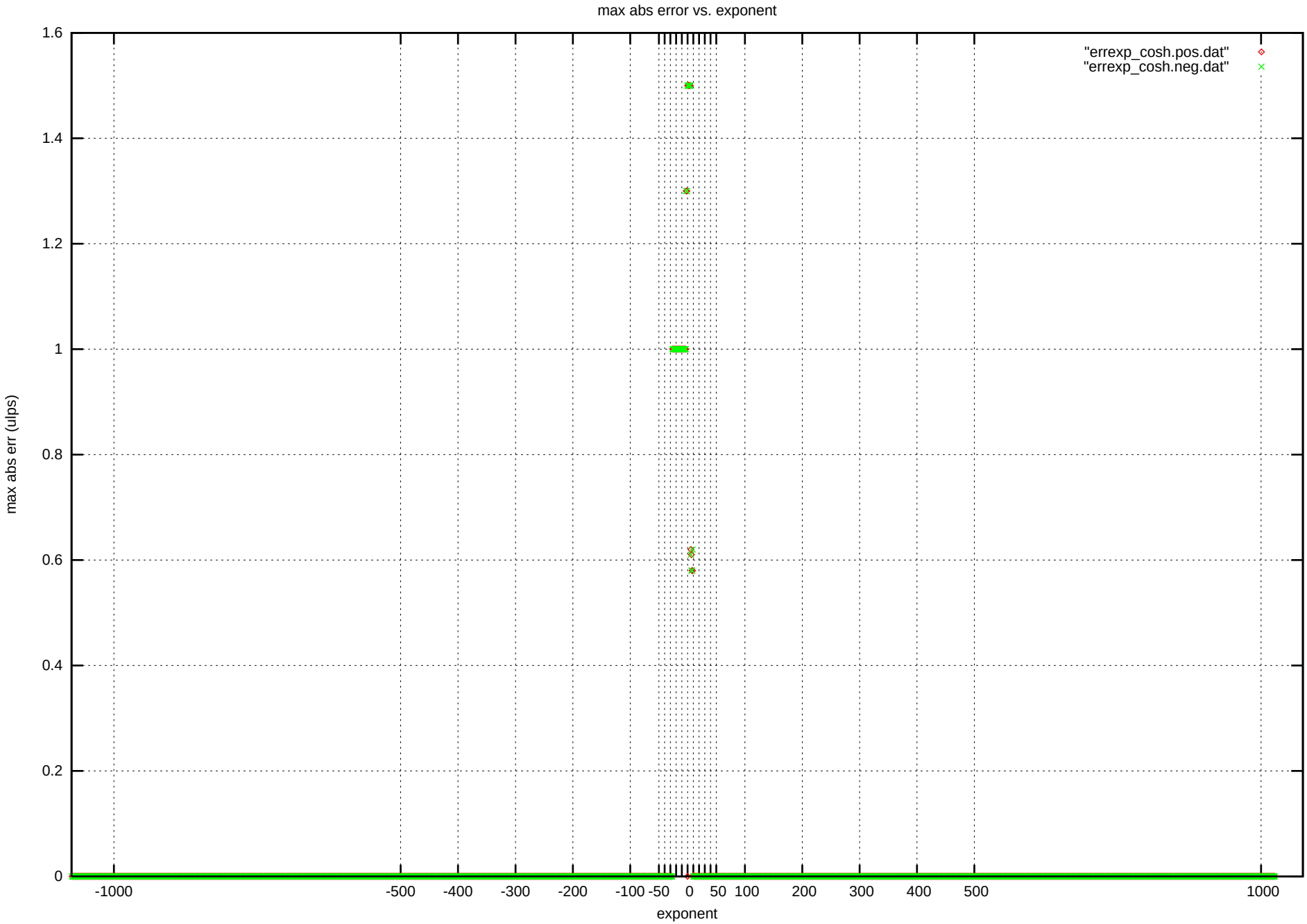
For the functions with two input arguments (e.g. atan2) the horizontal axis refers to the first argument, and the plots for all tested values of the second argument are superimposed.

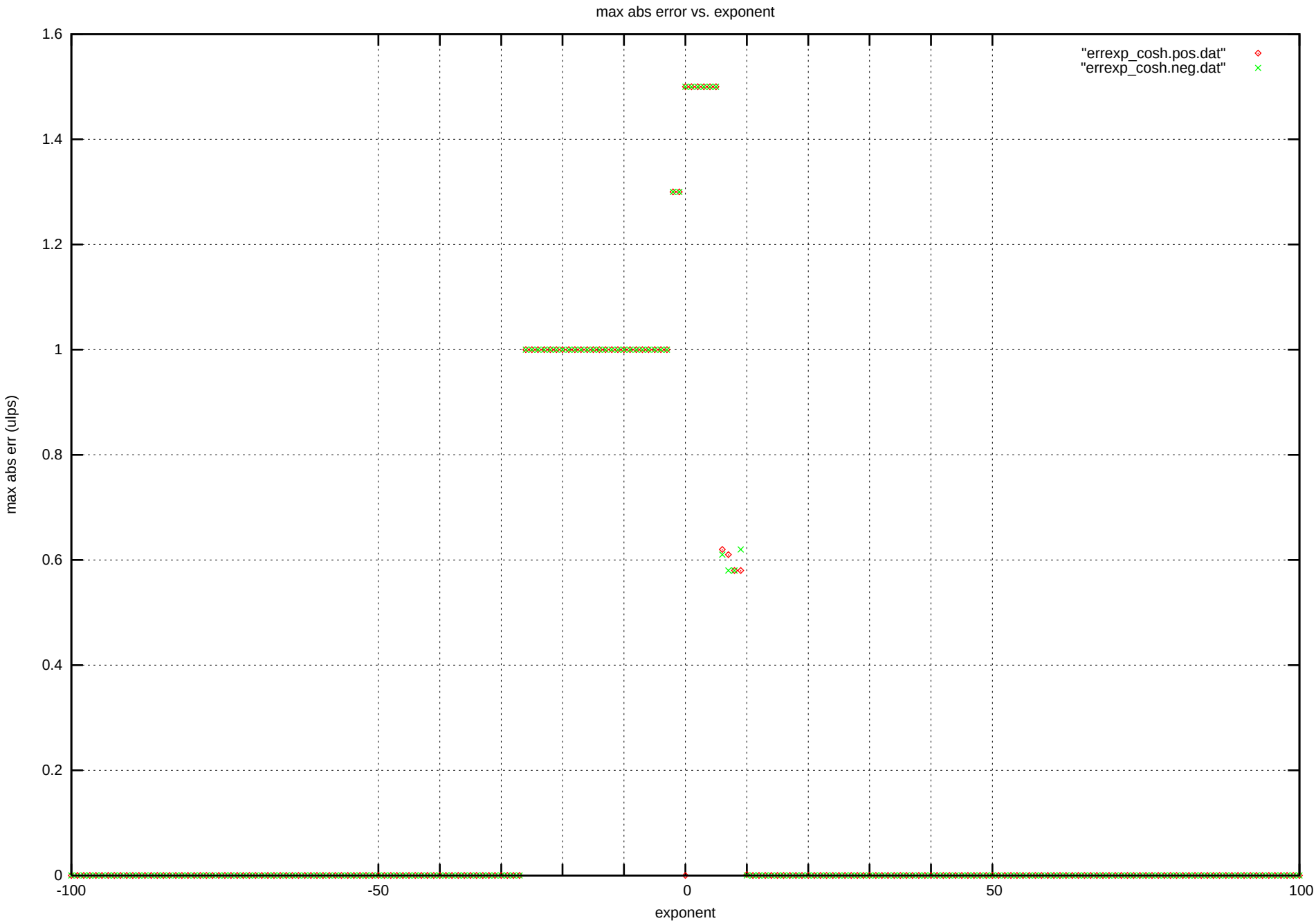

max abs error vs. exponent
"errexp_atan.pos.dat"
"errexp_atan.neg.dat"
max abs err (ulps)
1e+16
9e+15
8e+15
7e+15
6e+15
5e+15
4e+15
3e+15
2e+15
1e+15
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent

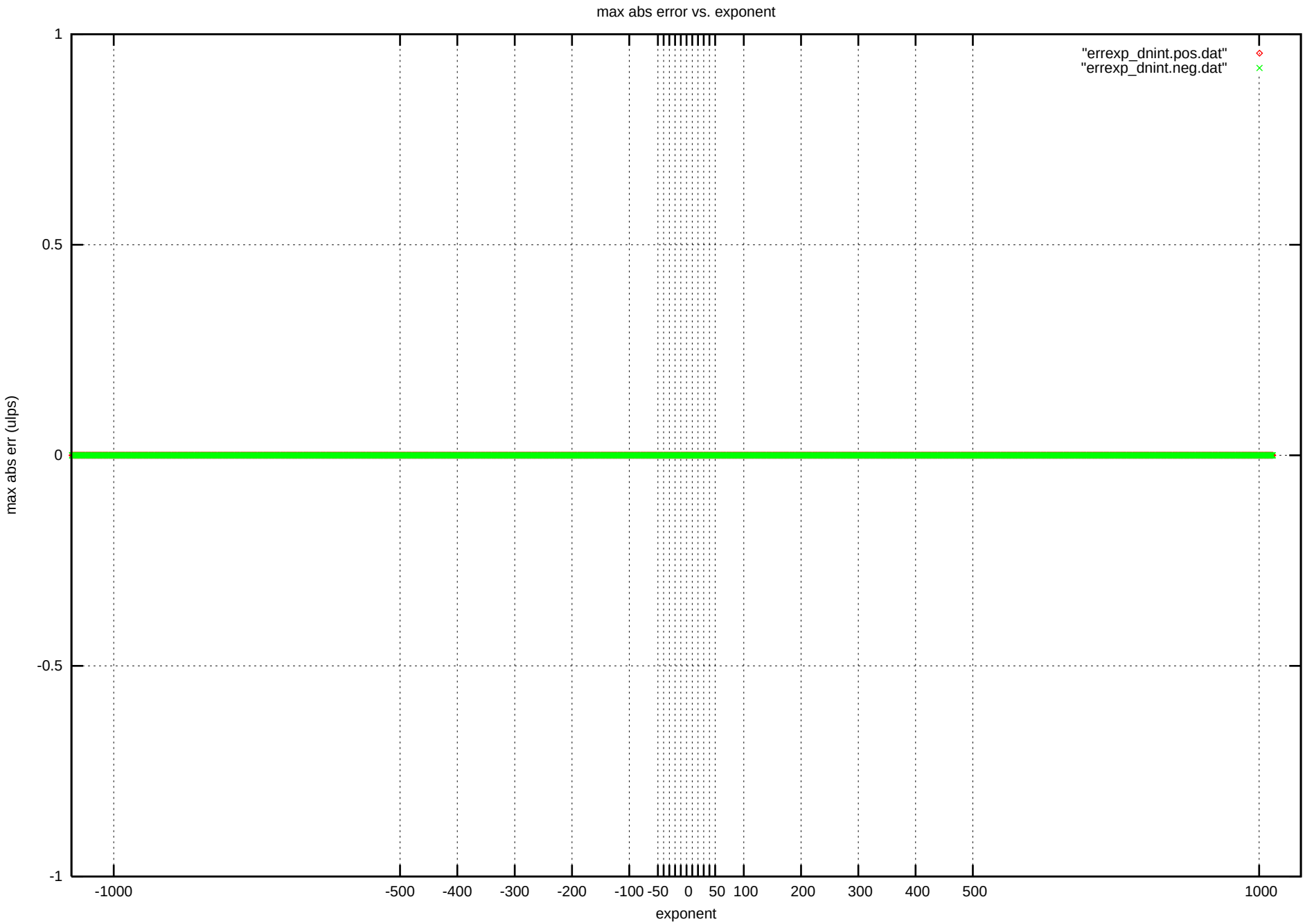

max abs error vs. exponent
"errexp_atan.pos.dat"
"errexp_atan.neg.dat"
max abs err (ulps)
exponent
2
1.5
1
0.5
0
-100
-50
0
50
100

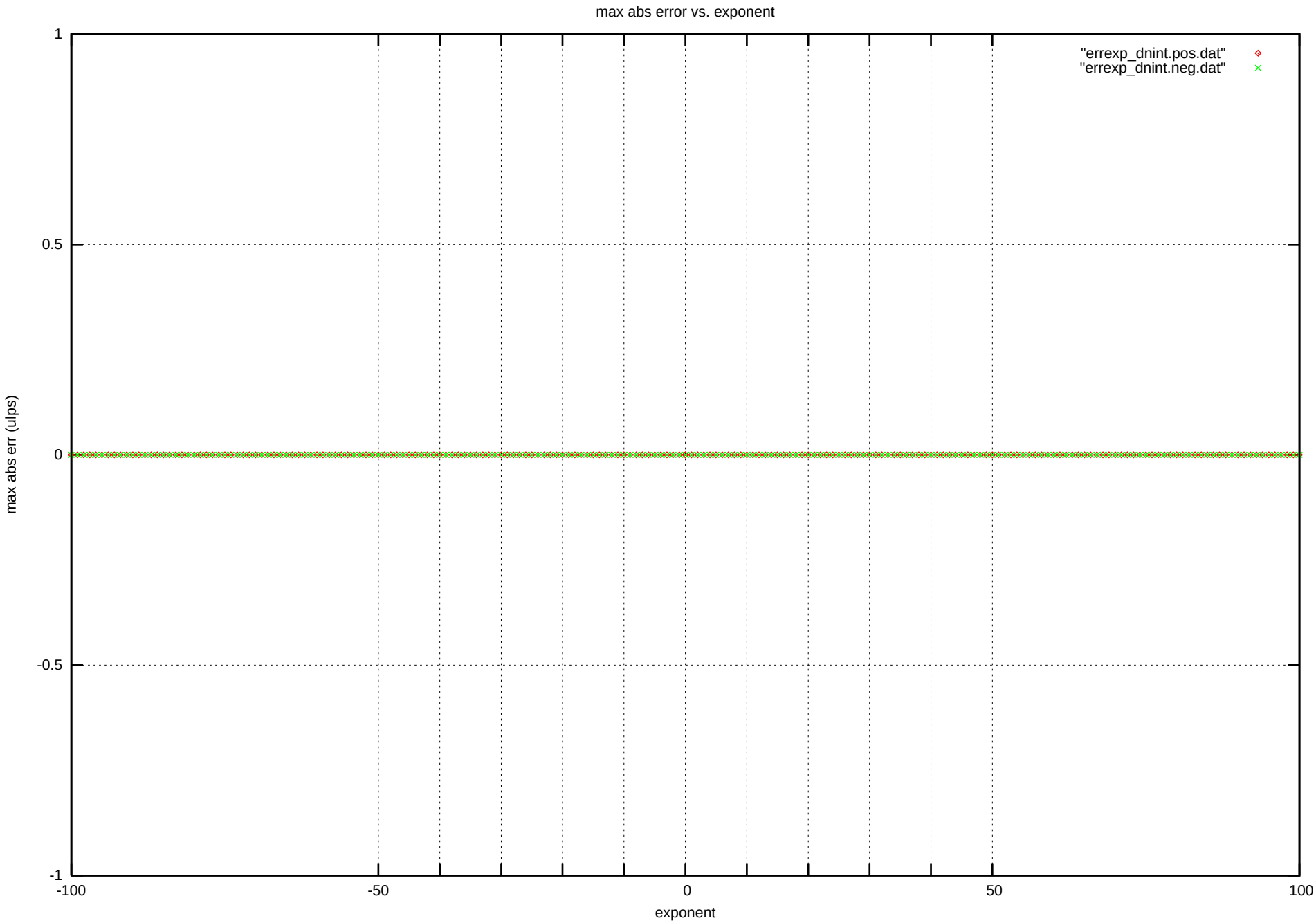

max abs error vs. exponent
"errexp_cos.pos.dat"
"errexp_cos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

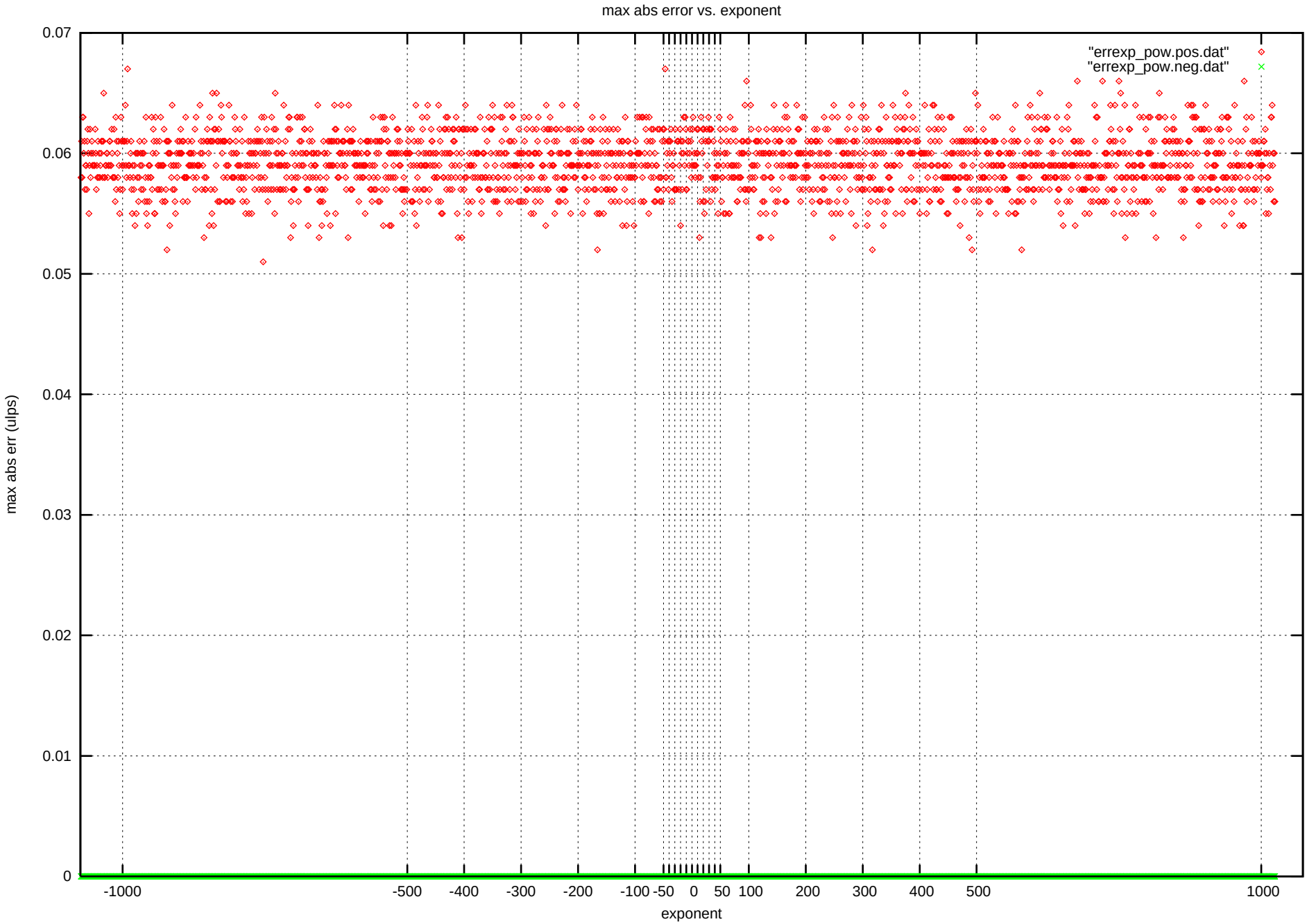

max abs error vs. exponent
"errexp_cos.pos.dat"
"errexp_cos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

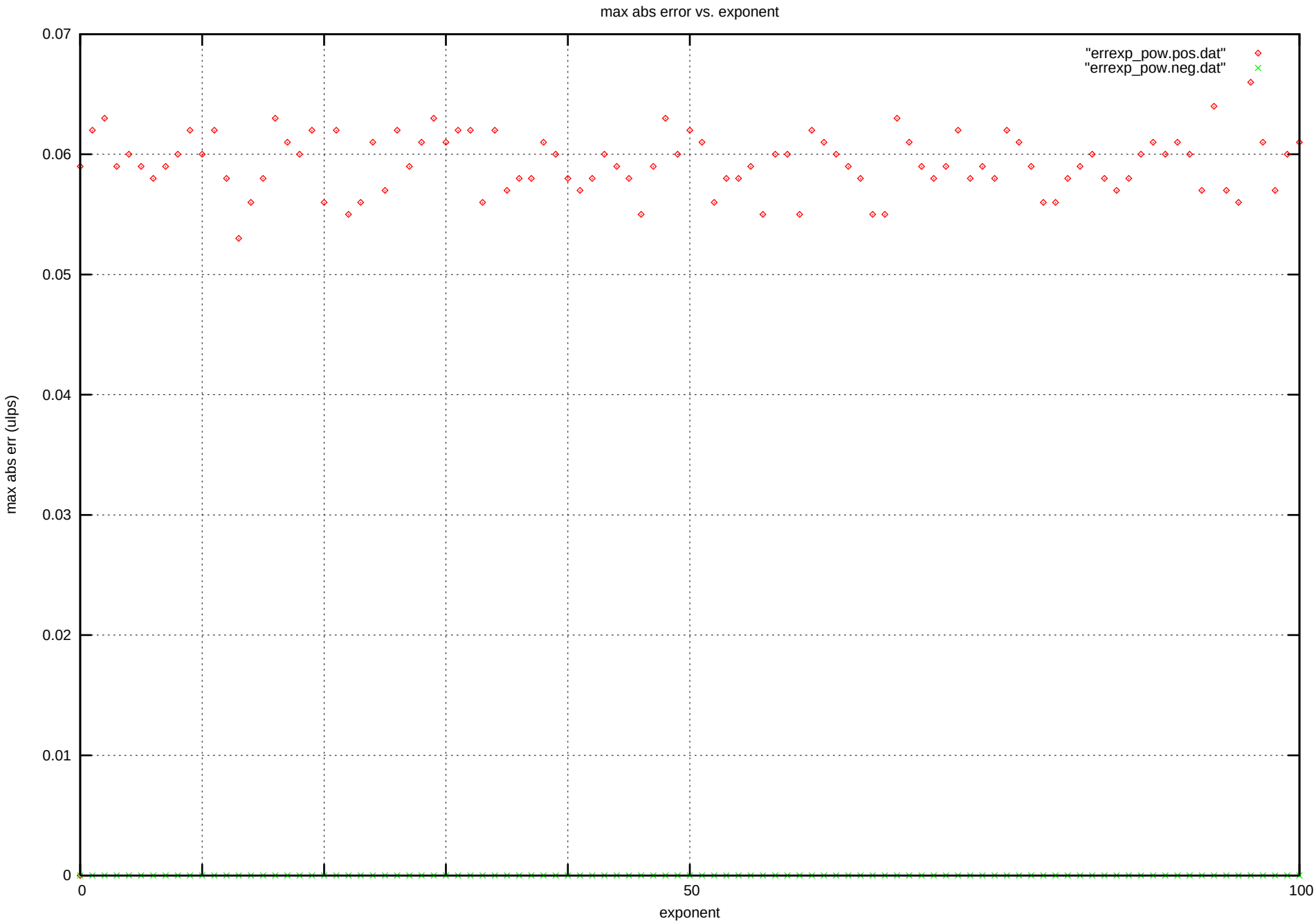

max abs error vs. exponent
"errexp_cosh.pos.dat"
"errexp_cosh.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

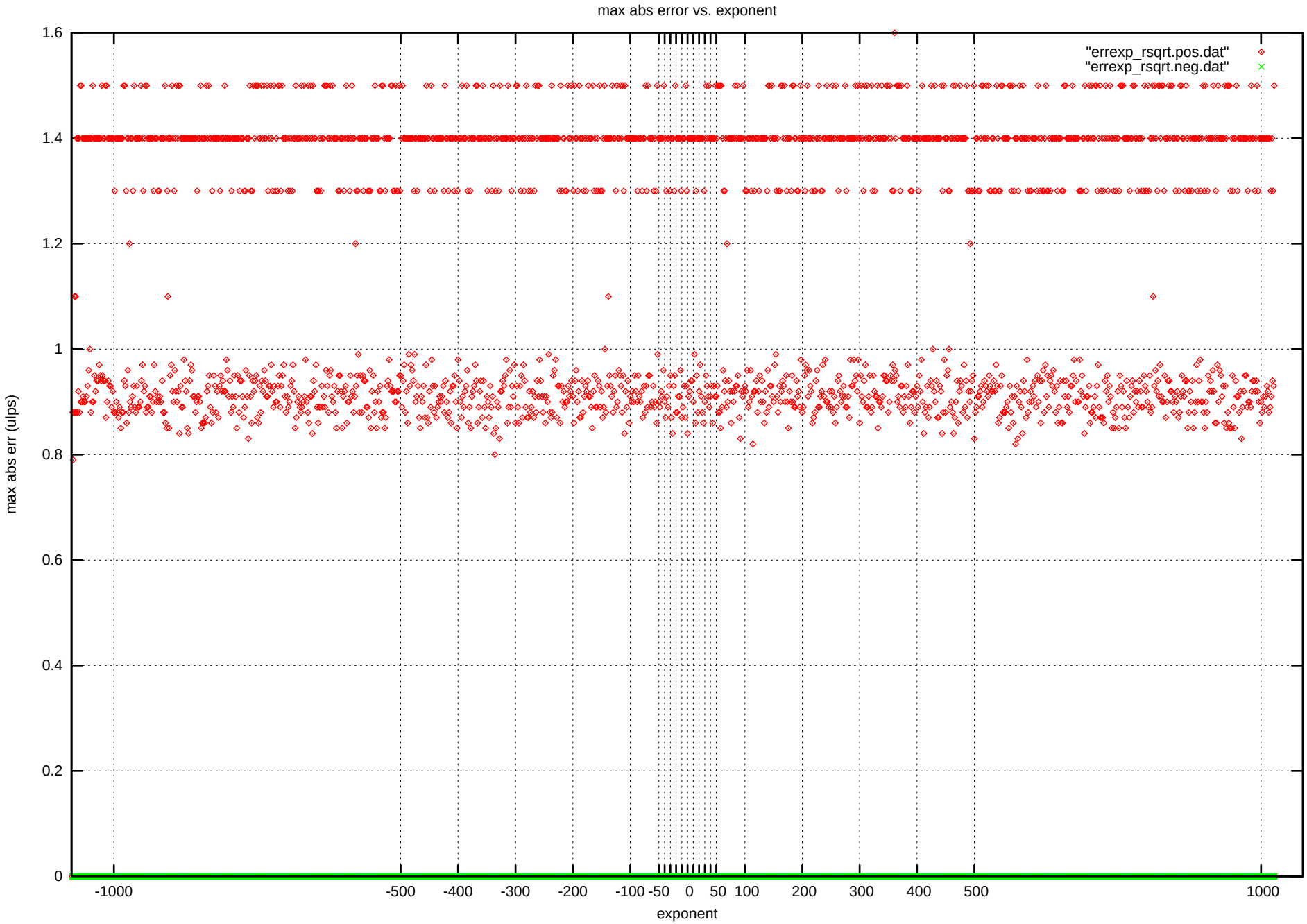

max abs error vs. exponent
"errexp_cosh.pos.dat"
"errexp_cosh.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

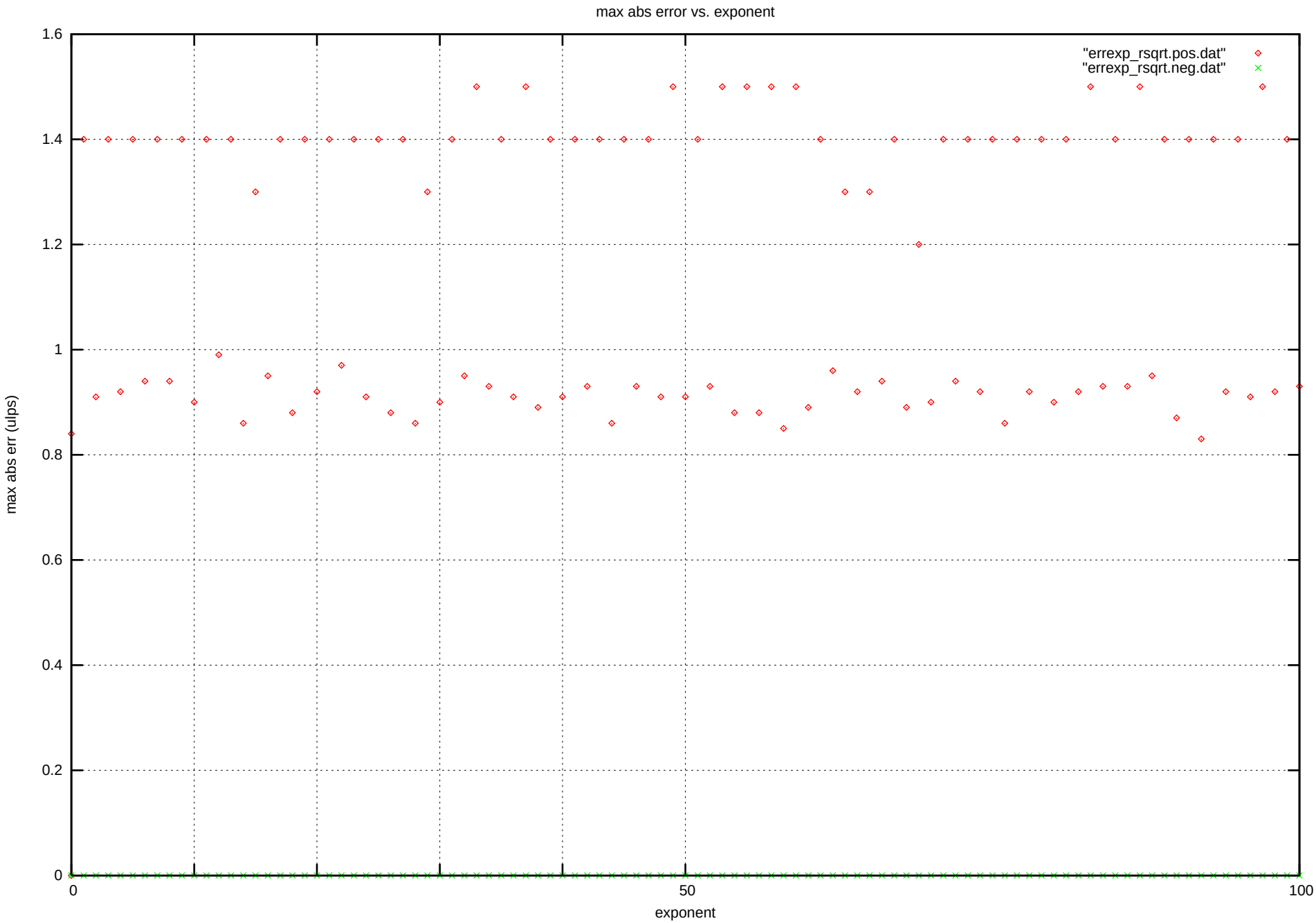

max abs error vs. exponent
"errexp_dnint.pos.dat"
"errexp_dnint.neg.dat"
max abs err (ulps)
1
0.5
0
-0.5
-1
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent

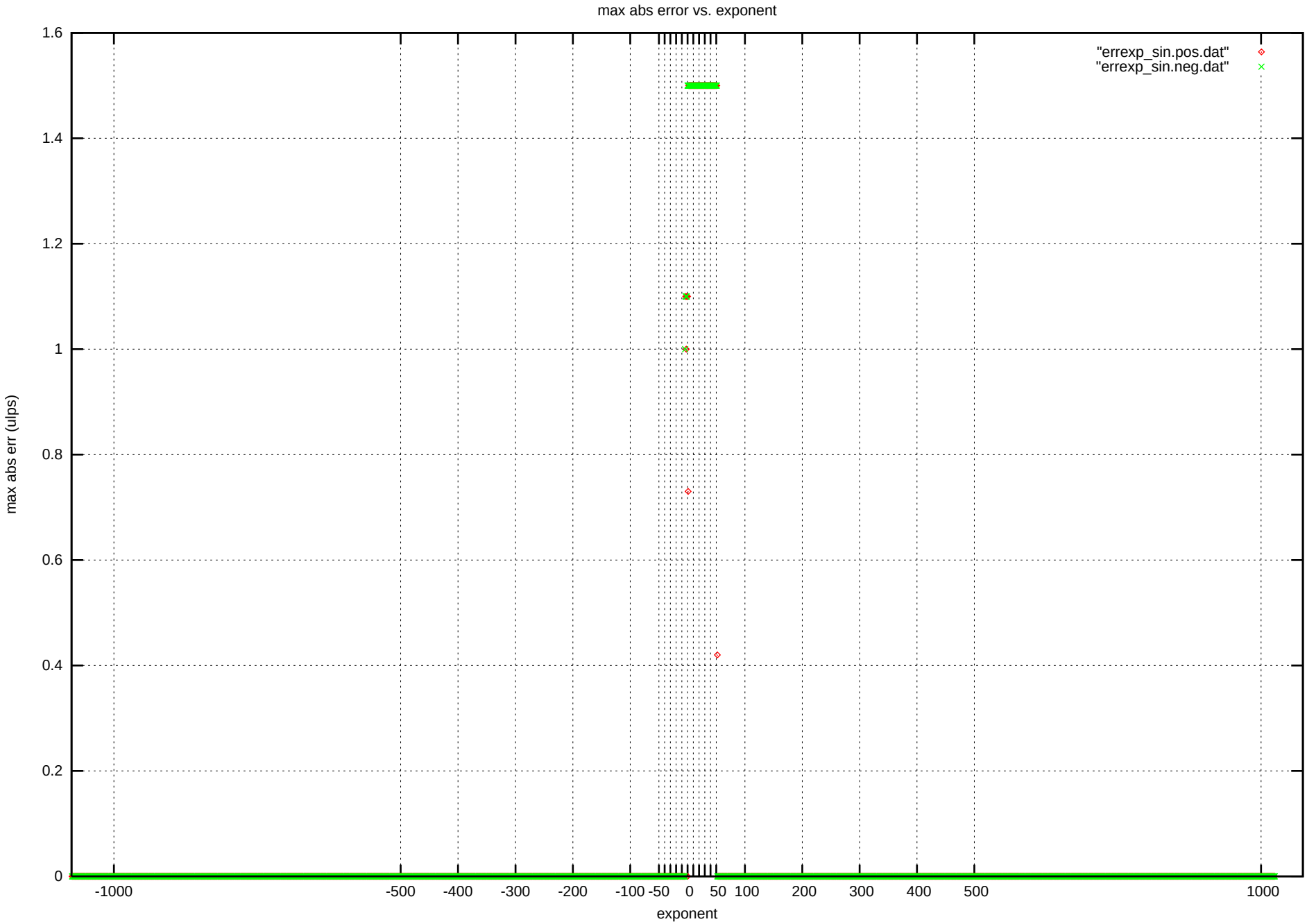

max abs error vs. exponent
"errexp_dnint.pos.dat"
"errexp_dnint.neg.dat"
max abs err (ulps)
exponent
1
0.5
0
-0.5
-1
-100
-50
0
50
100

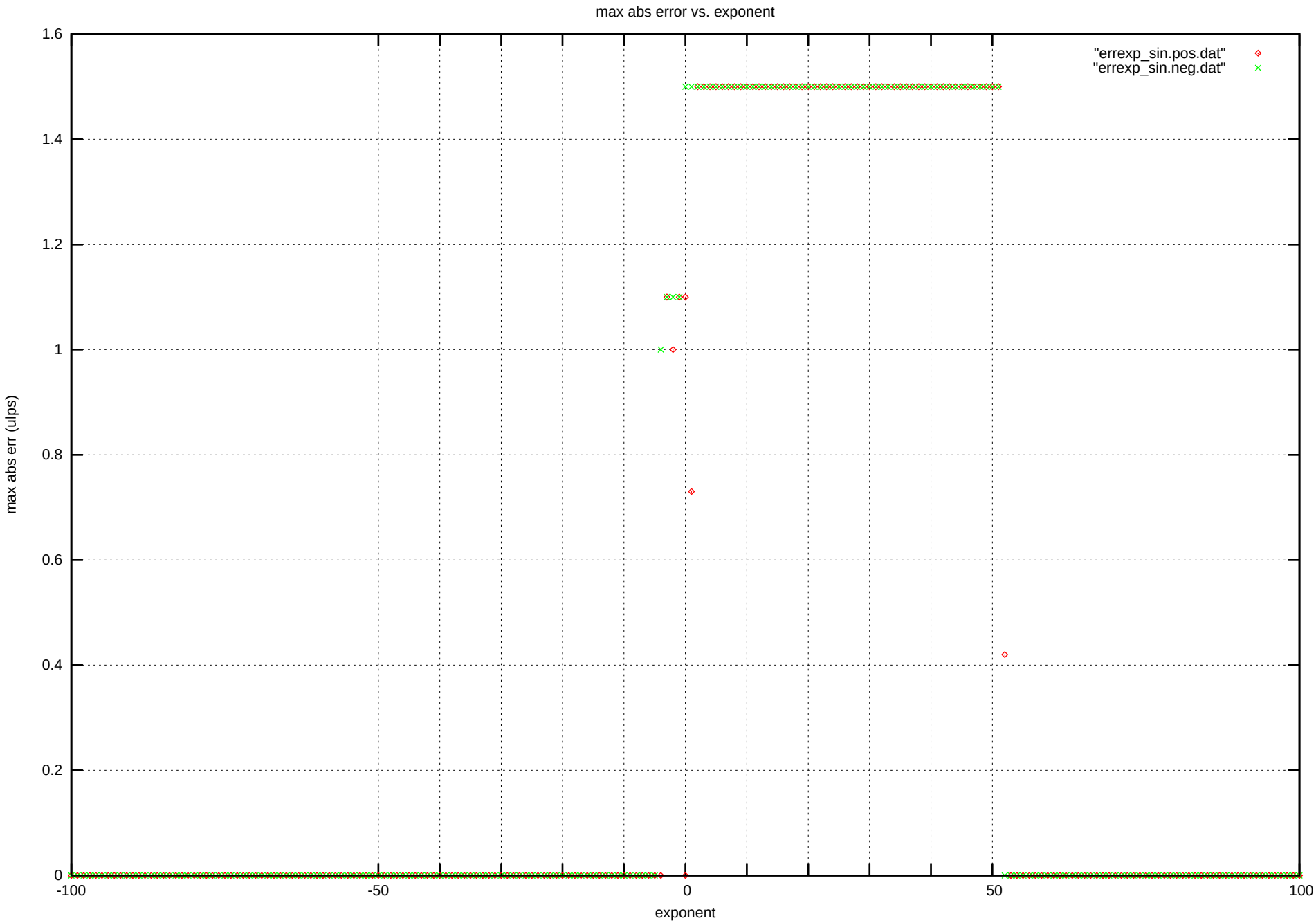

max abs error vs. exponent
"errexp_pow.pos.dat"
"errexp_pow.neg.dat"
max abs err (ulps)
exponent
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

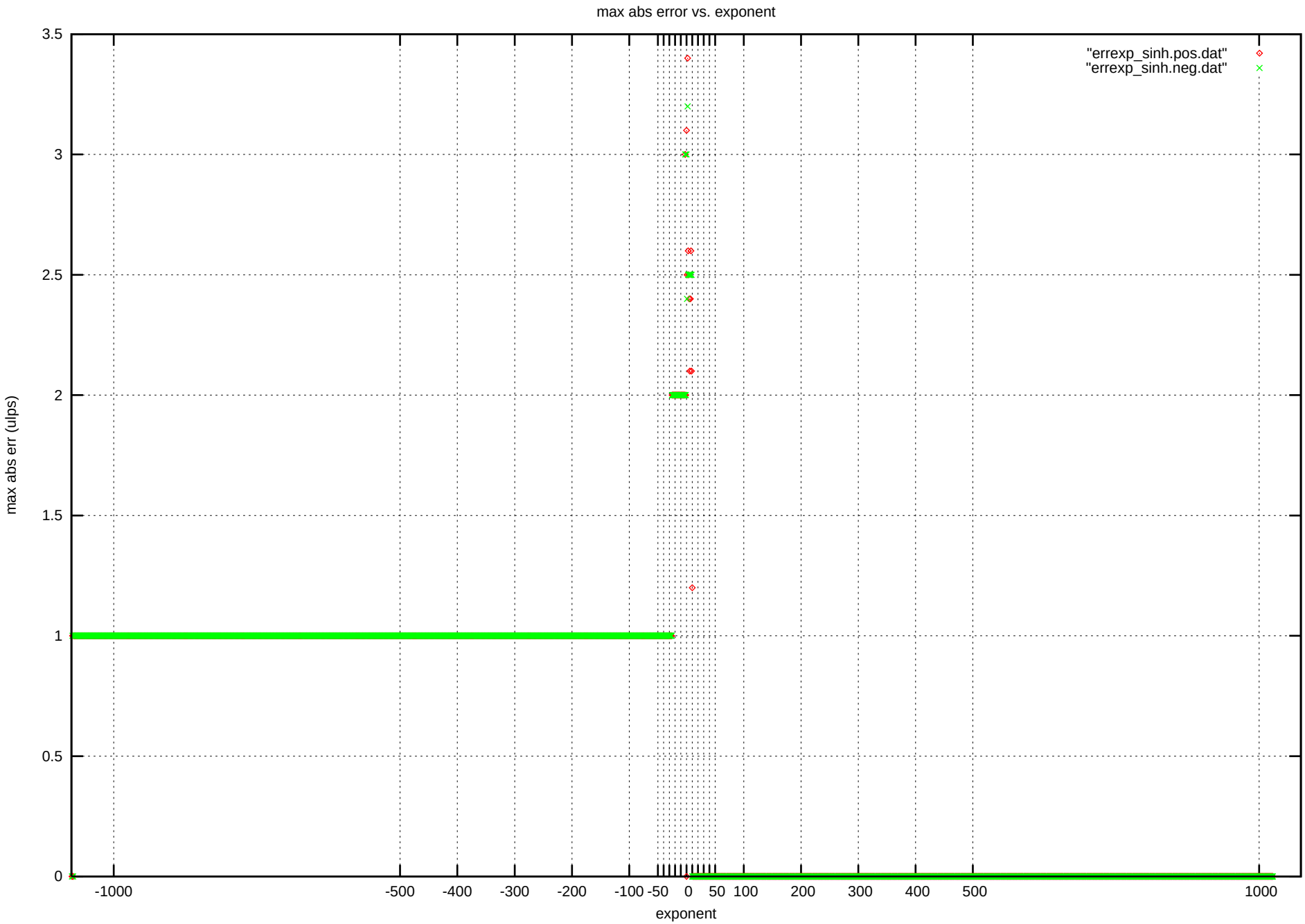

max abs error vs. exponent
"errexp_pow.pos.dat"
"errexp_pow.neg.dat"
max abs err (ulps)
exponent
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100

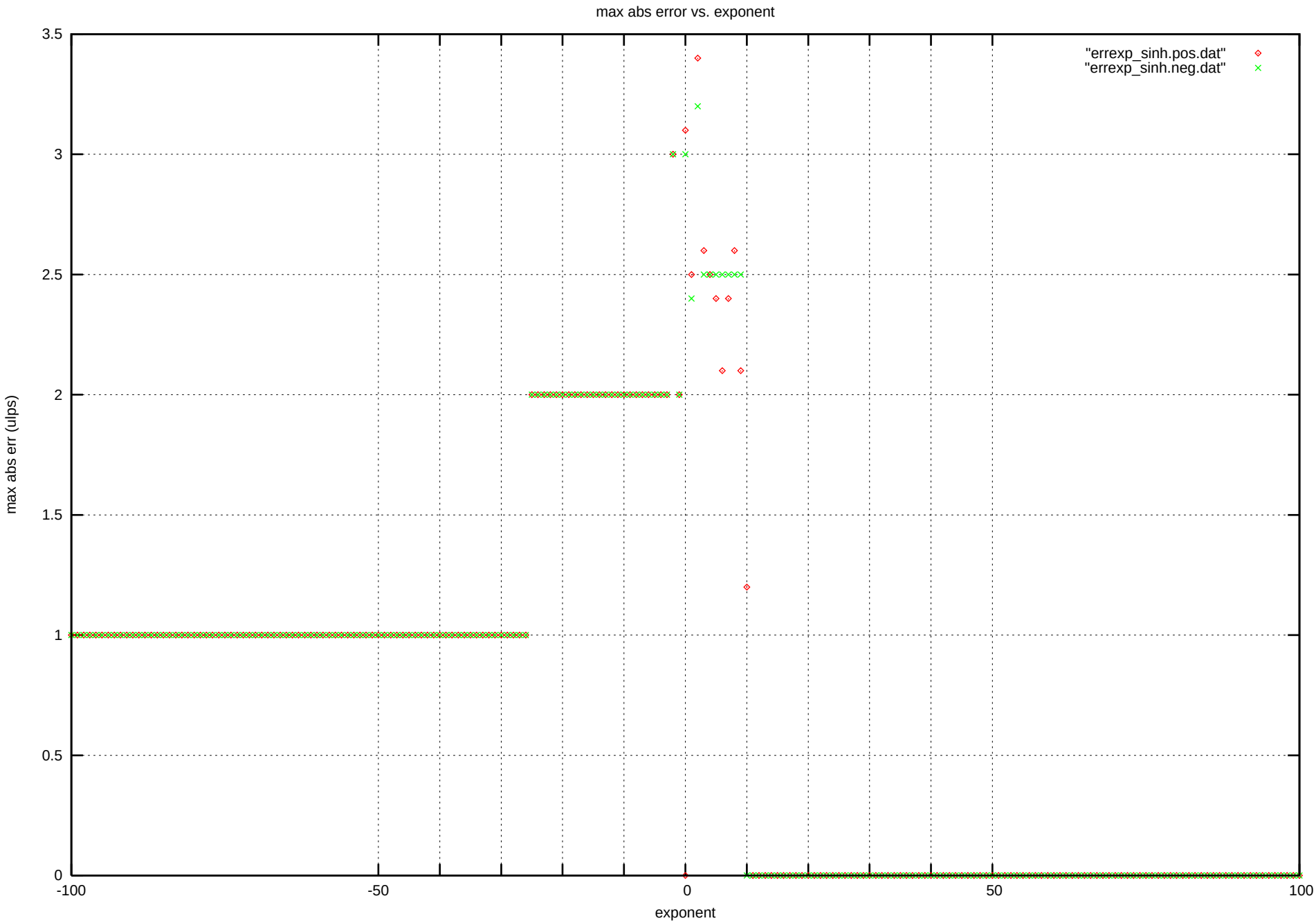

max abs error vs. exponent
"errexp_rsqrt.pos.dat"
"errexp_rsqrt.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_rsqrt.pos.dat"
"errexp_rsqrt.neg.dat"
max abs err (ulps)
exponent
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
0
50
100

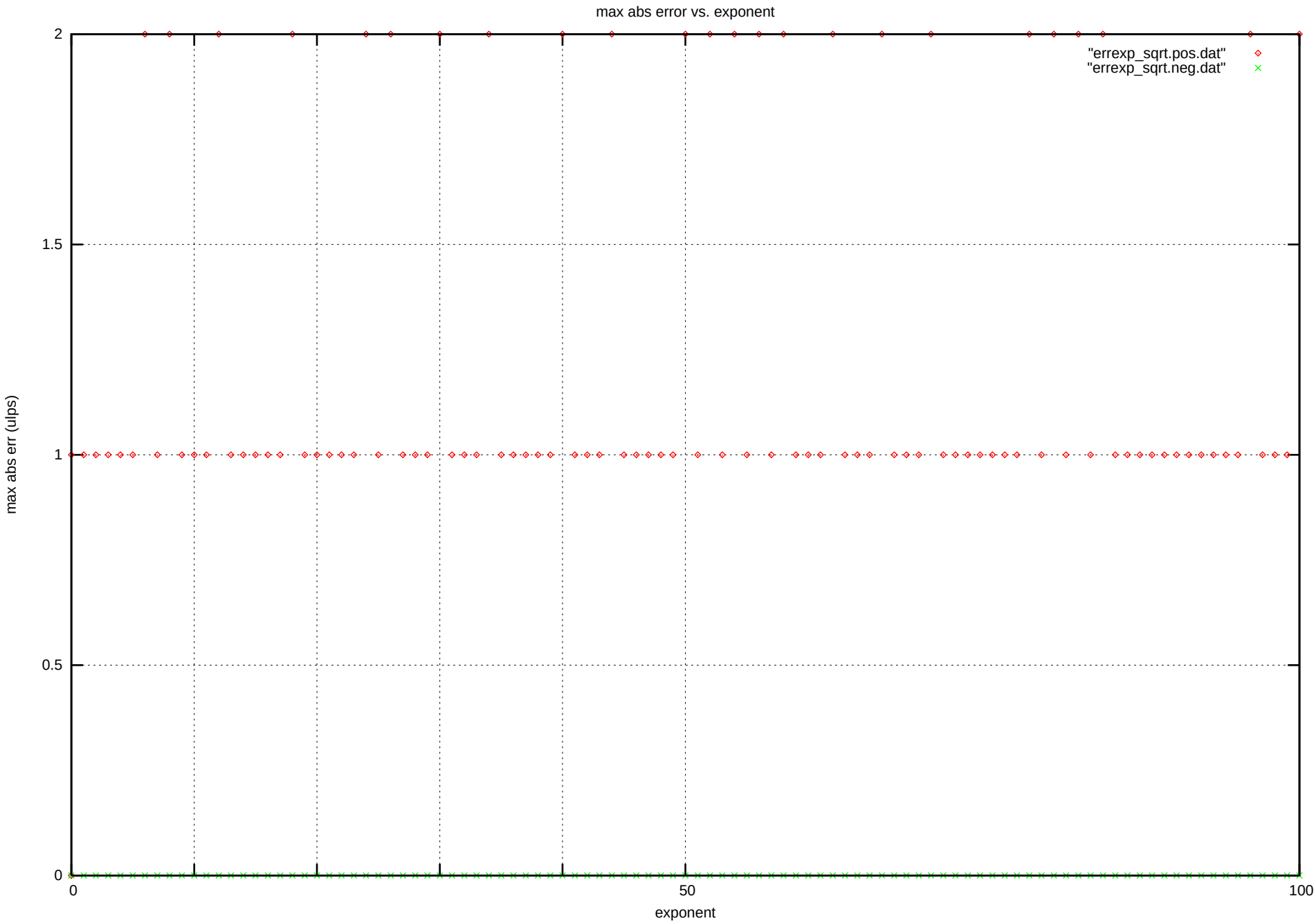

max abs error vs. exponent
"errexp_sin.pos.dat"
"errexp_sin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

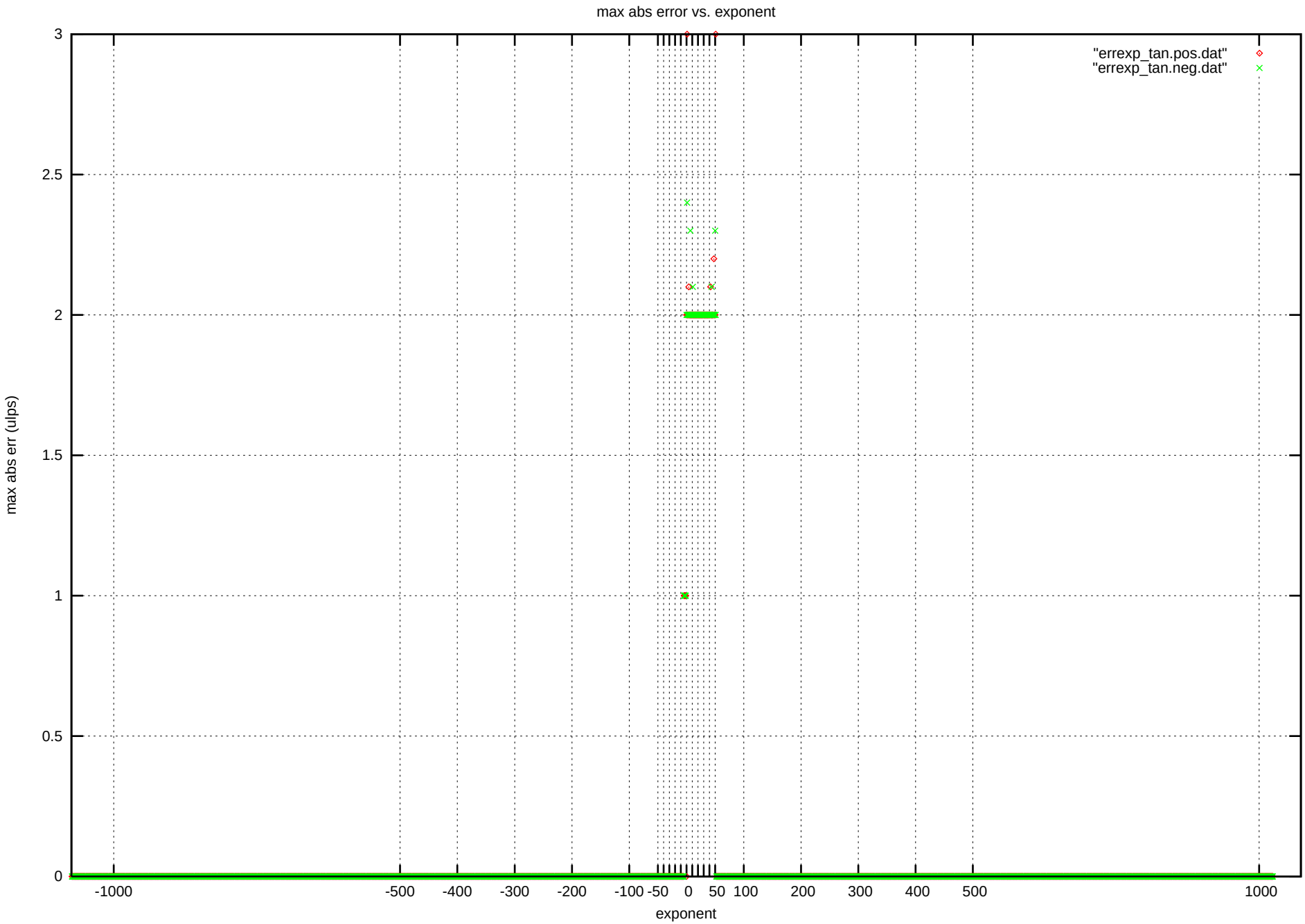

max abs error vs. exponent
"errexp_sin.pos.dat"
"errexp_sin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

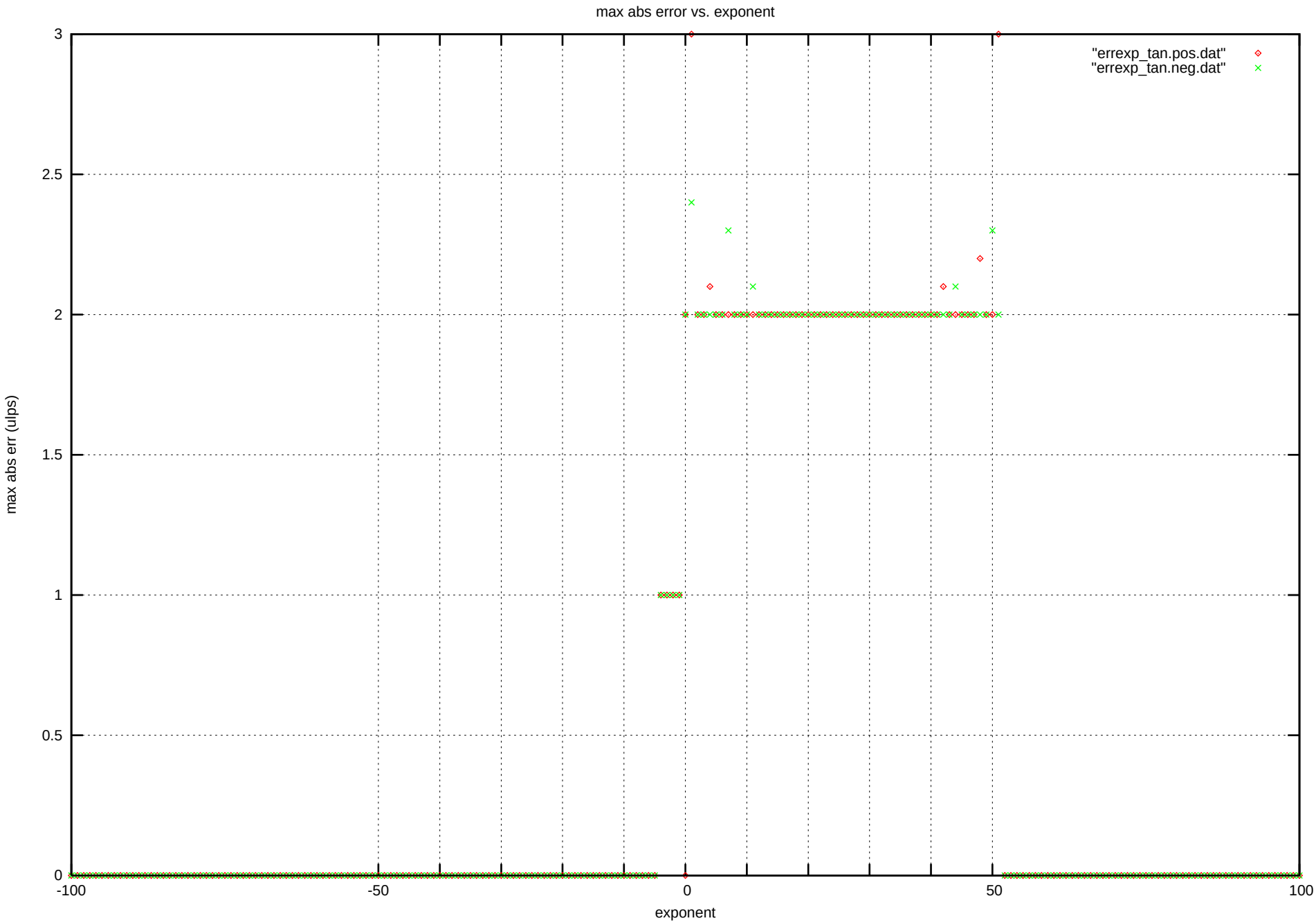

max abs error vs. exponent
"errexp_sinh.pos.dat"
"errexp_sinh.neg.dat"
max abs err (ulps)
exponent
3.5
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

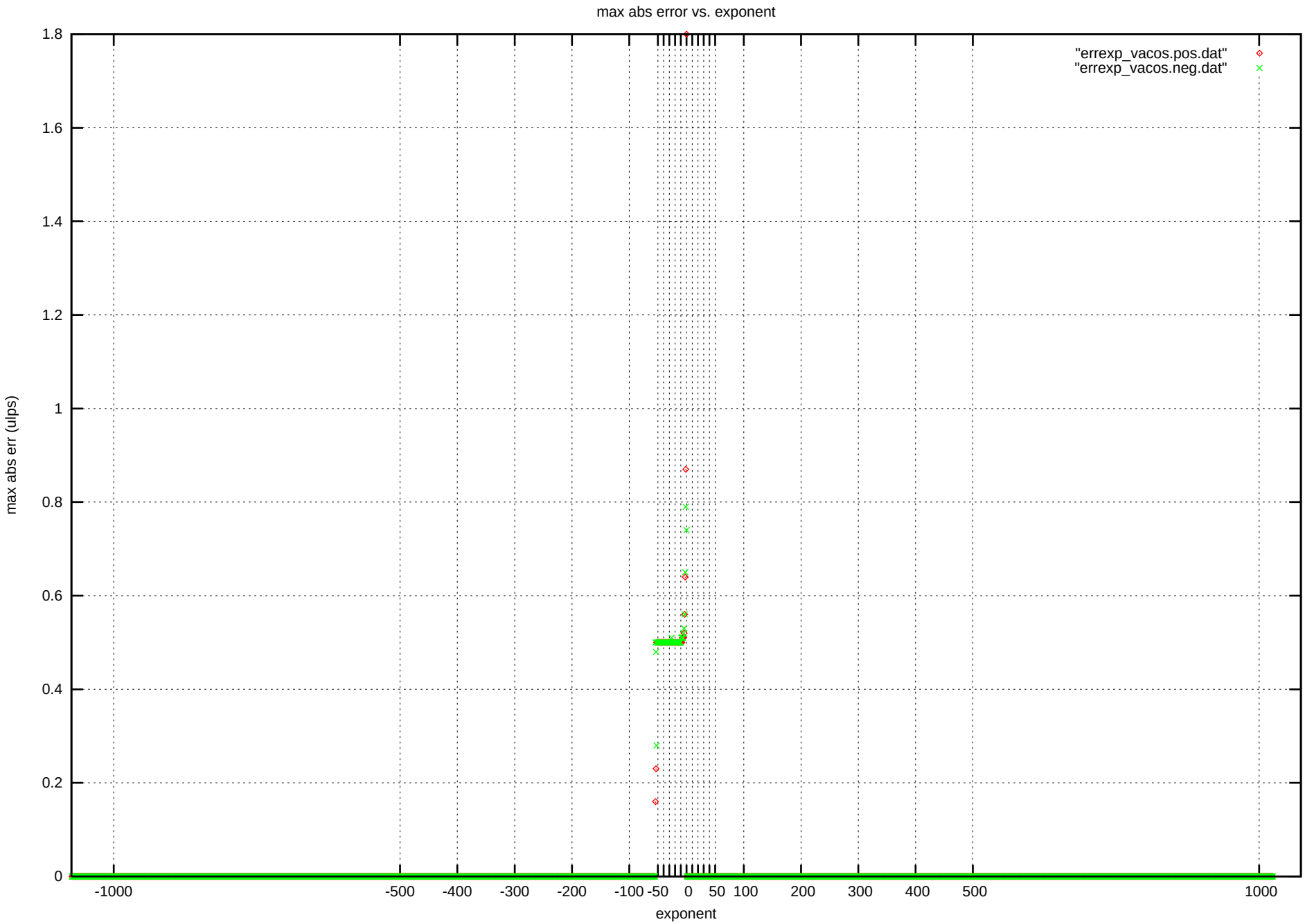

max abs error vs. exponent
"errexp_sinh.pos.dat"
"errexp_sinh.neg.dat"
max abs err (ulps)
exponent
3.5
3
2.5
2
1.5
1
0.5
0
-100
-50
0
50
100

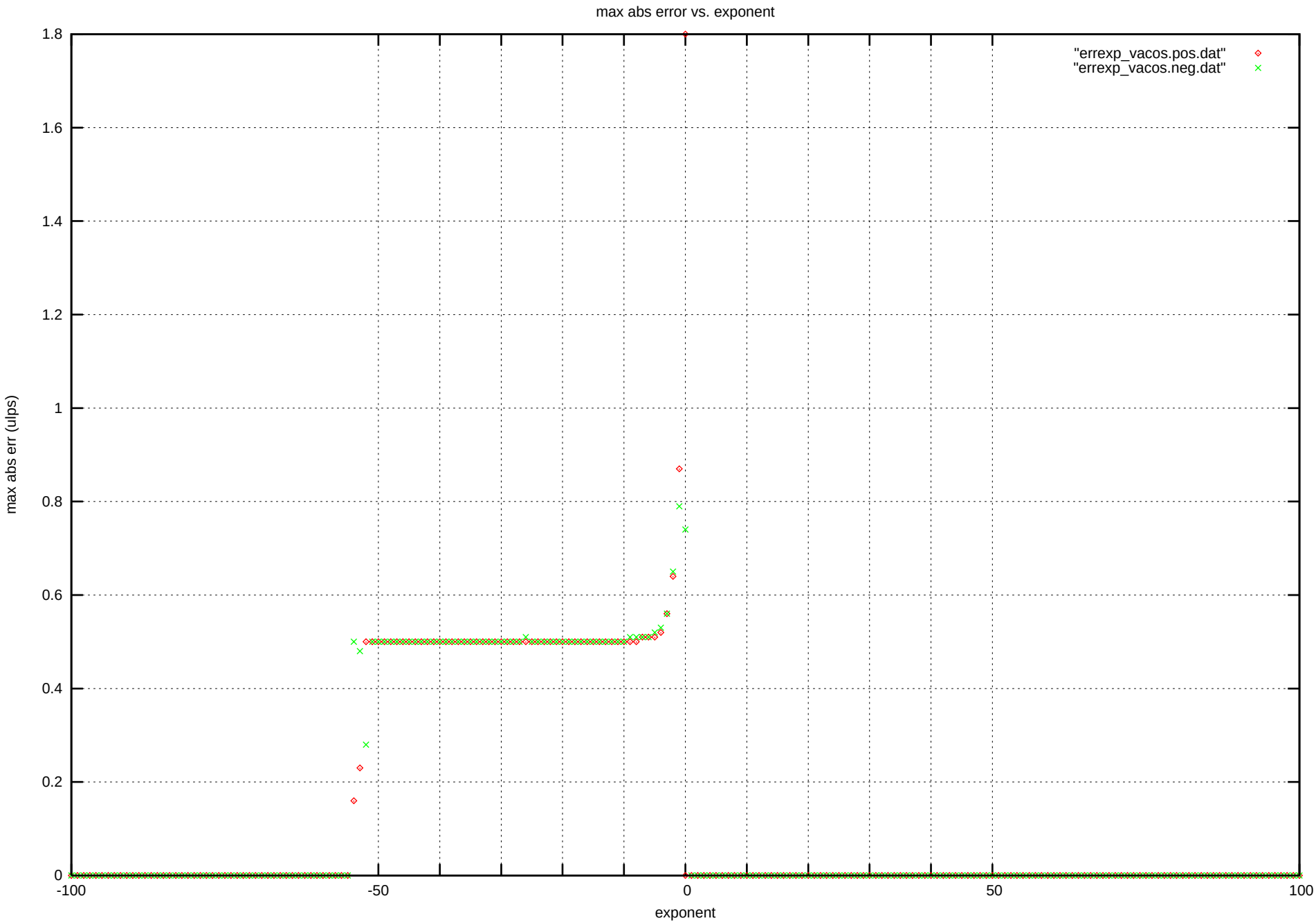

max abs error vs. exponent
"errexp_sqrt.pos.dat"
"errexp_sqrt.neg.dat"
max abs err (ulps)
exponent
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

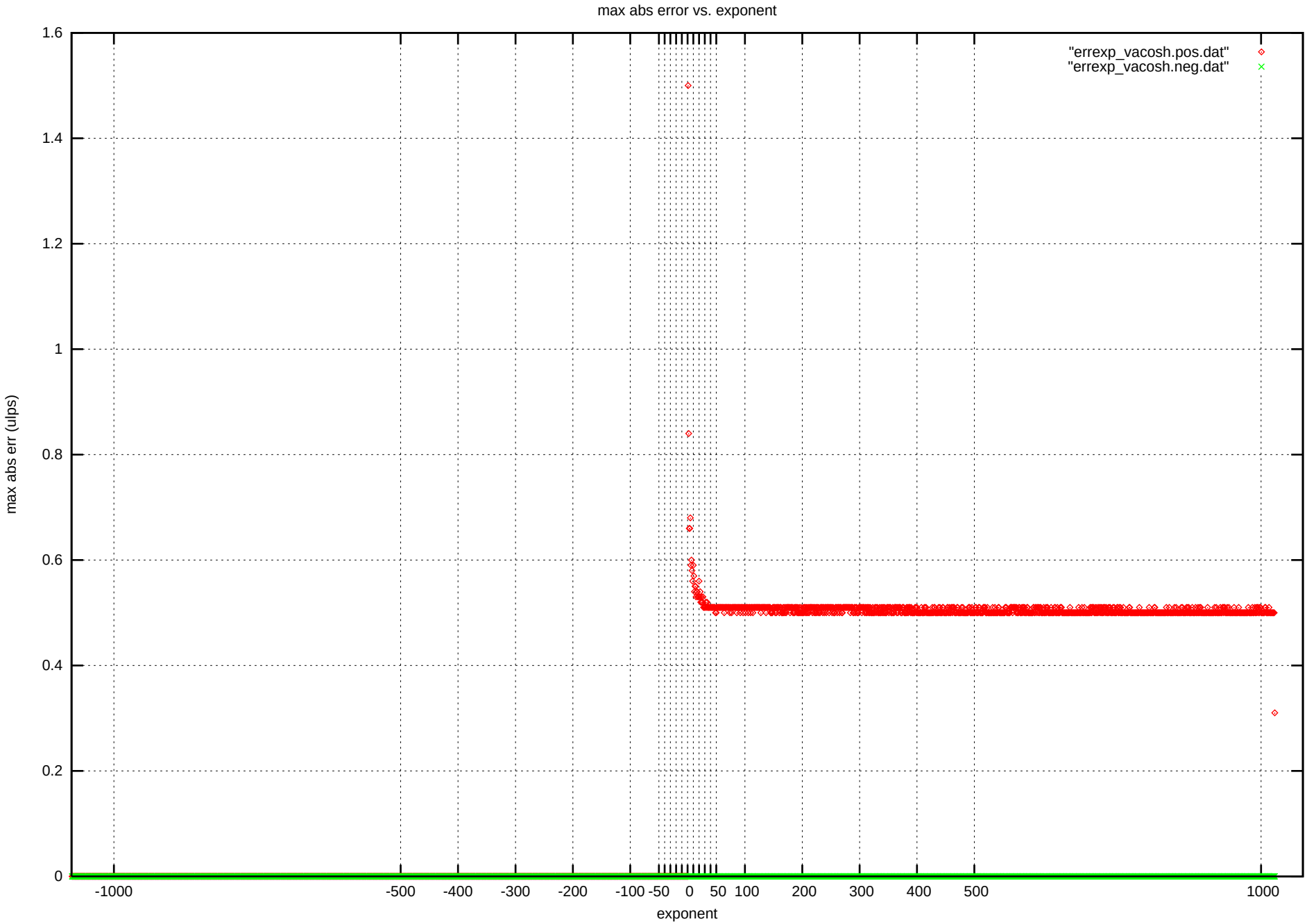

max abs error vs. exponent
"errexp_sqrt.pos.dat"
"errexp_sqrt.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
0
50
100

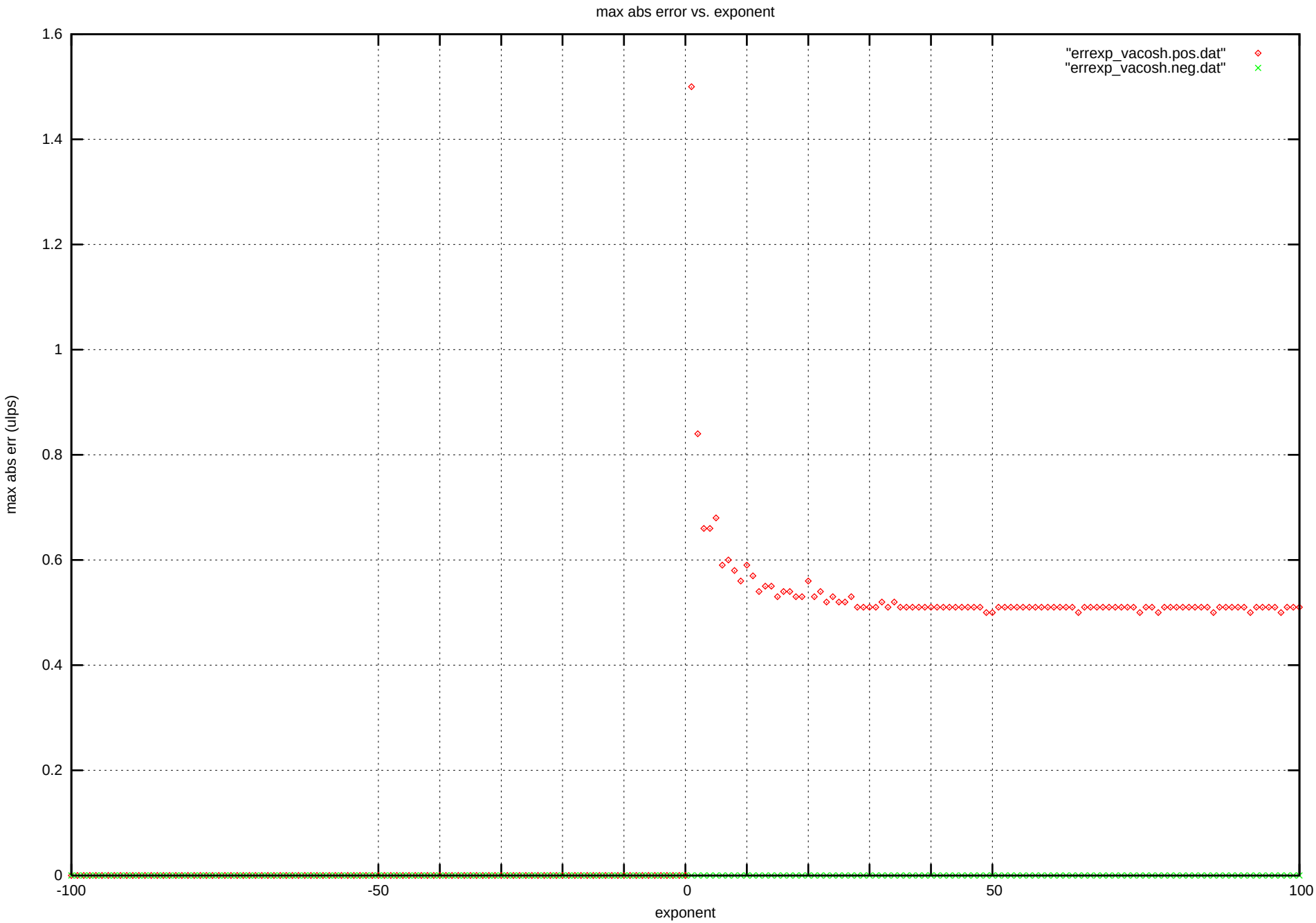

max abs error vs. exponent
"errexp_tan.pos.dat"
"errexp_tan.neg.dat"
max abs err (ulps)
exponent
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

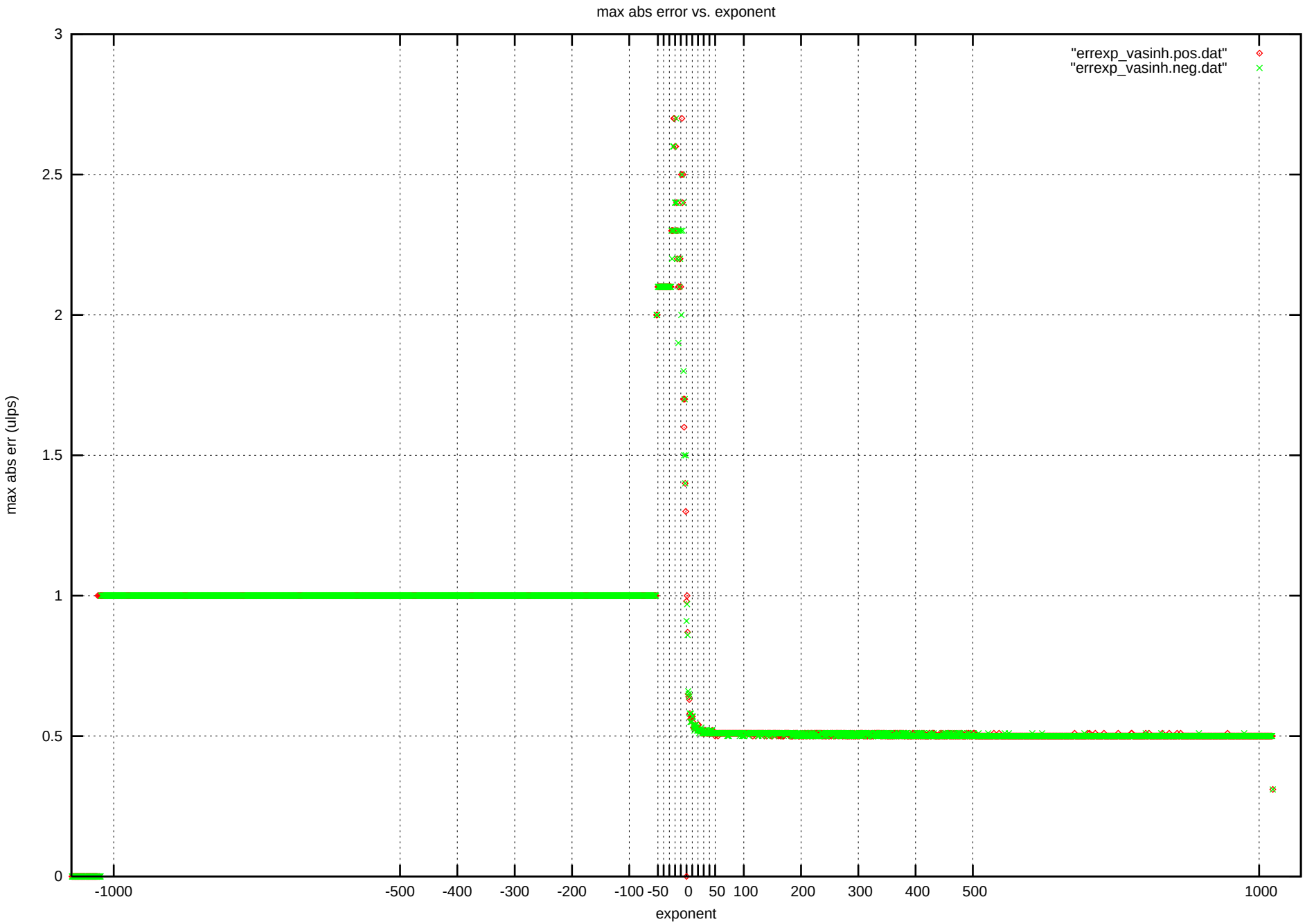

max abs error vs. exponent
"errexp_tan.pos.dat"
"errexp_tan.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
2.5
3
-100
-50
0
50
100

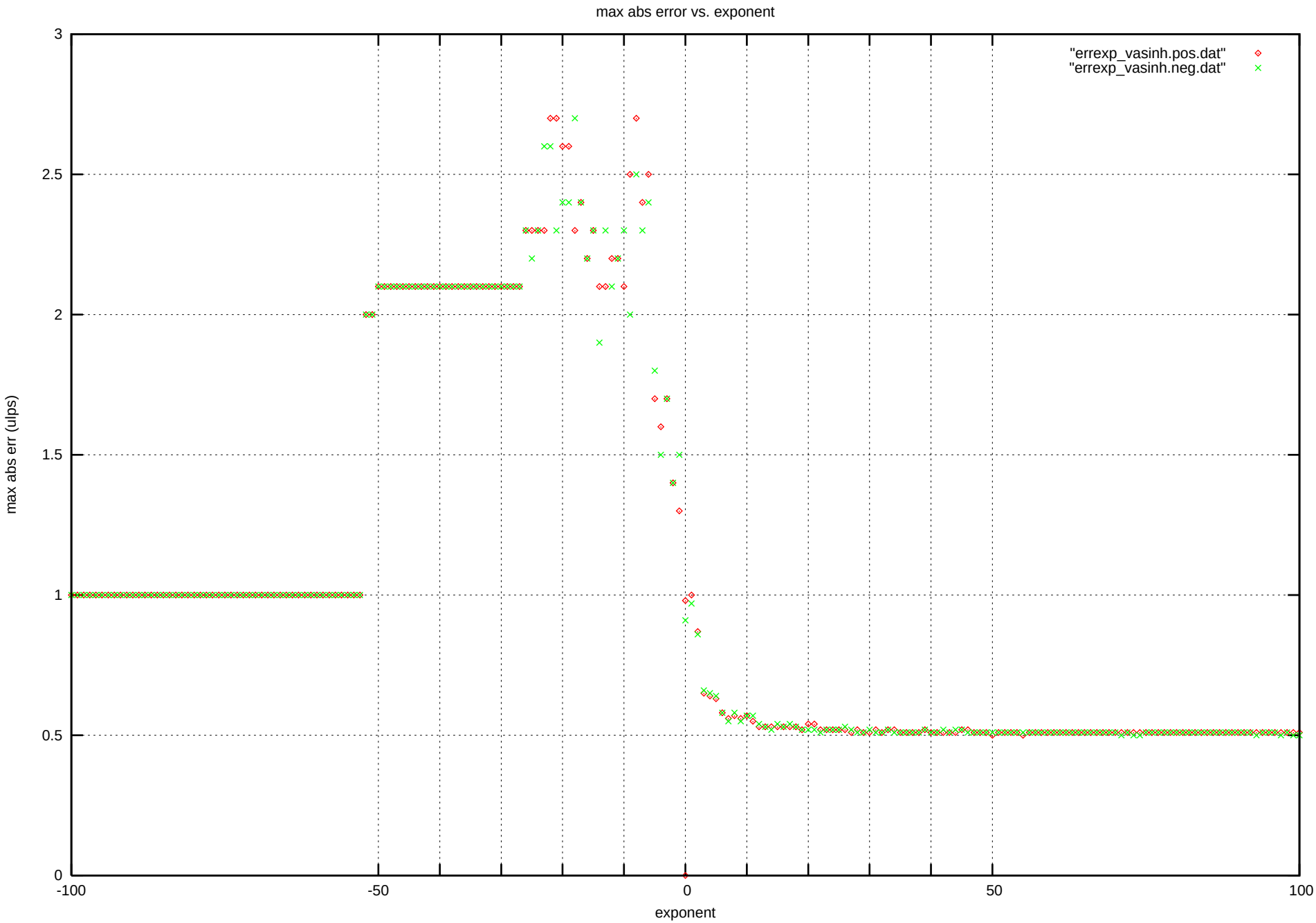

max abs error vs. exponent
"errexp_vacos.pos.dat"
"errexp_vacos.neg.dat"
max abs err (ulps)
exponent
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

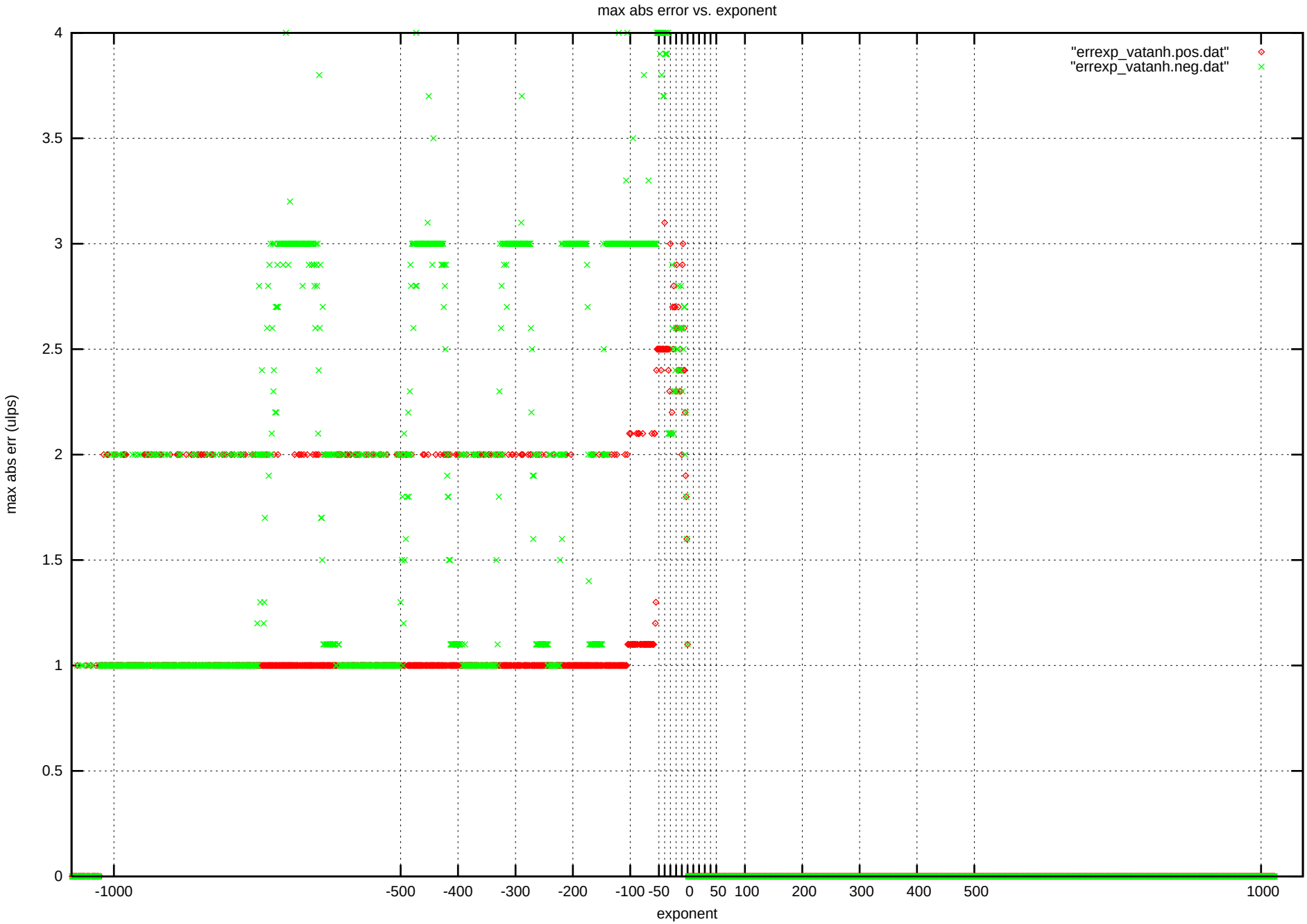

max abs error vs. exponent
"errexp_vacos.pos.dat"
"errexp_vacos.neg.dat"
max abs err (ulps)
exponent
1.8
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

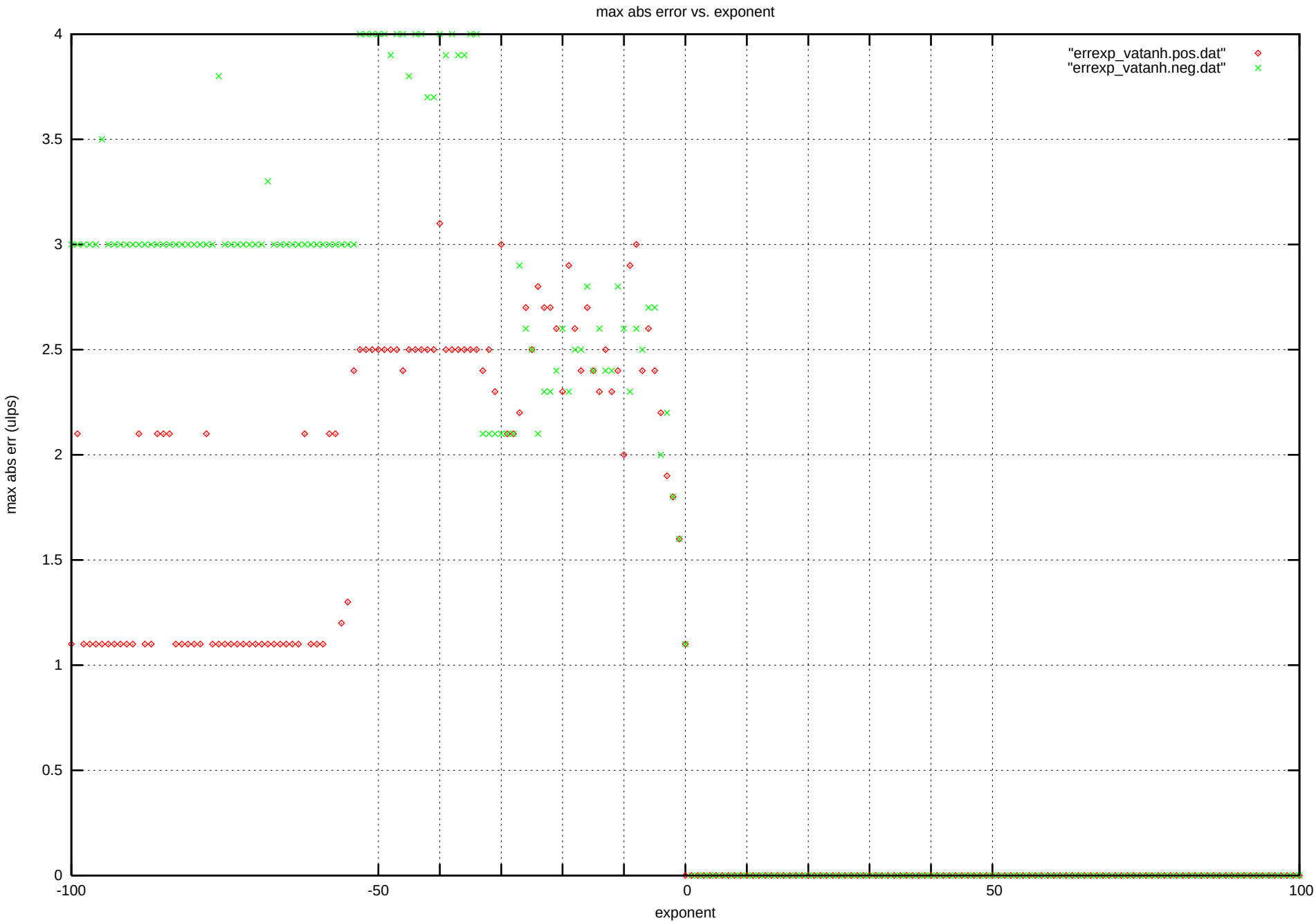

max abs error vs. exponent
"errexp_vacosh.pos.dat"
"errexp_vacosh.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

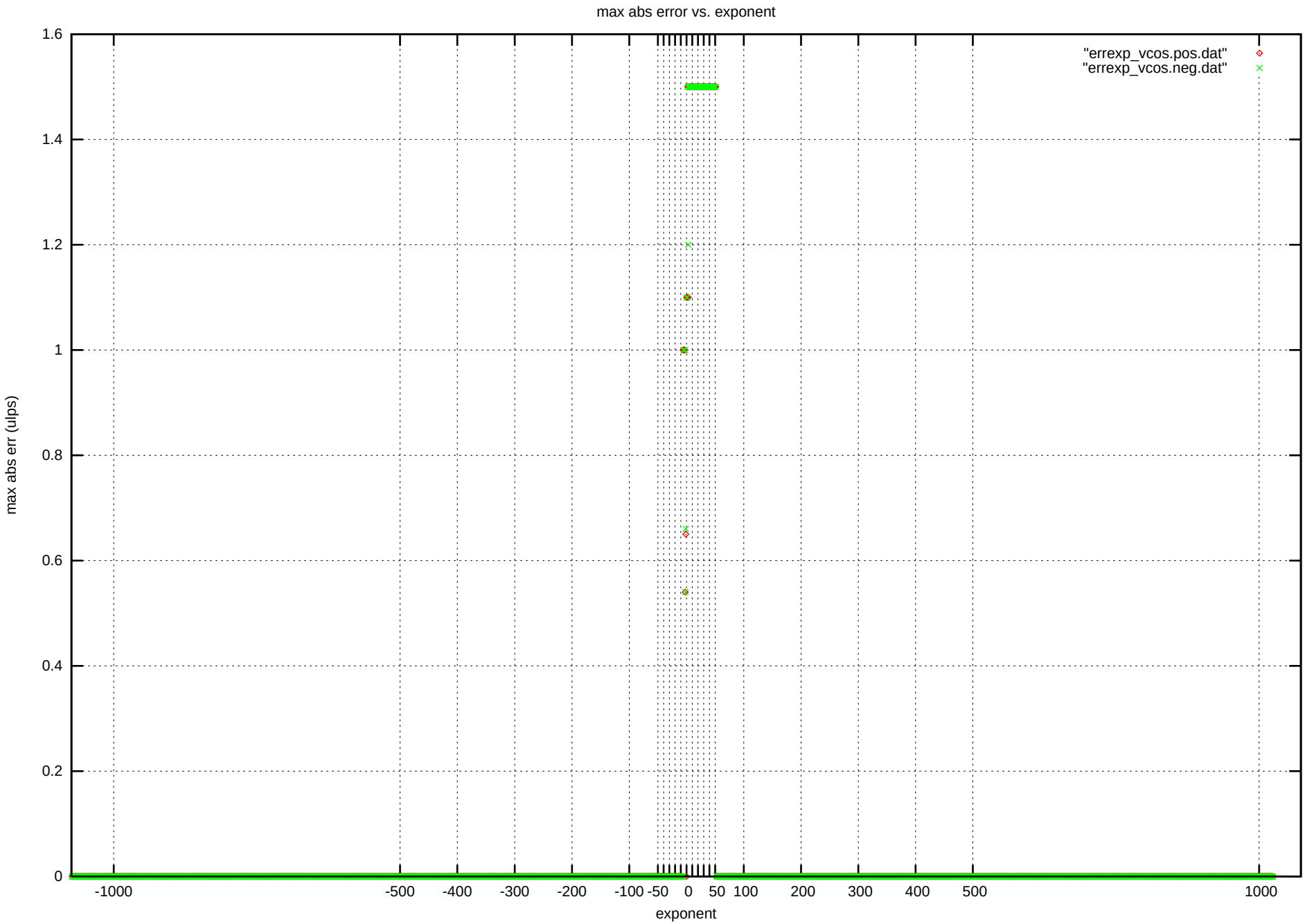

max abs error vs. exponent
"errexp_vacosh.pos.dat"
"errexp_vacosh.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

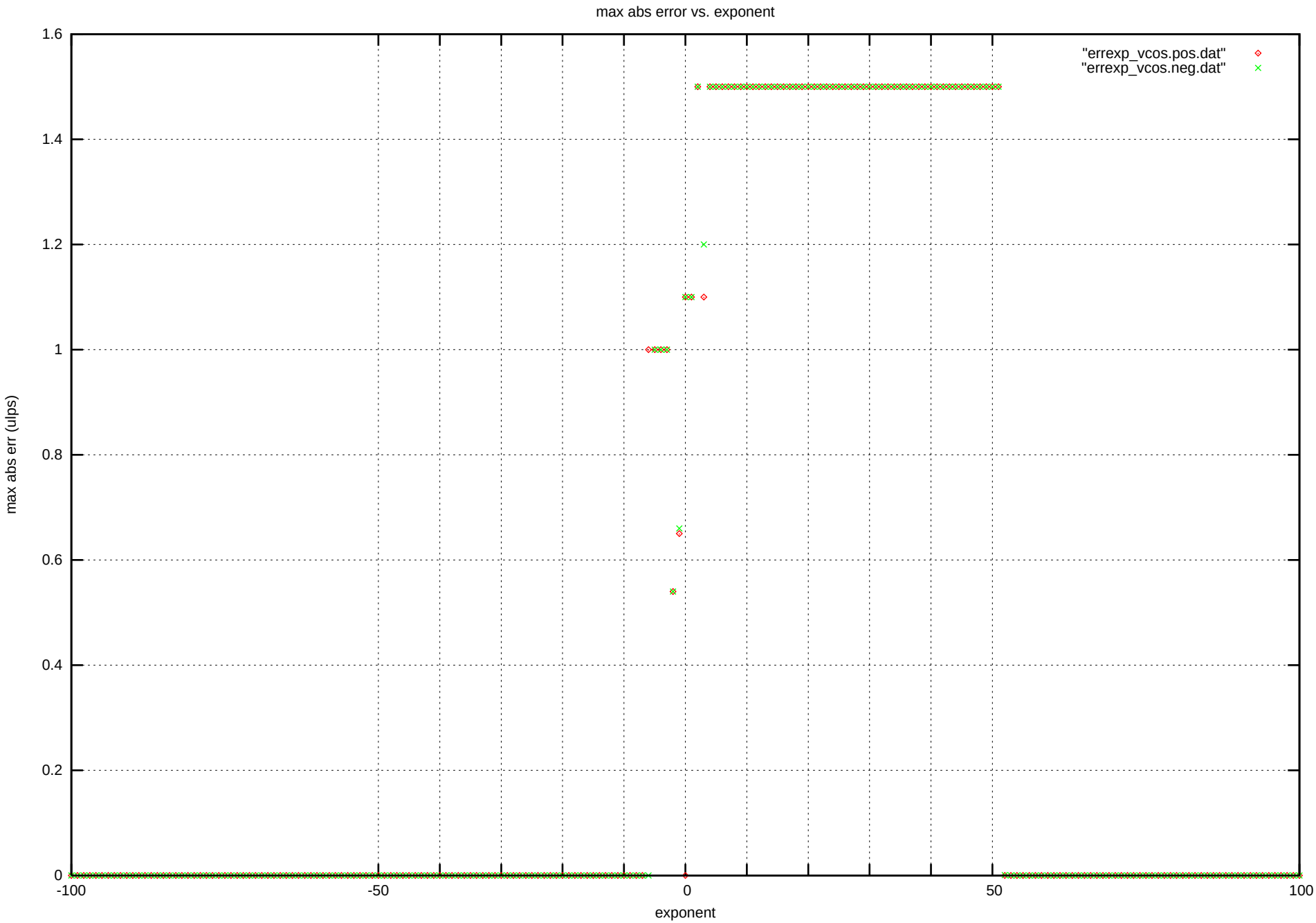

max abs error vs. exponent
"errexp_vasinh.pos.dat"
"errexp_vasinh.neg.dat"
max abs err (ulps)
exponent
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

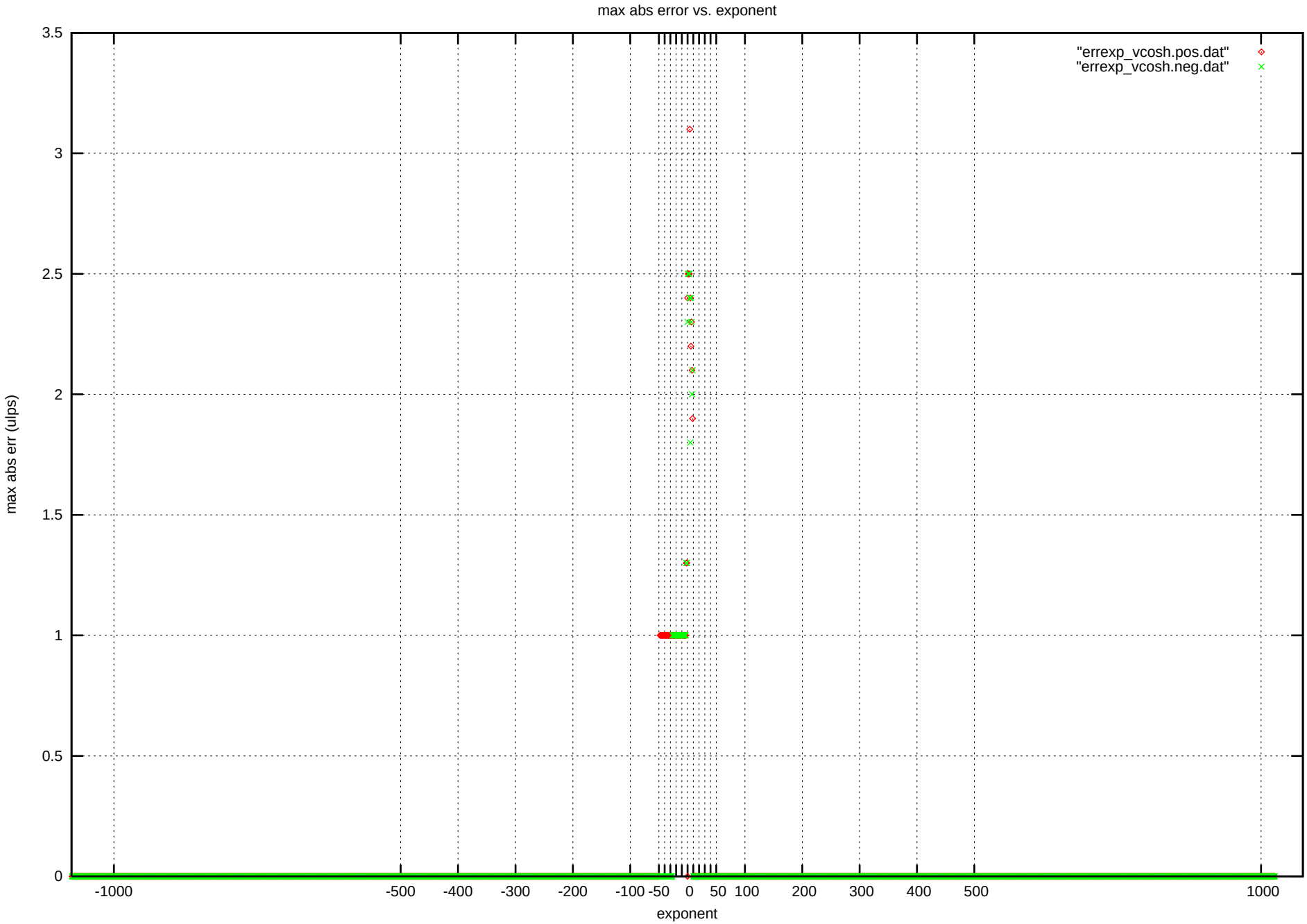

max abs error vs. exponent
"errexp_vasinh.pos.dat"
"errexp_vasinh.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
2.5
3
-100
-50
0
50
100

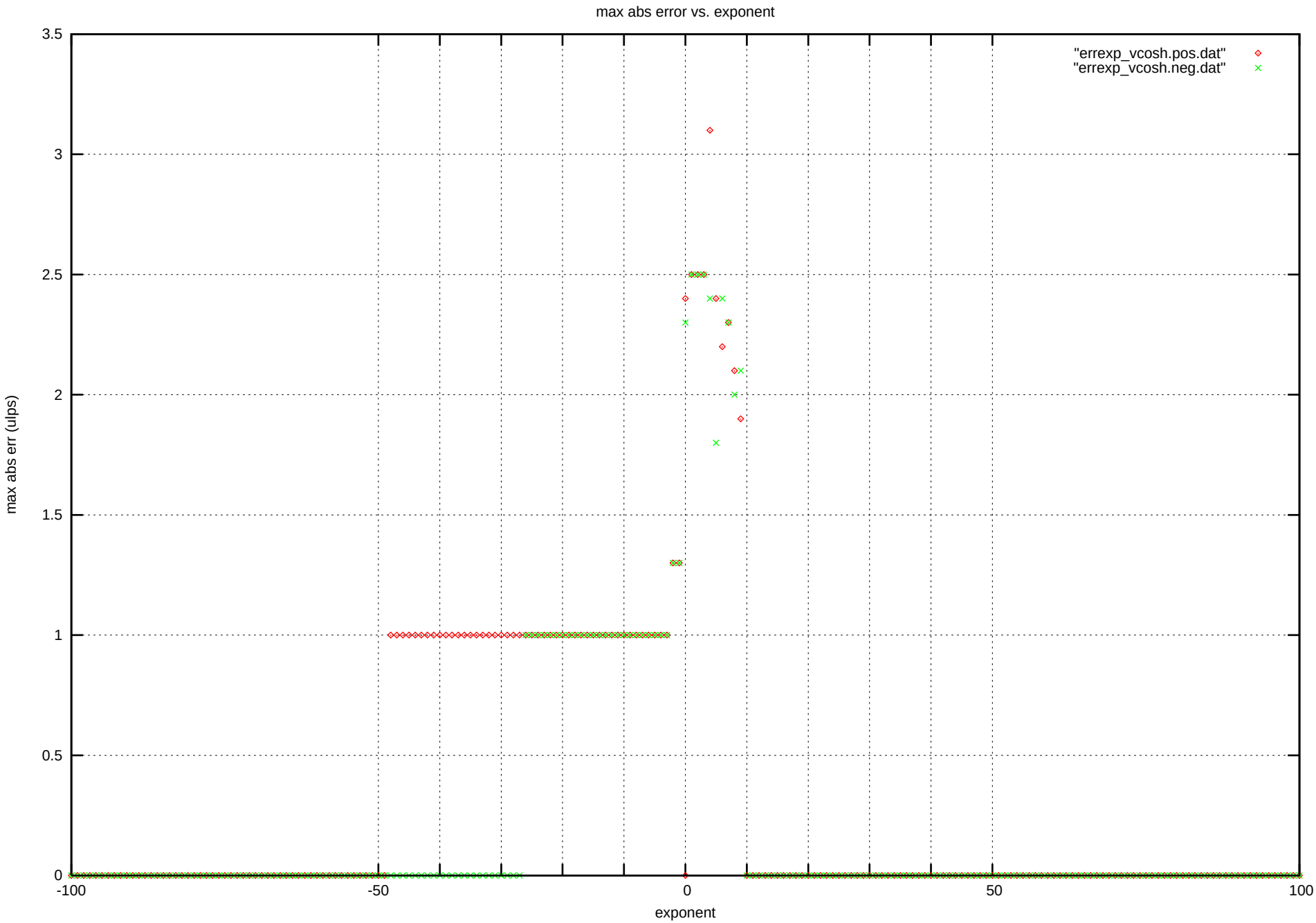

max abs error vs. exponent
"errexp_vatanh.pos.dat"
"errexp_vatanh.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
2.5
3
3.5
4
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

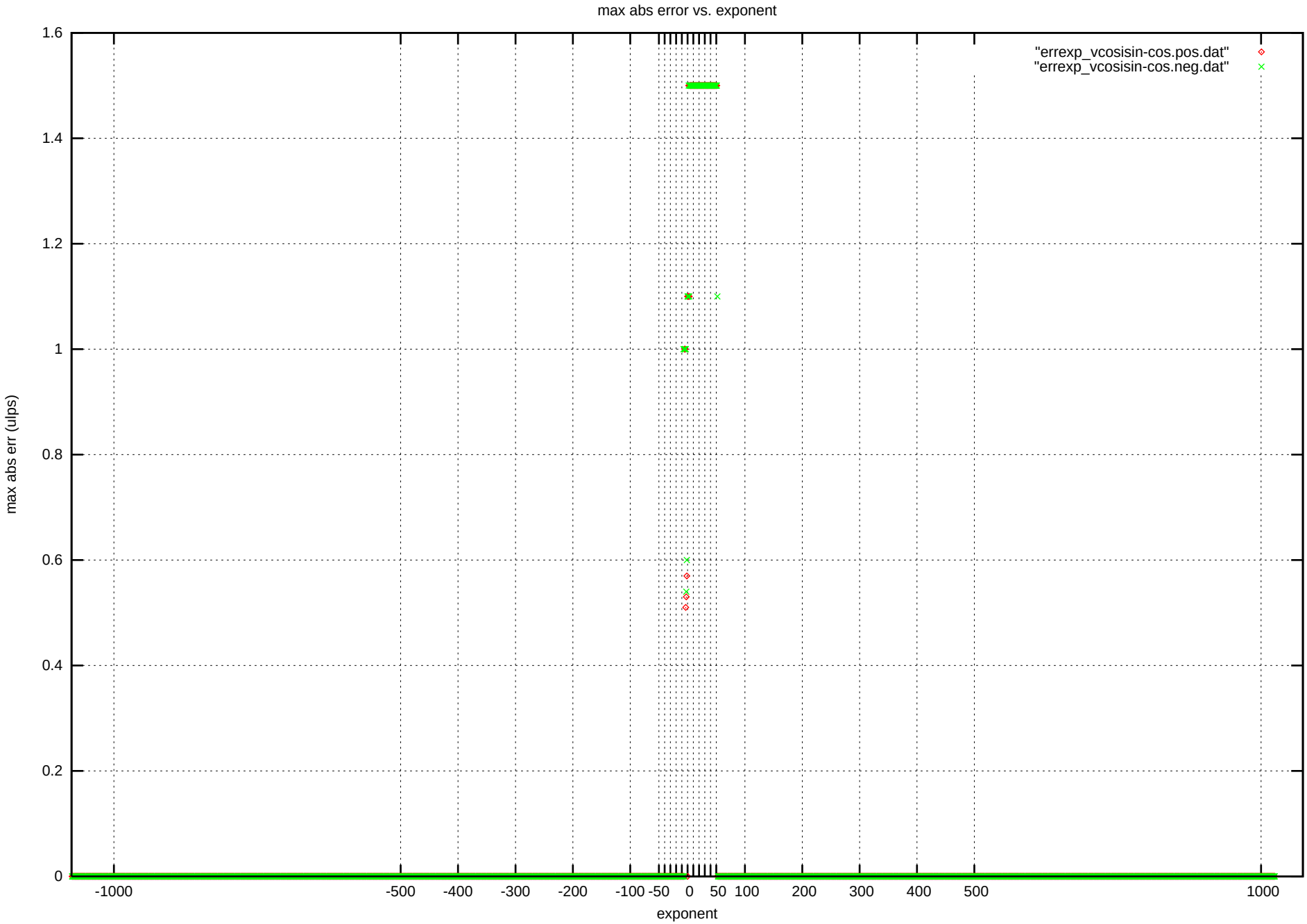

max abs error vs. exponent
"errexp_vatanh.pos.dat"
"errexp_vatanh.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
2.5
3
3.5
4
-100
-50
0
50
100

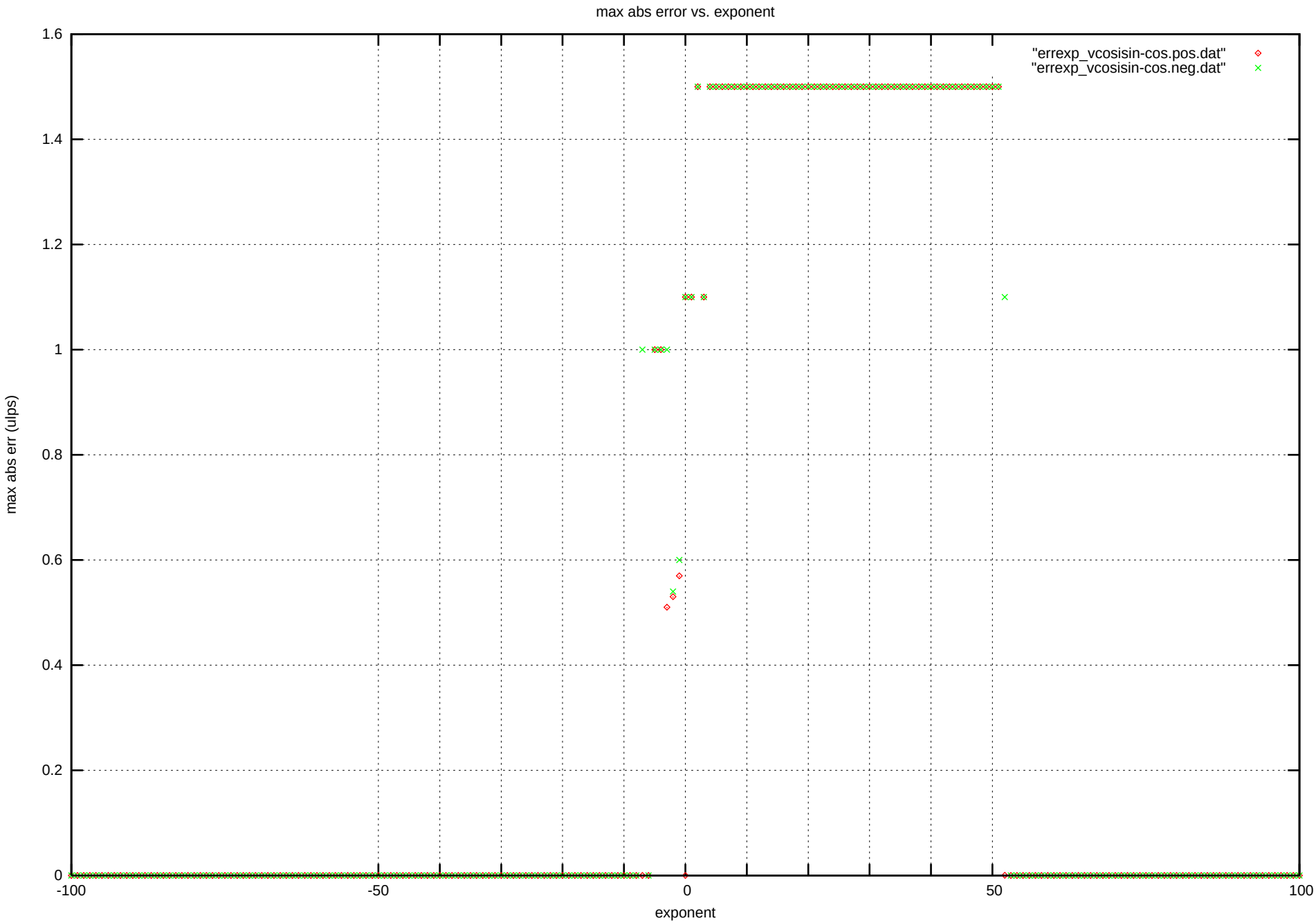

max abs error vs. exponent
"errexp_vcos.pos.dat"
"errexp_vcos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

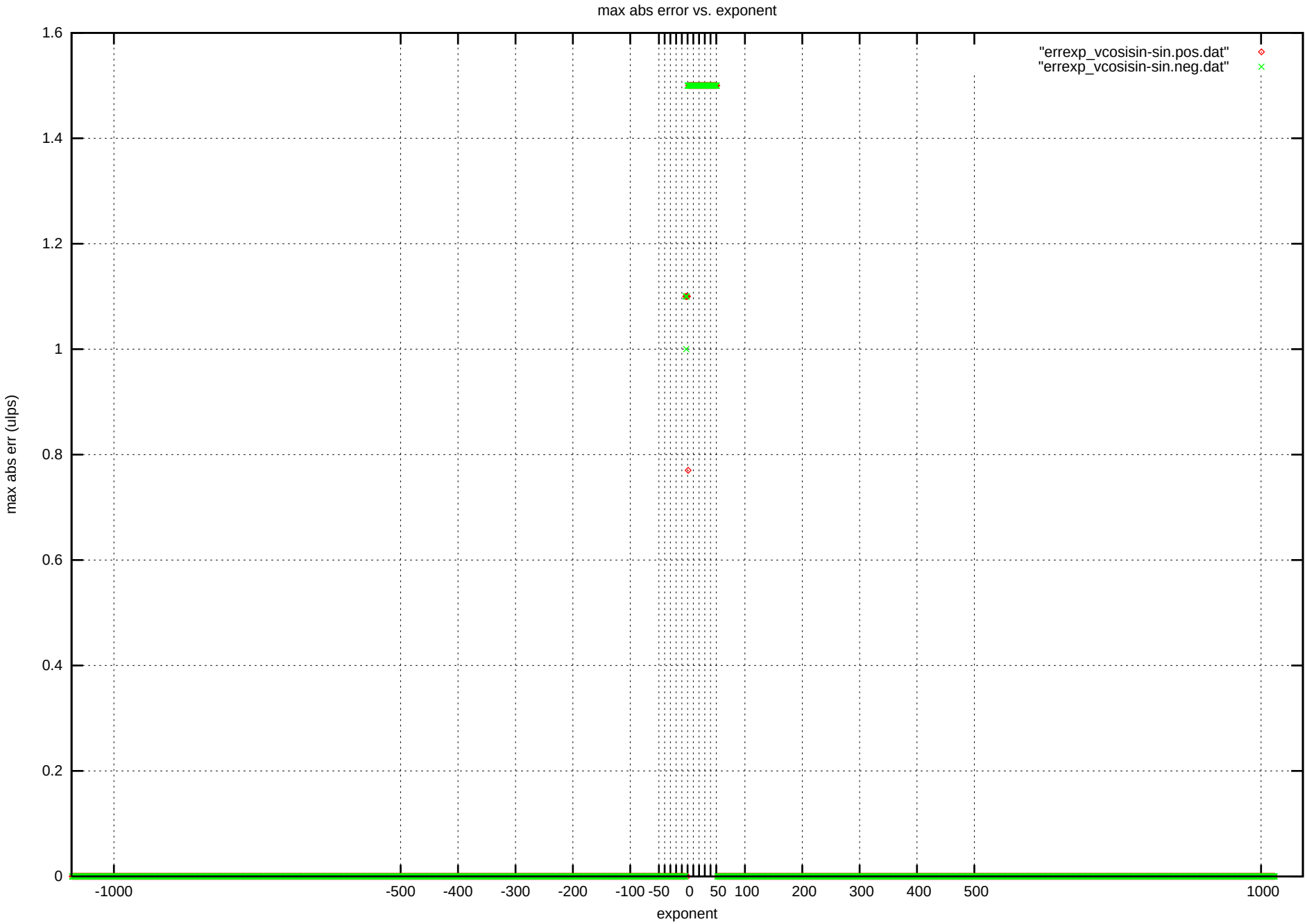

max abs error vs. exponent
"errexp_vcos.pos.dat"
"errexp_vcos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

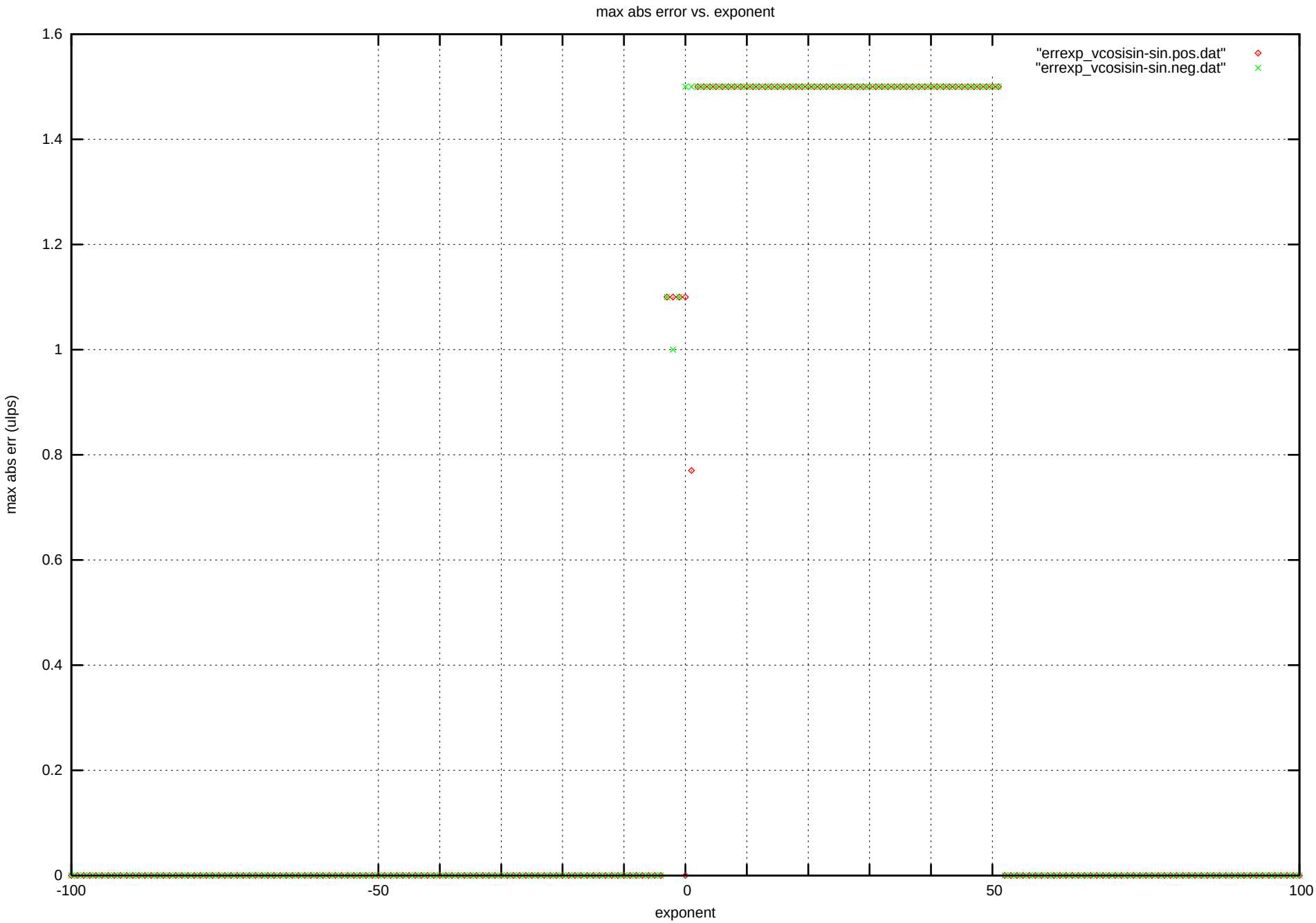

max abs error vs. exponent
"errexp_vcosh.pos.dat"
"errexp_vcosh.neg.dat"
max abs err (ulps)
exponent
3.5
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

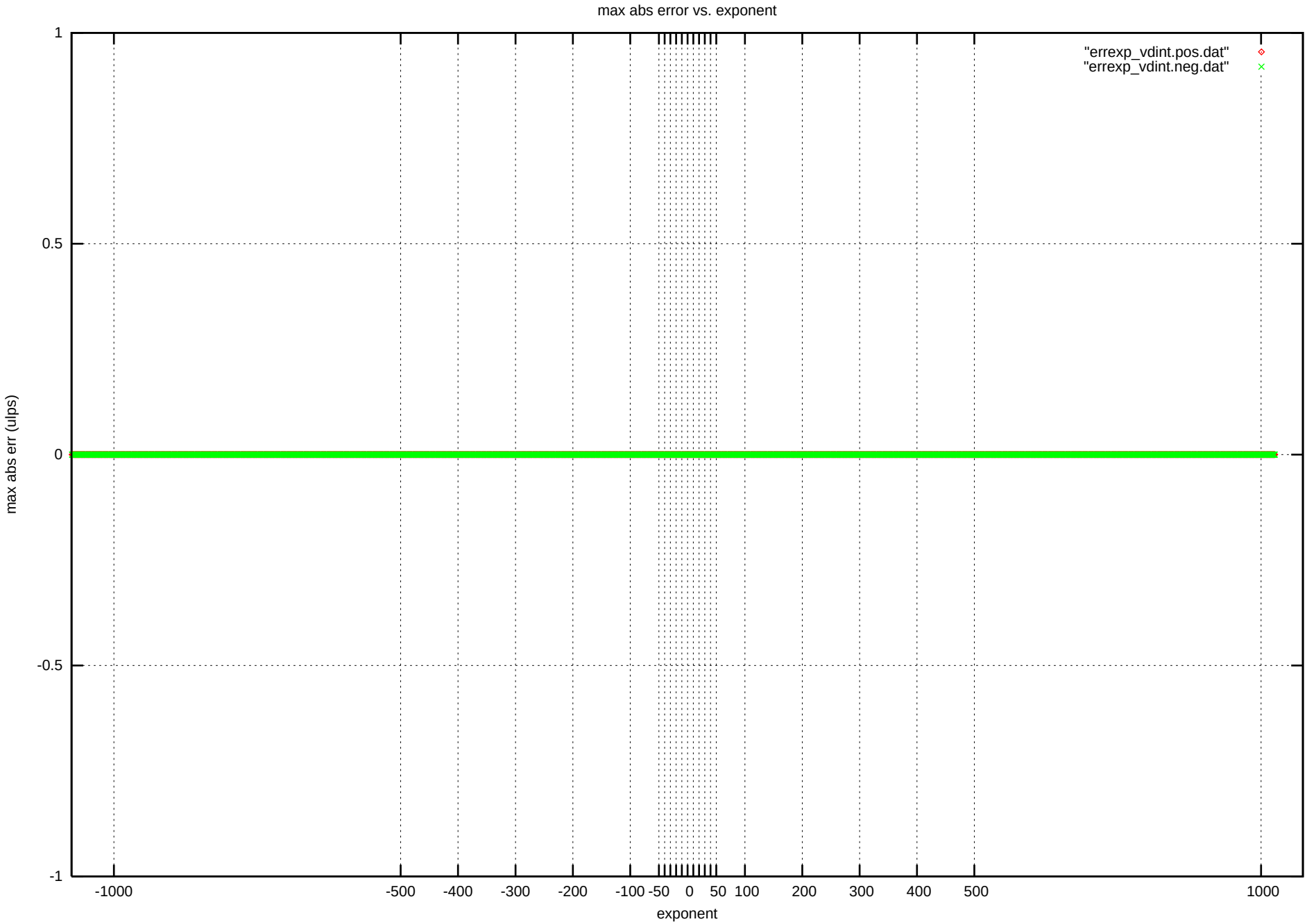

max abs error vs. exponent
"errexp_vcosh.pos.dat"
"errexp_vcosh.neg.dat"
max abs err (ulps)
exponent
3.5
3
2.5
2
1.5
1
0.5
0
-100
-50
0
50
100

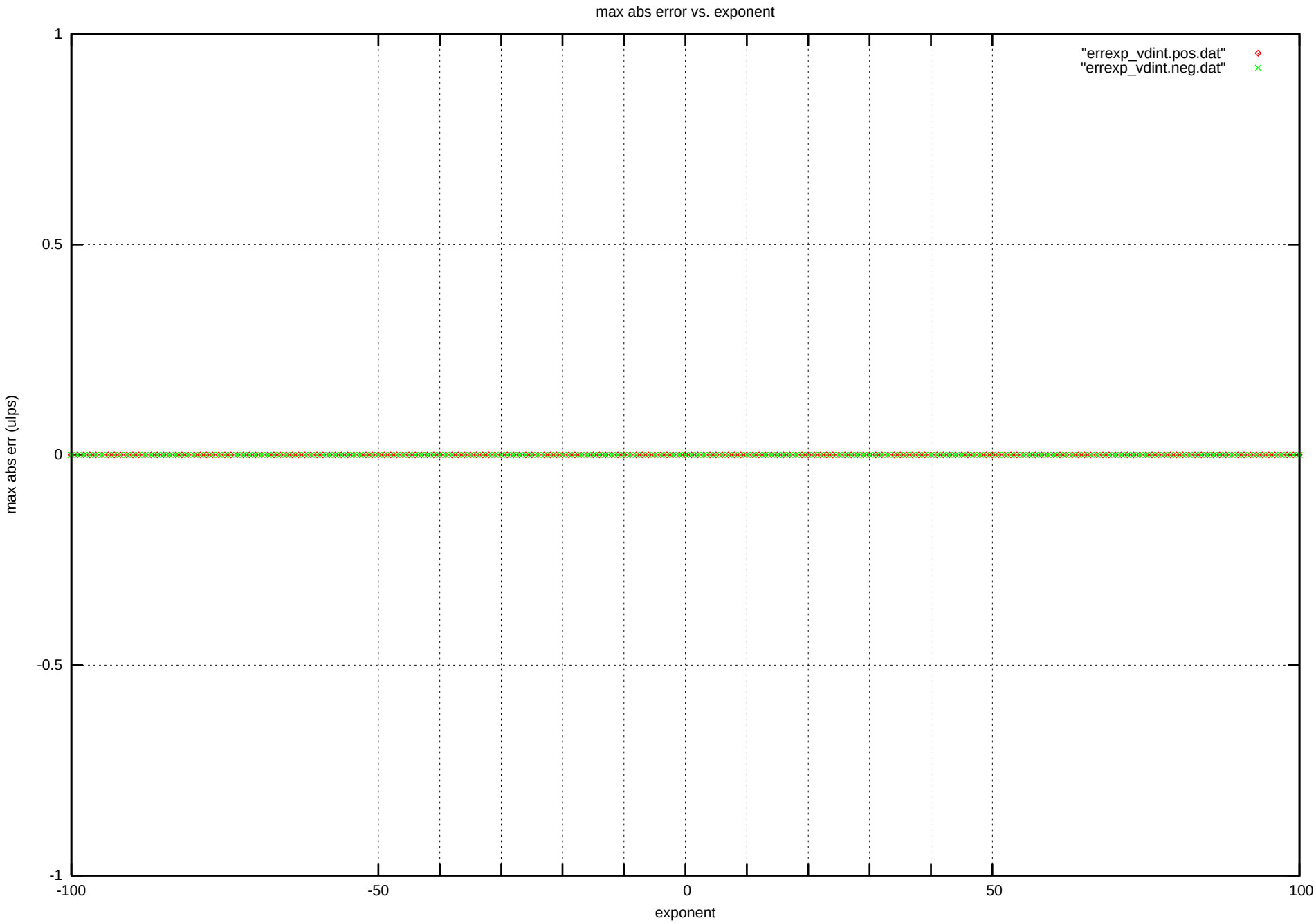

max abs error vs. exponent
"errexp_vcosisin-cos.pos.dat"
"errexp_vcosisin-cos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

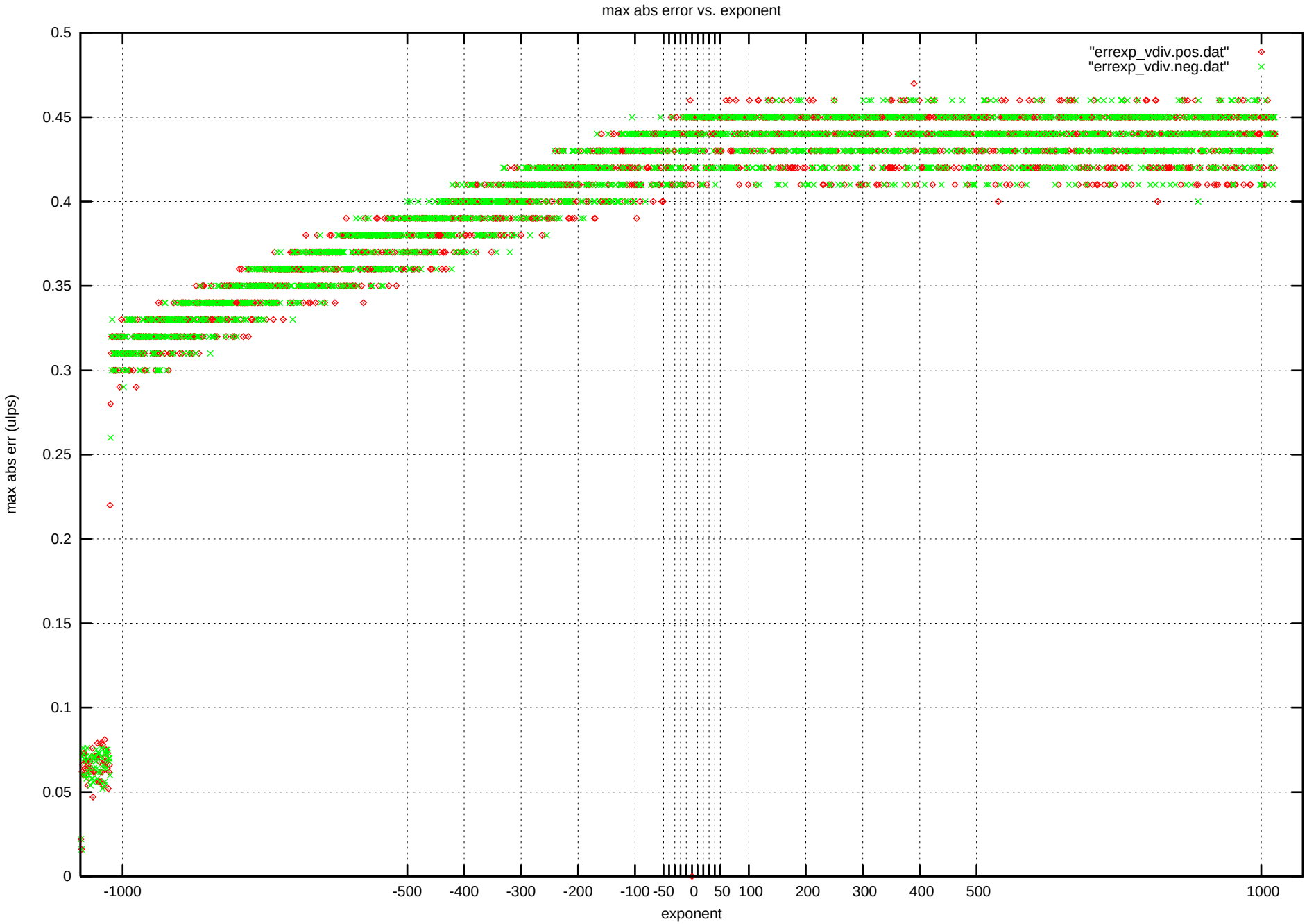

max abs error vs. exponent
"errexp_vcosisin-cos.pos.dat"
"errexp_vcosisin-cos.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

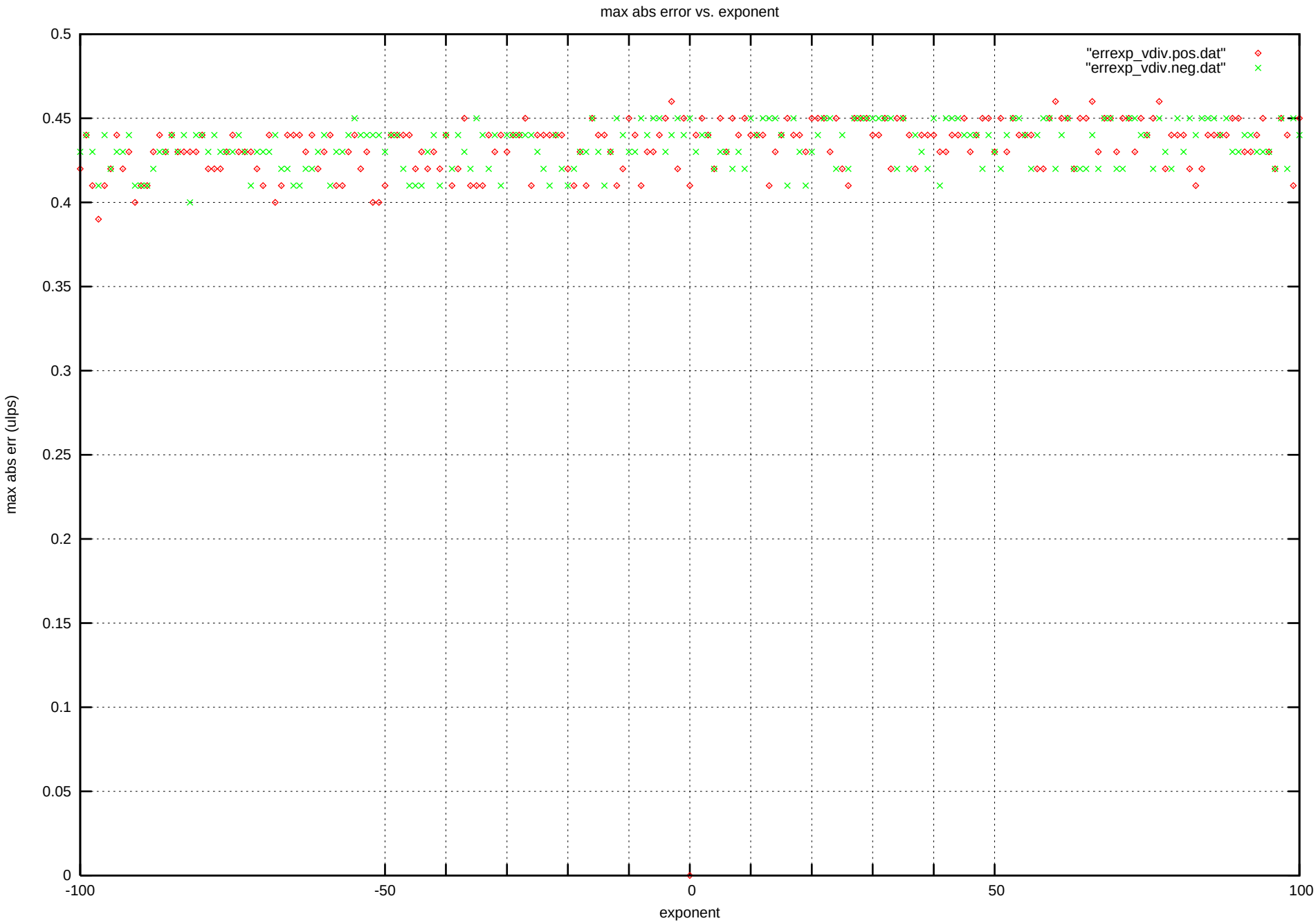

max abs error vs. exponent
"errexp_vcosisin-sin.pos.dat"
"errexp_vcosisin-sin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

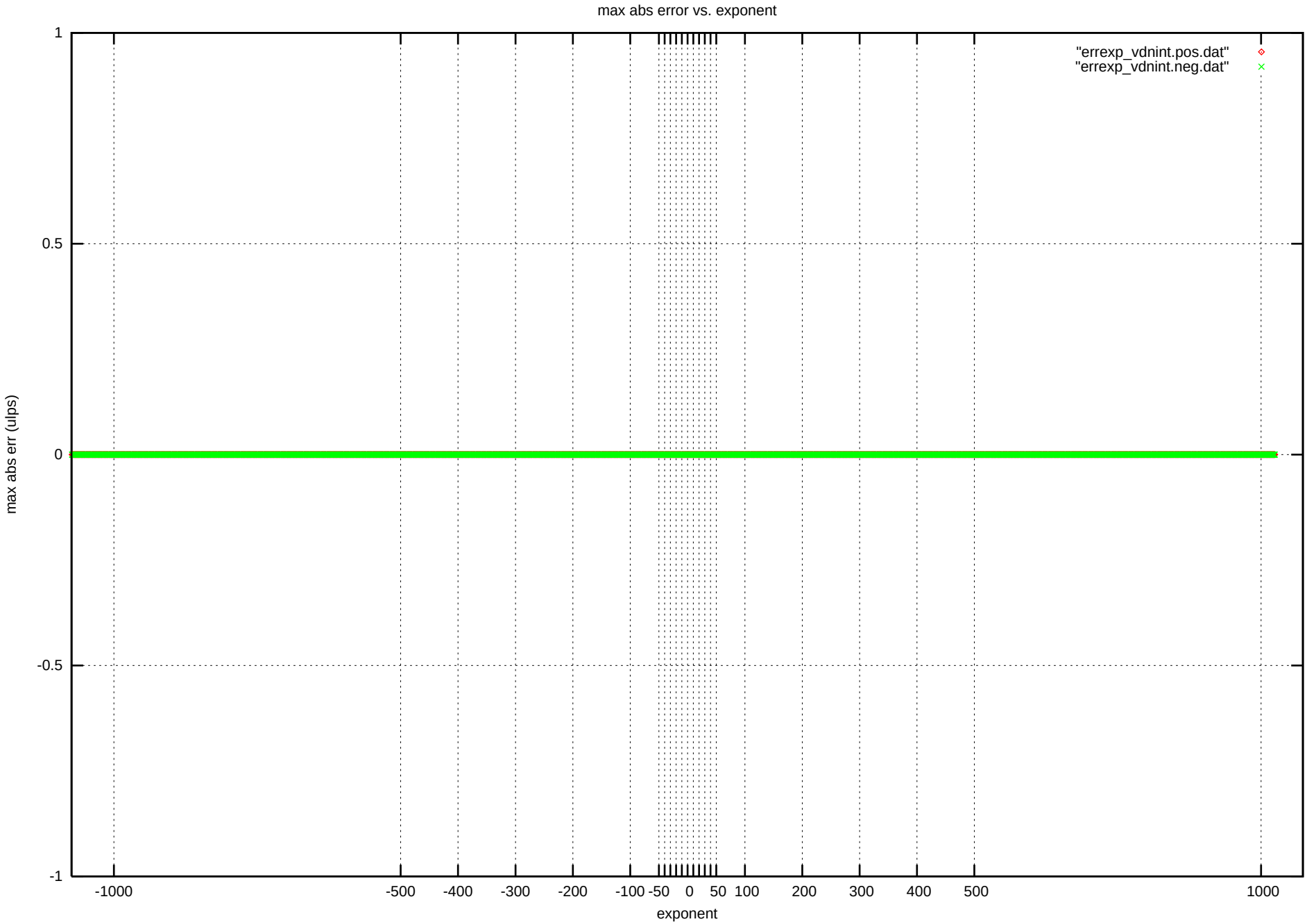

max abs error vs. exponent
"errexp_vcosisin-sin.pos.dat"
"errexp_vcosisin-sin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

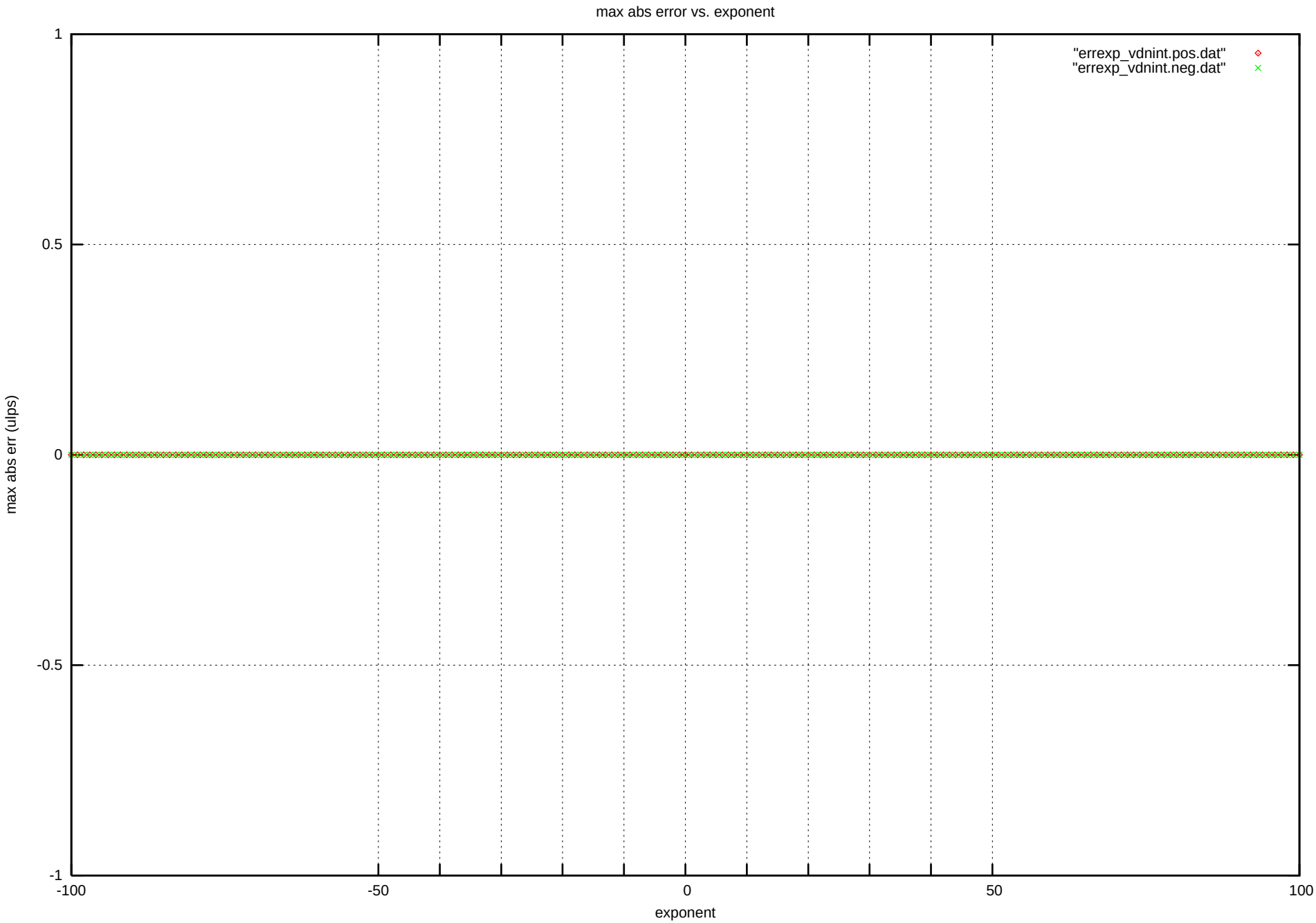

max abs error vs. exponent
"errexp_vdint.pos.dat"
"errexp_vdint.neg.dat"
max abs err (ulps)
1
0.5
0
-0.5
-1
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent

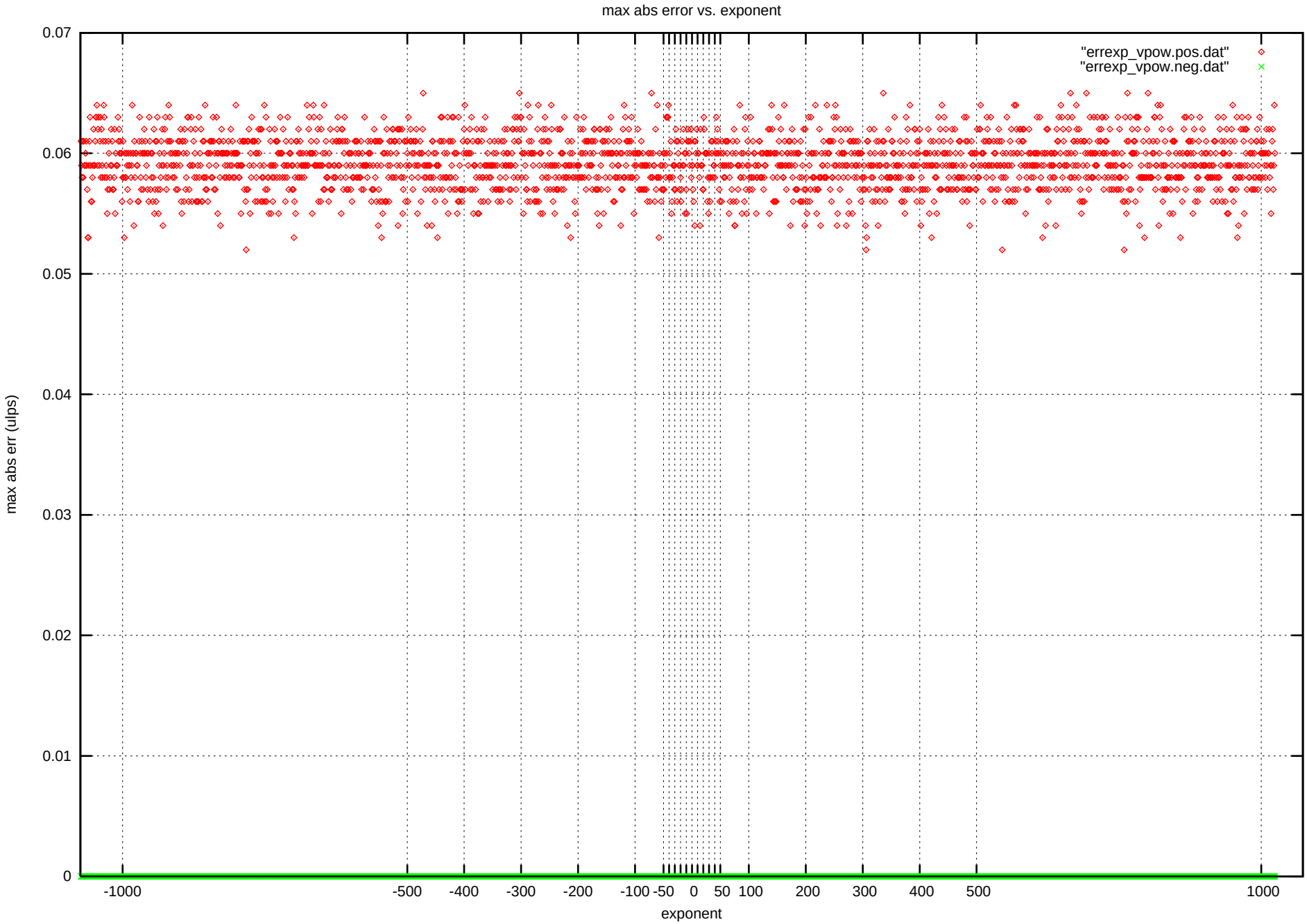

max abs error vs. exponent
"errexp_vdint.pos.dat"
"errexp_vdint.neg.dat"
max abs err (ulps)
exponent
1
0.5
0
-0.5
-1
-100
-50
0
50
100

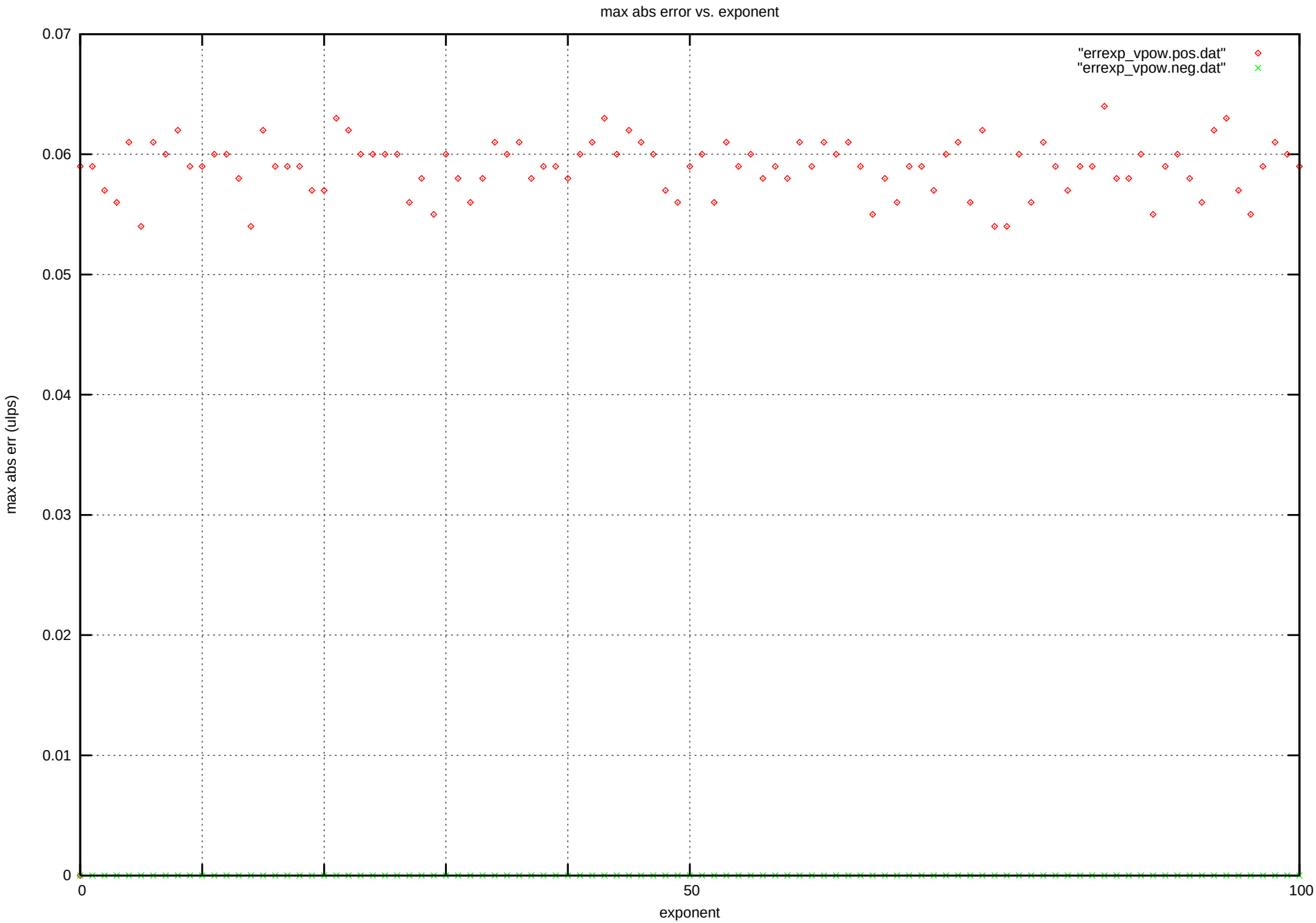

max abs error vs. exponent
"errexp_vdiv.pos.dat"
"errexp_vdiv.neg.dat"
max abs err (ulps)
exponent
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

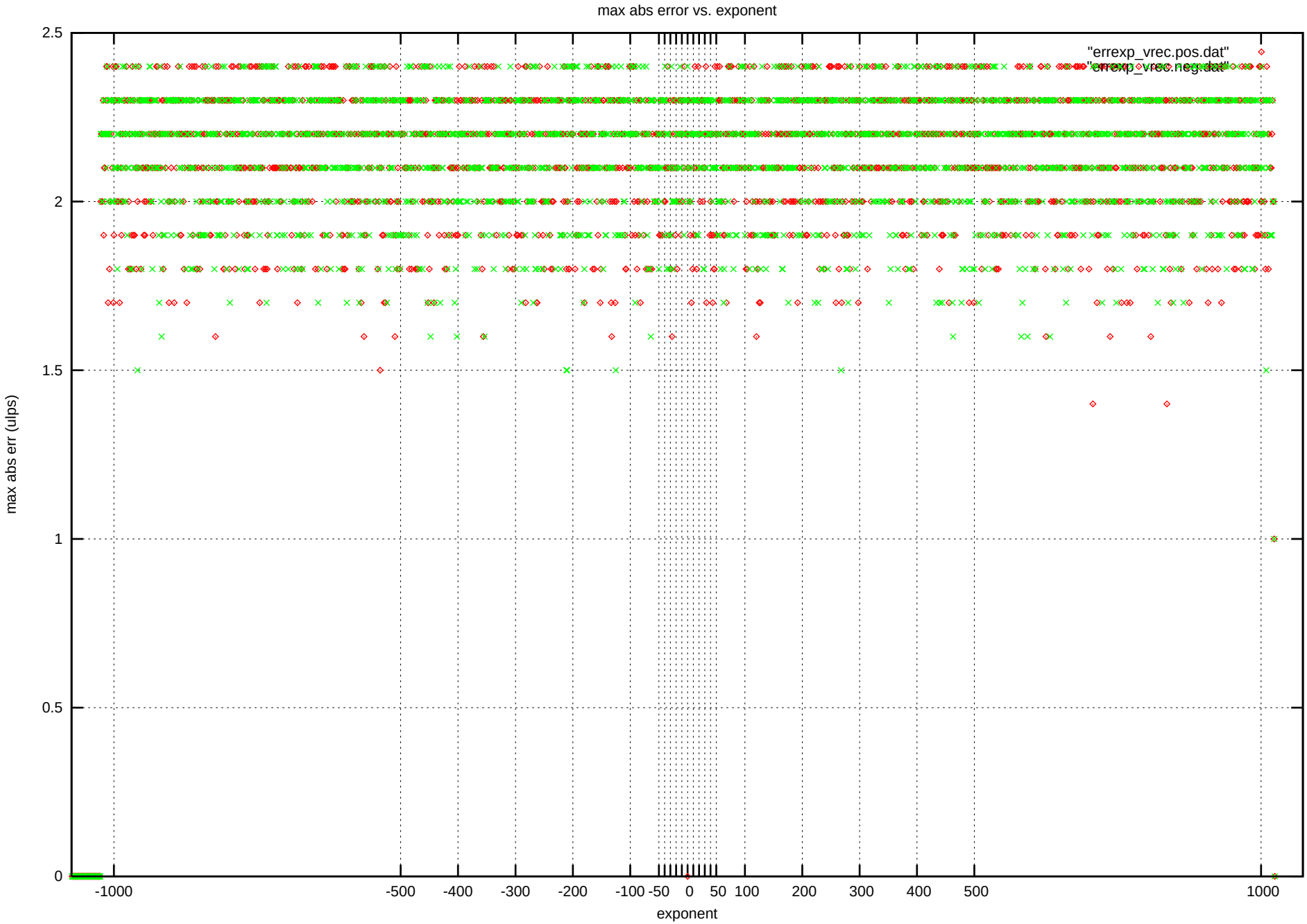

max abs error vs. exponent
"errexp_vdiv.pos.dat"
"errexp_vdiv.neg.dat"
max abs err (ulps)
exponent
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
-100
-50
0
50
100

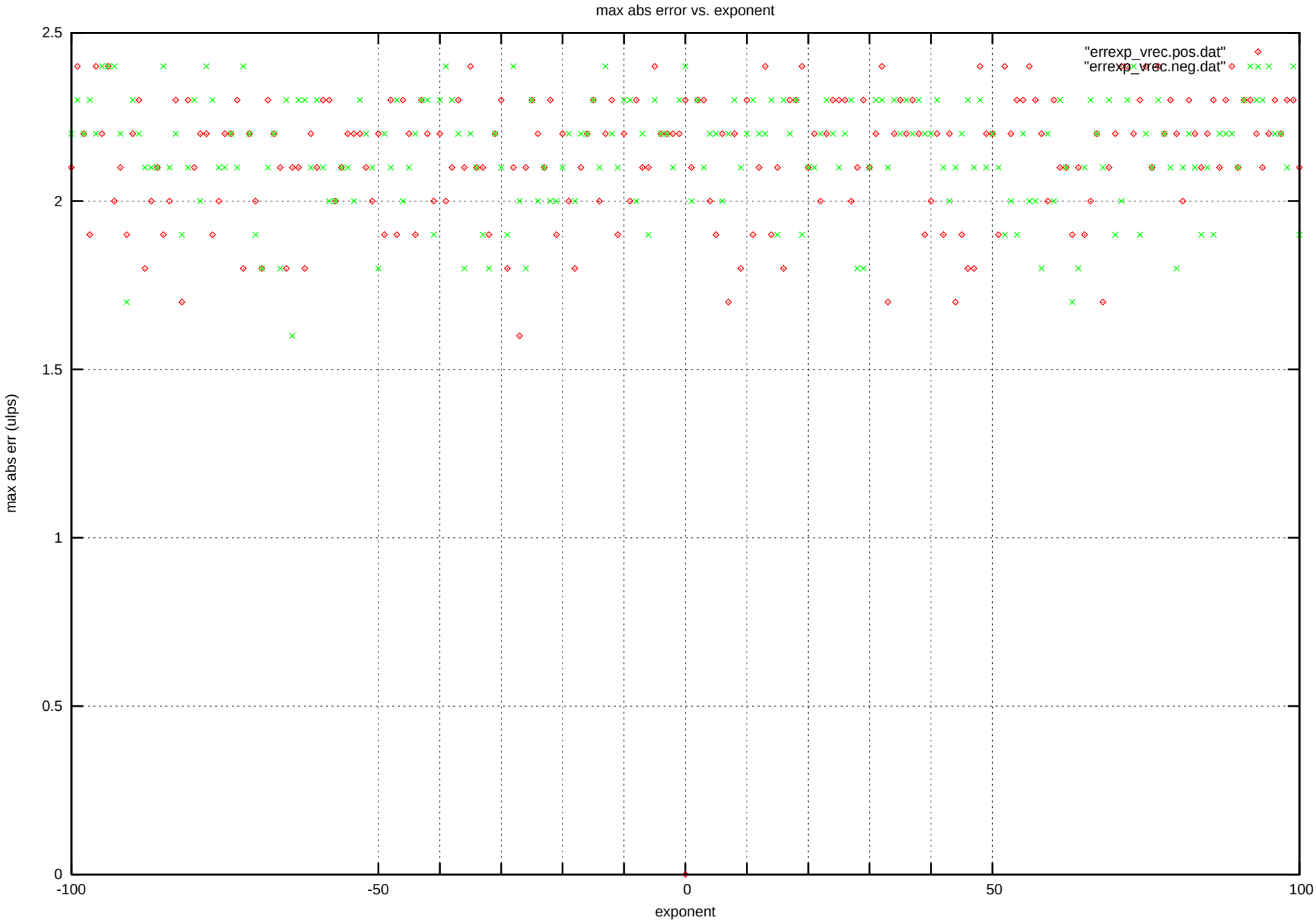

max abs error vs. exponent
"errexp_vdnint.pos.dat"
"errexp_vdnint.neg.dat"
max abs err (ulps)
exponent
1
0.5
0
-0.5
-1
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

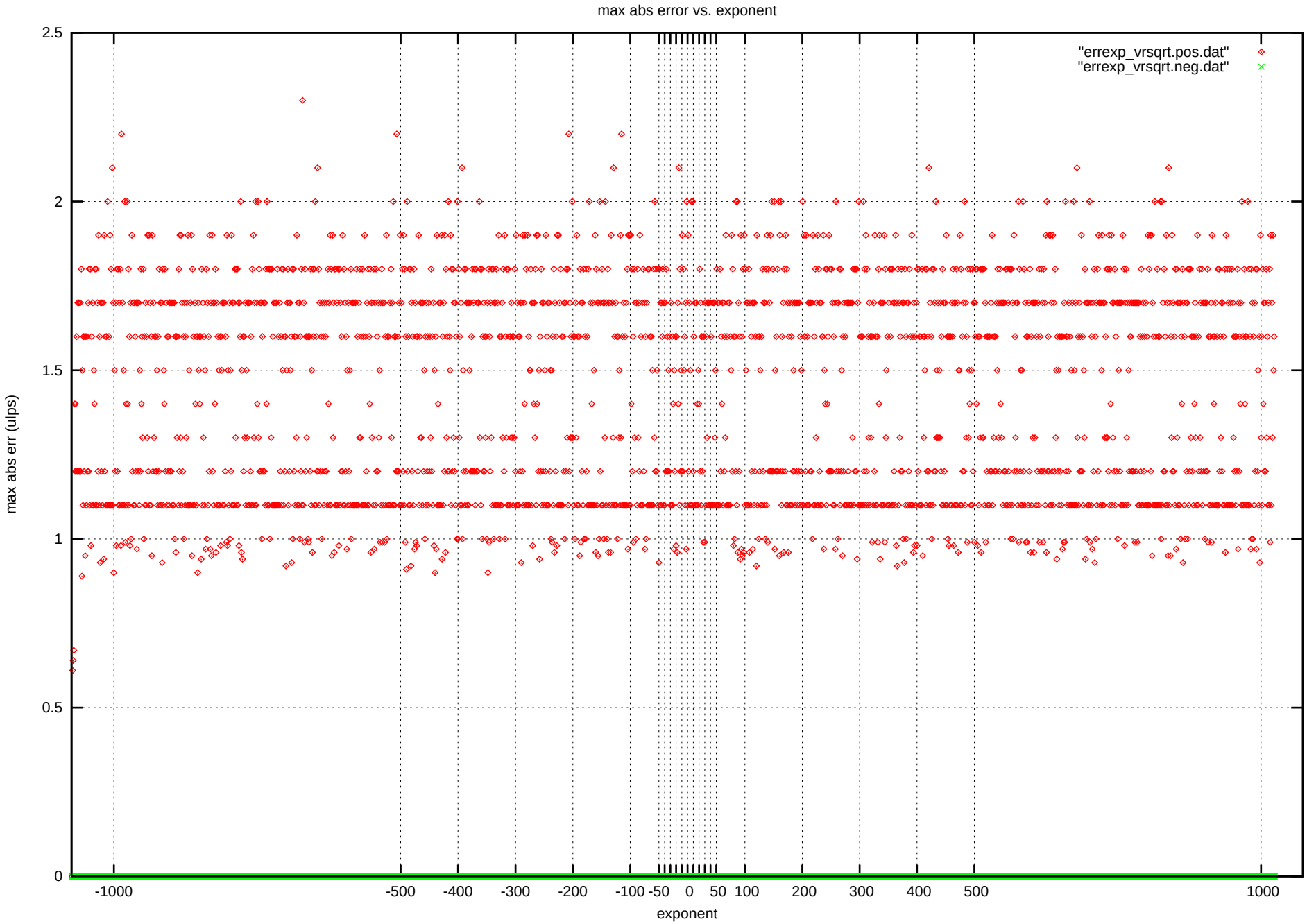

max abs error vs. exponent
"errexp_vdnint.pos.dat"
"errexp_vdnint.neg.dat"
max abs err (ulps)
exponent
1
0.5
0
-0.5
-1
-100
-50
0
50
100

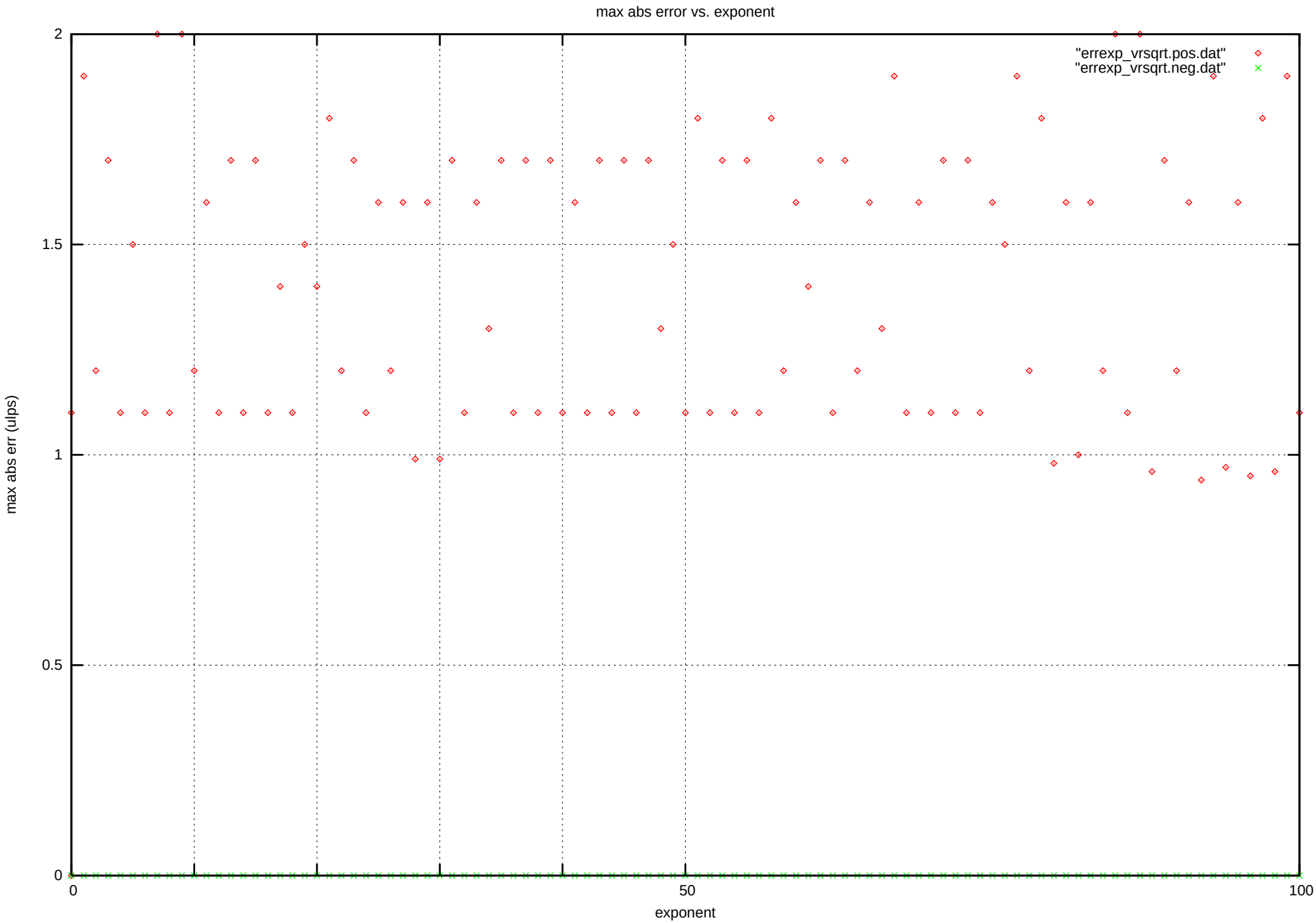

max abs error vs. exponent
"errexp_vpow.pos.dat"
"errexp_vpow.neg.dat"
max abs err (ulps)
exponent
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

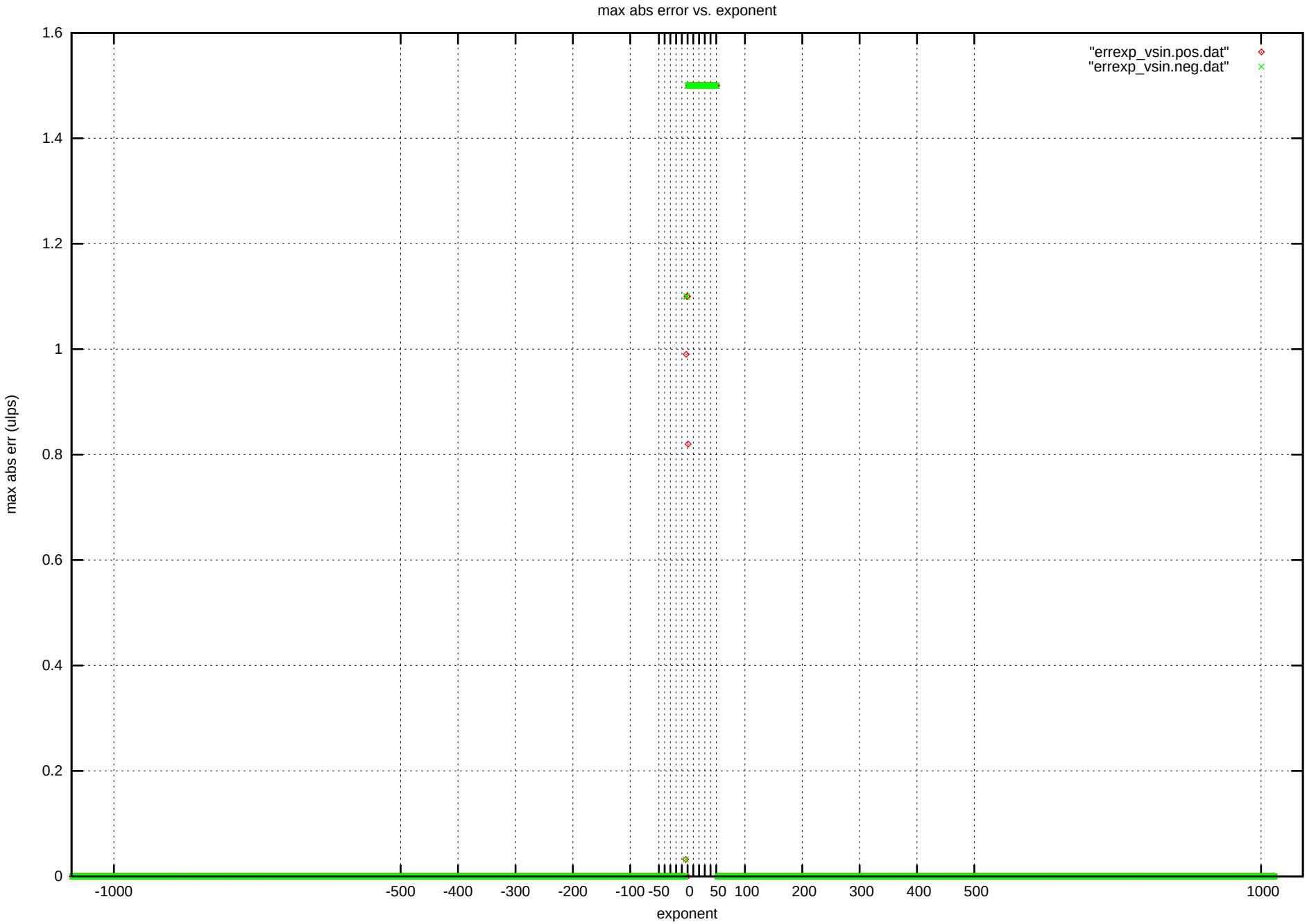

max abs error vs. exponent
"errexp_vpow.pos.dat"
"errexp_vpow.neg.dat"
max abs err (ulps)
exponent
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
50
100

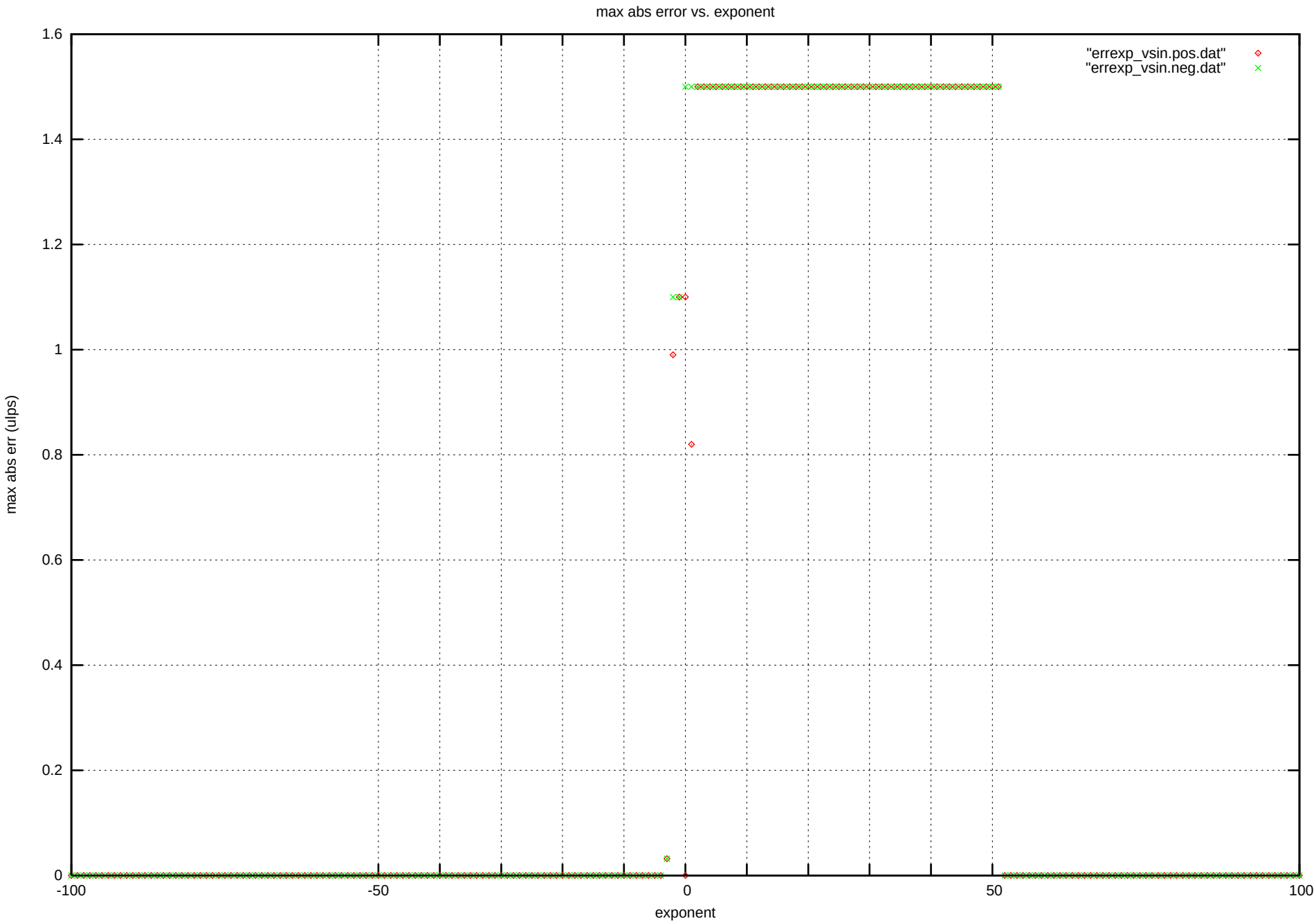

max abs error vs. exponent
"errexp_vrec.pos.dat"
"errexp_vrec.neg.dat"
max abs err (ulps)
exponent
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

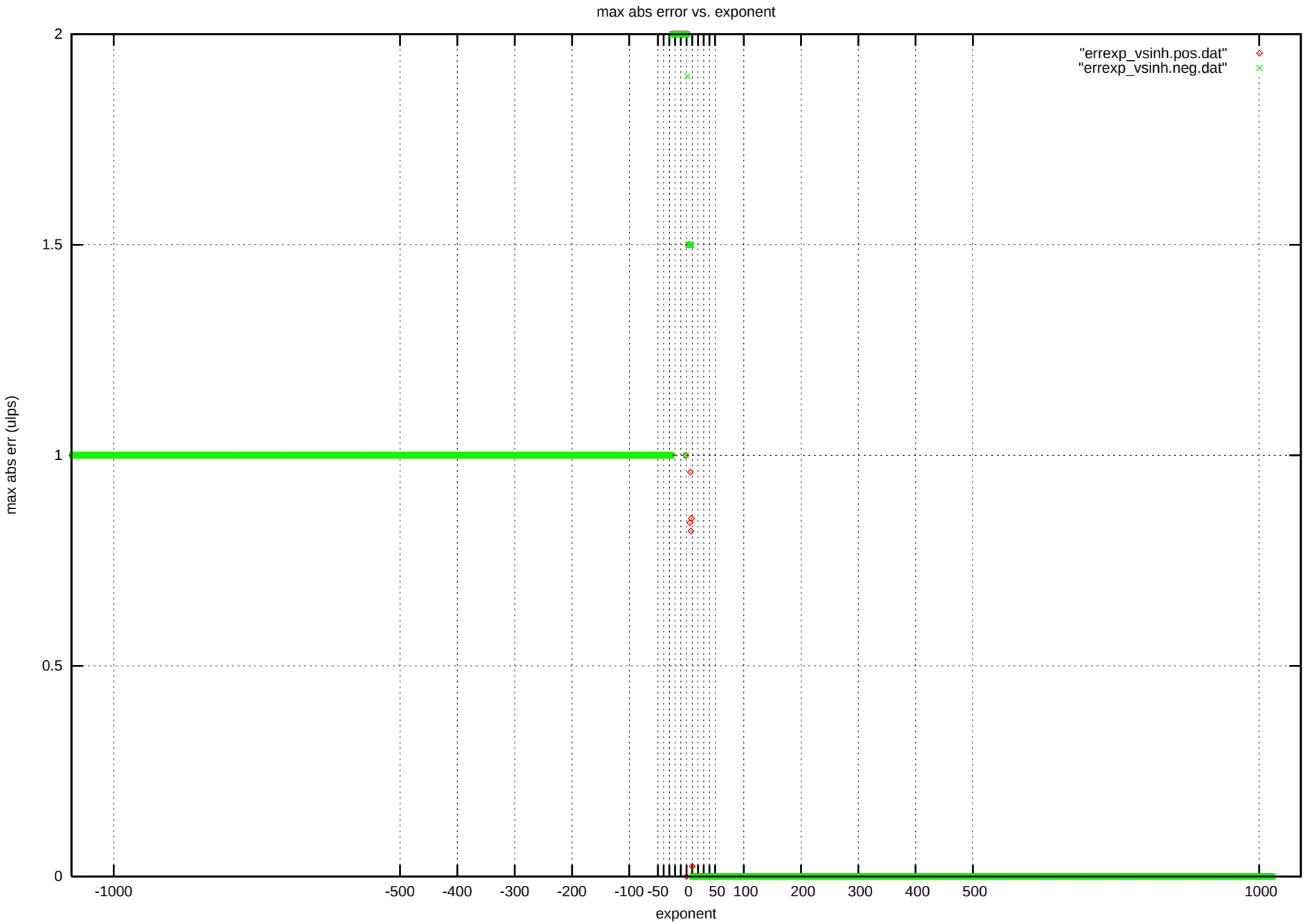

max abs error vs. exponent
"errexp_vrec.pos.dat"
"errexp_vrec.neg.dat"
max abs err (ulps)
exponent
2.5
2
1.5
1
0.5
0
-100
-50
0
50
100

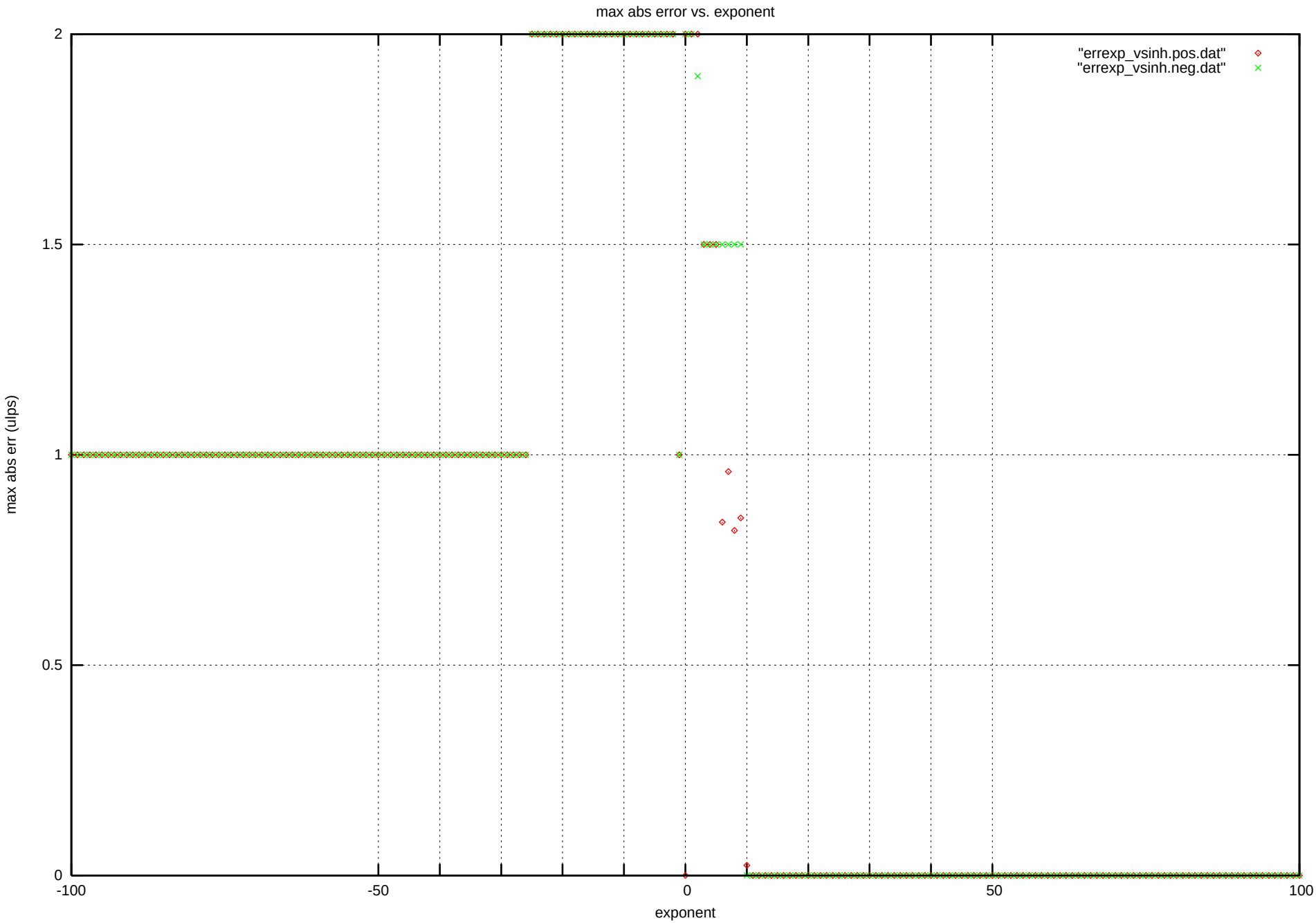

max abs error vs. exponent
"errexp_vrsqrt.pos.dat"
"errexp_vrsqrt.neg.dat"
max abs err (ulps)
exponent
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

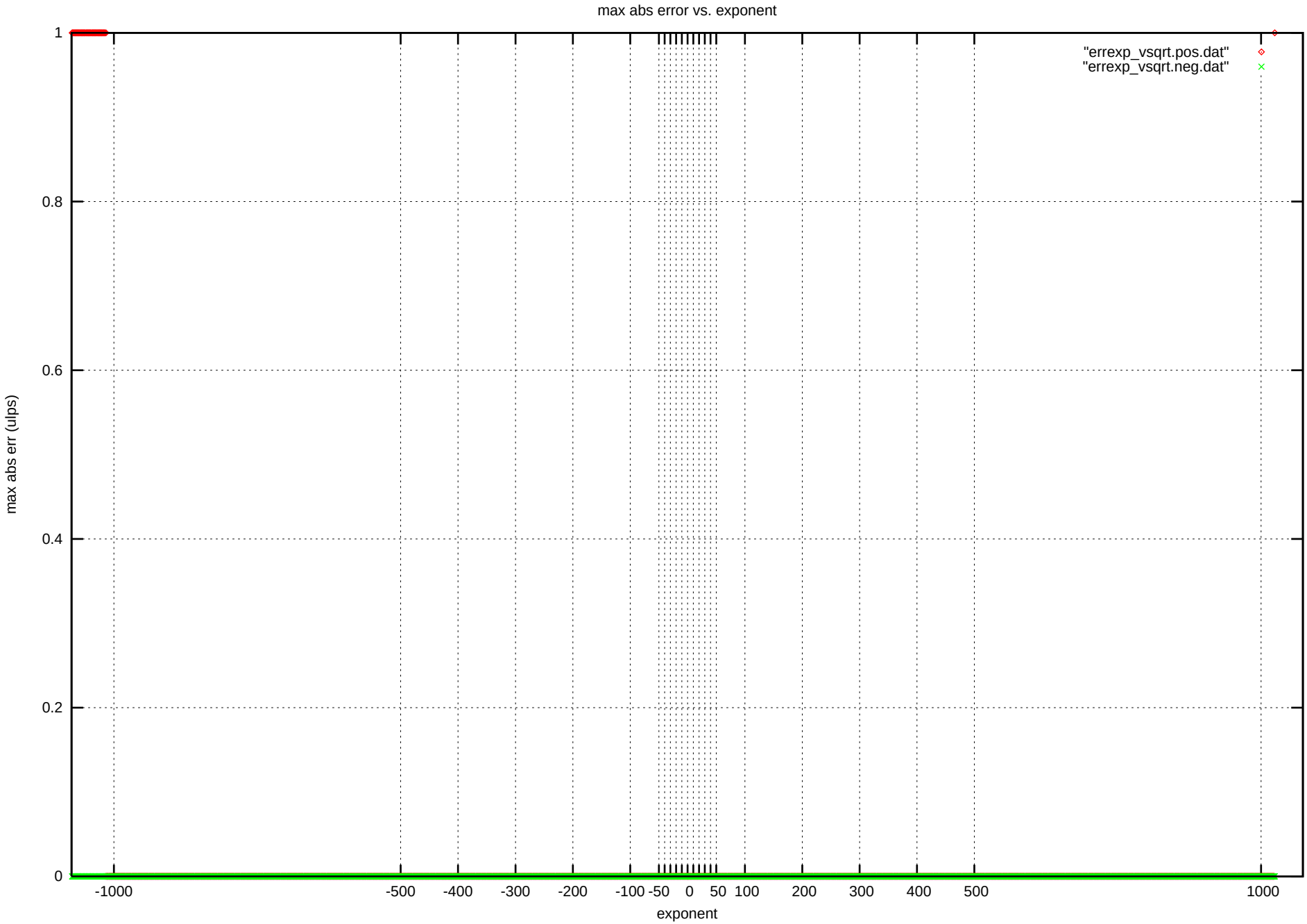

max abs error vs. exponent
"errexp_vrsqrt.pos.dat"
"errexp_vrsqrt.neg.dat"
max abs err (ulps)
exponent
0
0.5
1
1.5
2
0
50
100

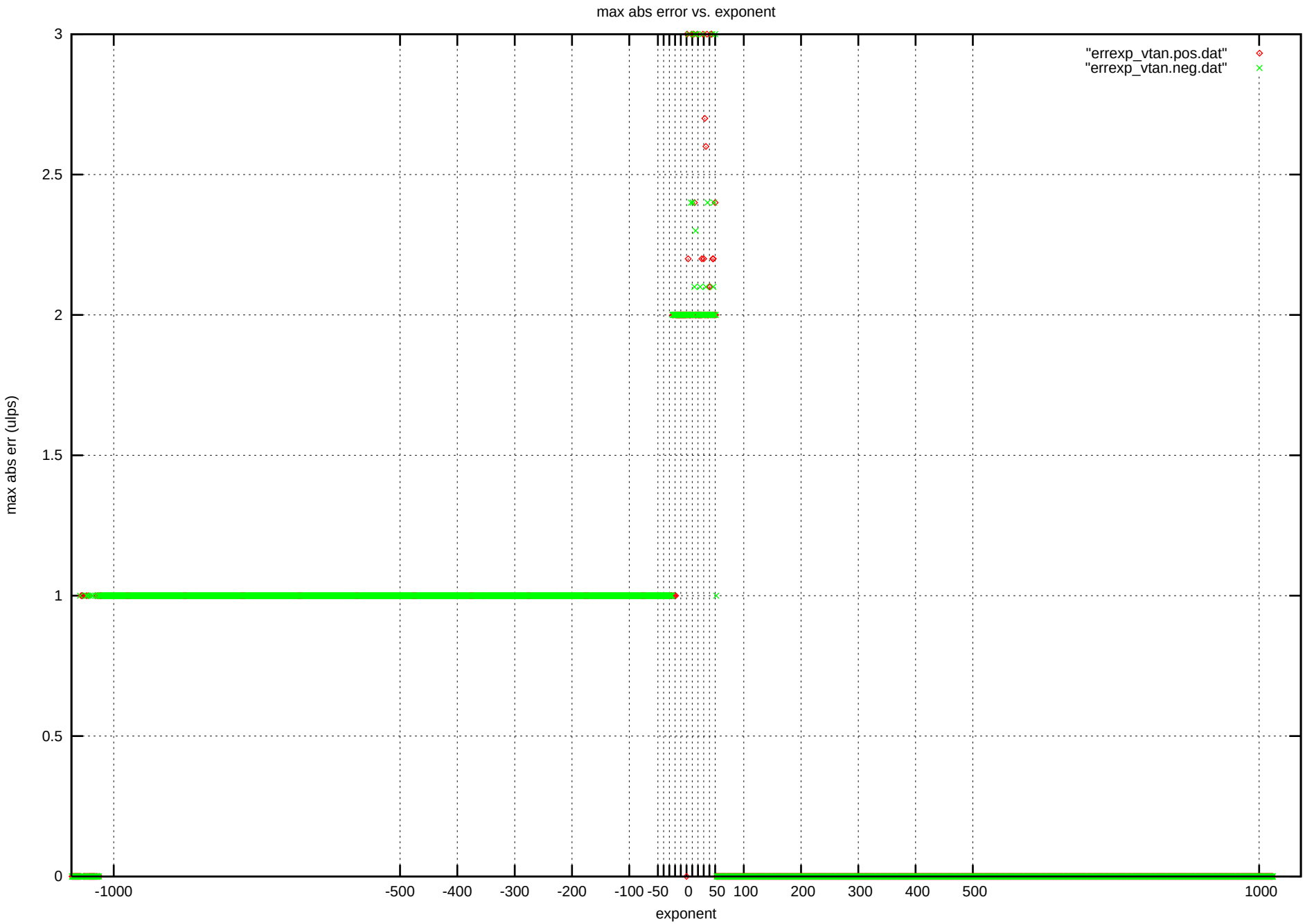

max abs error vs. exponent
"errexp_vsin.pos.dat"
"errexp_vsin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

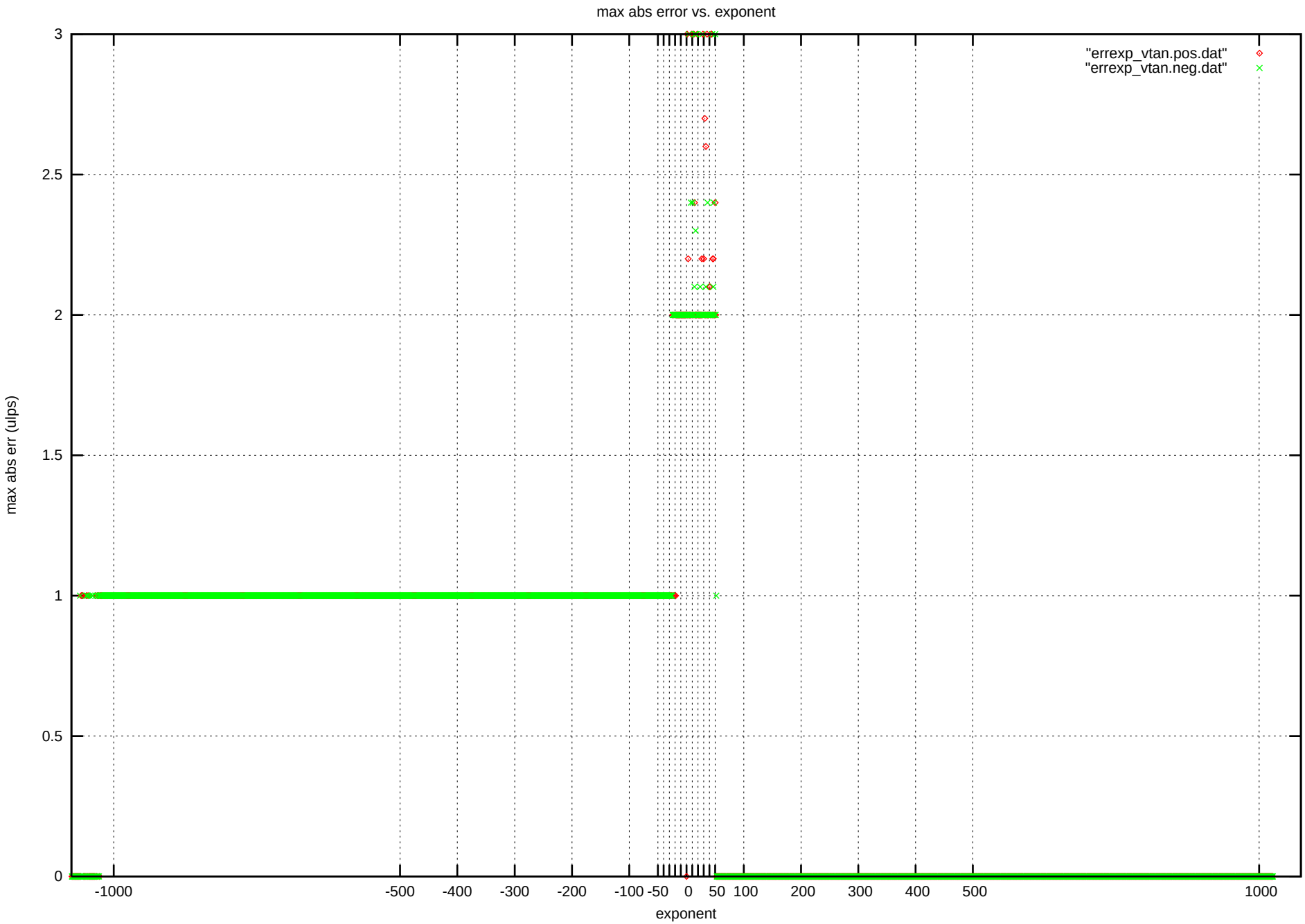

max abs error vs. exponent
"errexp_vsin.pos.dat"
"errexp_vsin.neg.dat"
max abs err (ulps)
exponent
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100

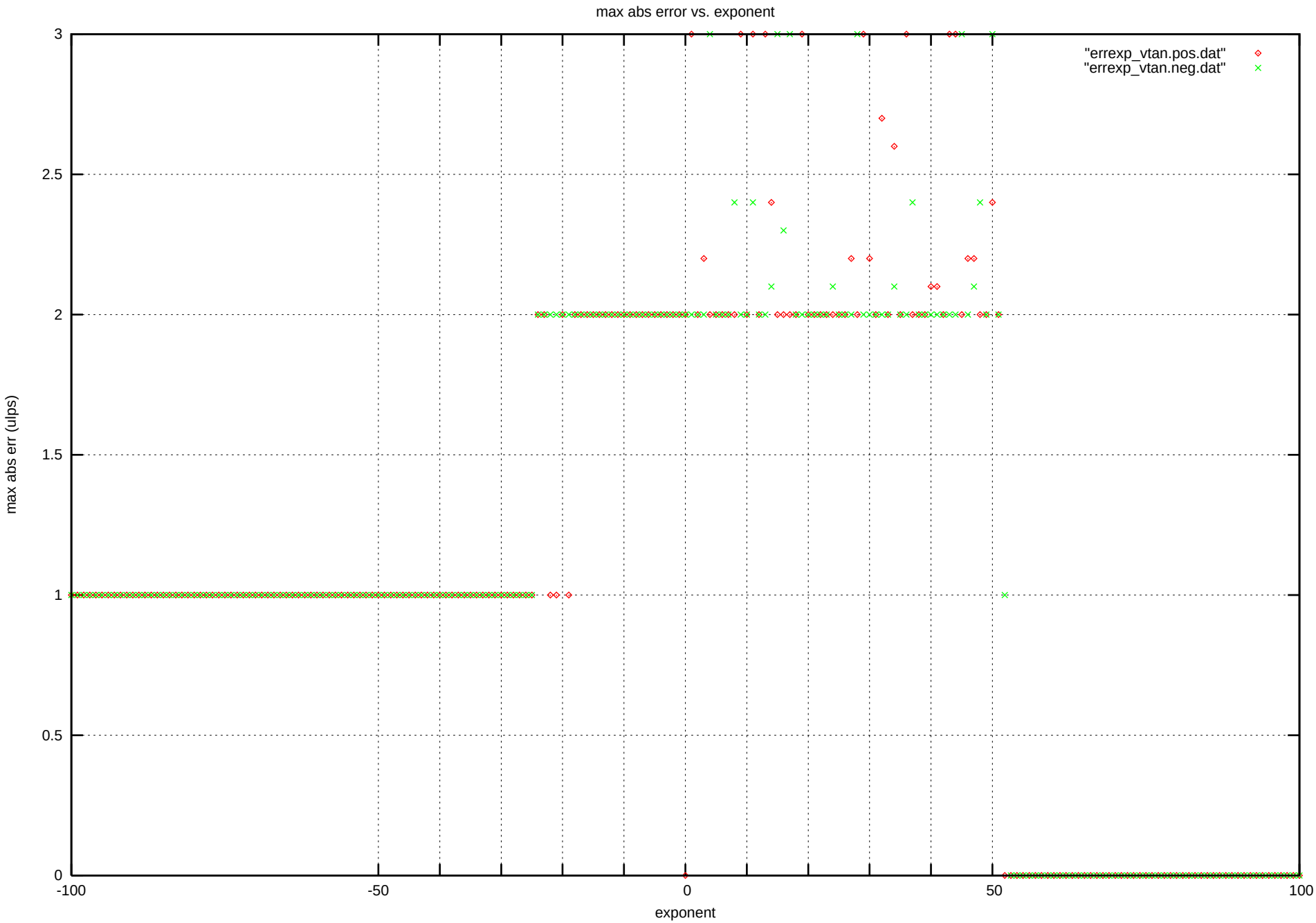

max abs error vs. exponent
"errexp_vsinh.pos.dat"
"errexp_vsinh.neg.dat"
max abs err (ulps)
exponent
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

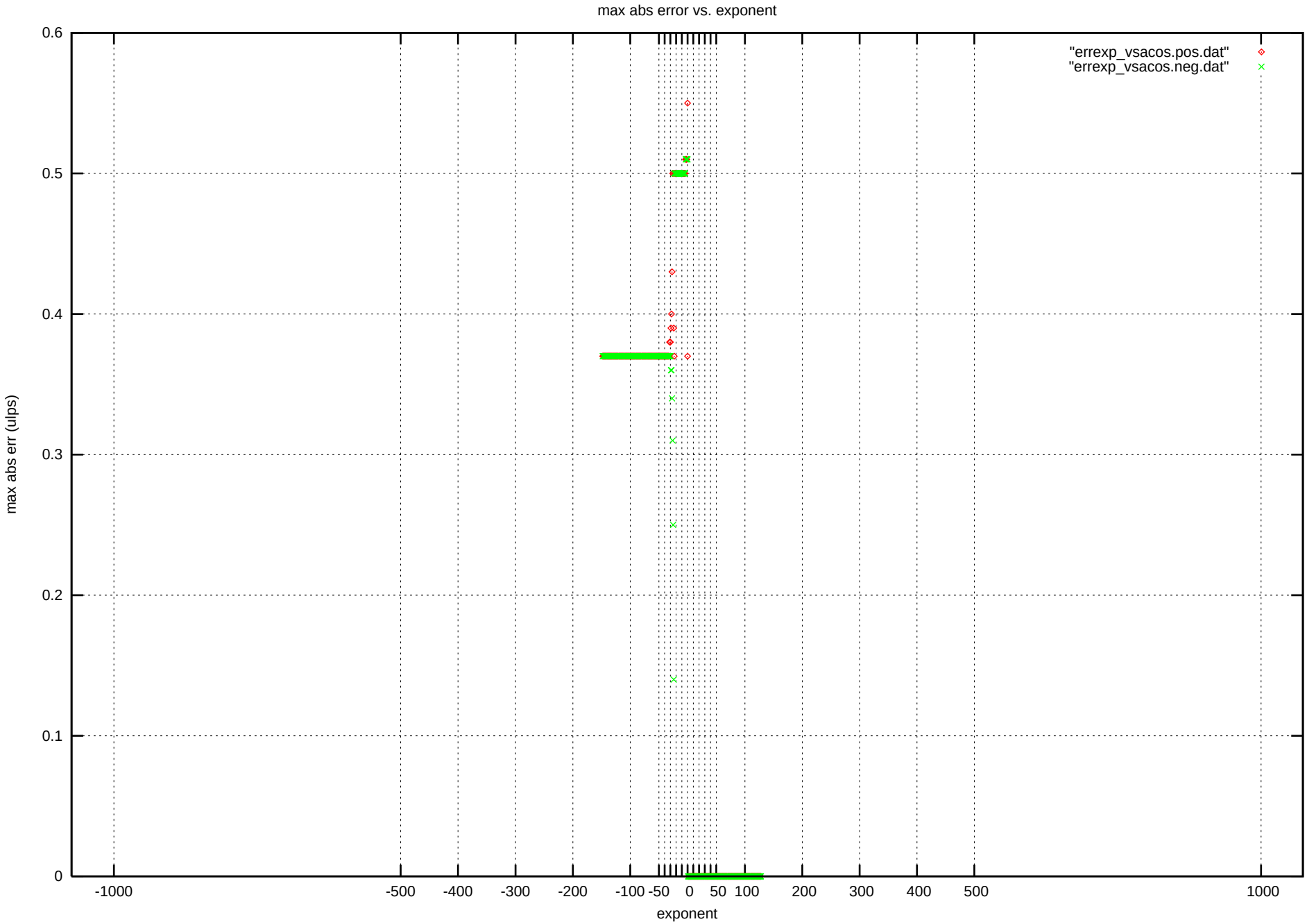

max abs error vs. exponent
"errexp_vsinh.pos.dat"
"errexp_vsinh.neg.dat"
max abs err (ulps)
exponent
2
1.5
1
0.5
0
-100
-50
0
50
100

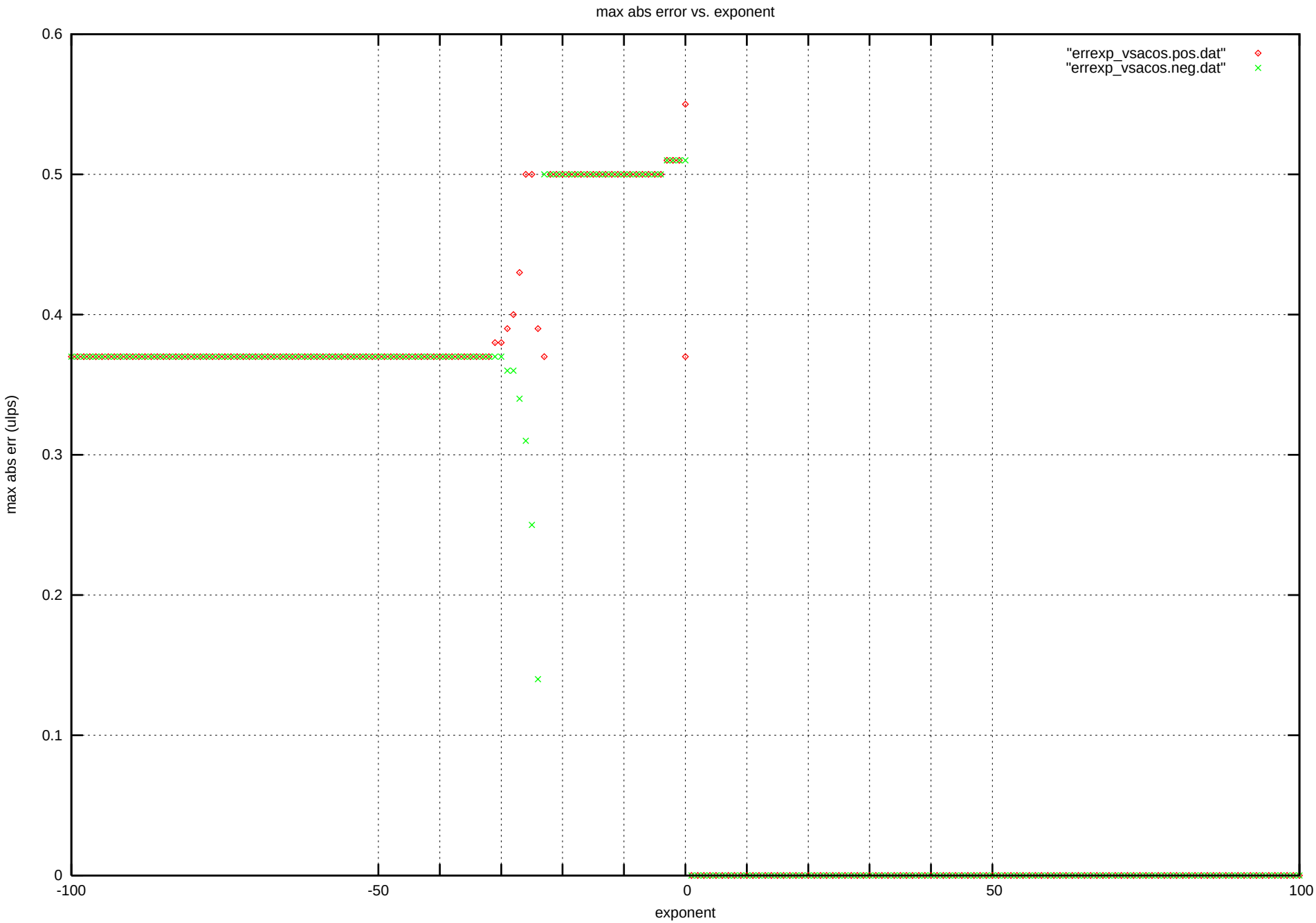

max abs error vs. exponent
"errexp_vsqrt.pos.dat"
"errexp_vsqrt.neg.dat"
max abs err (ulps)
exponent
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

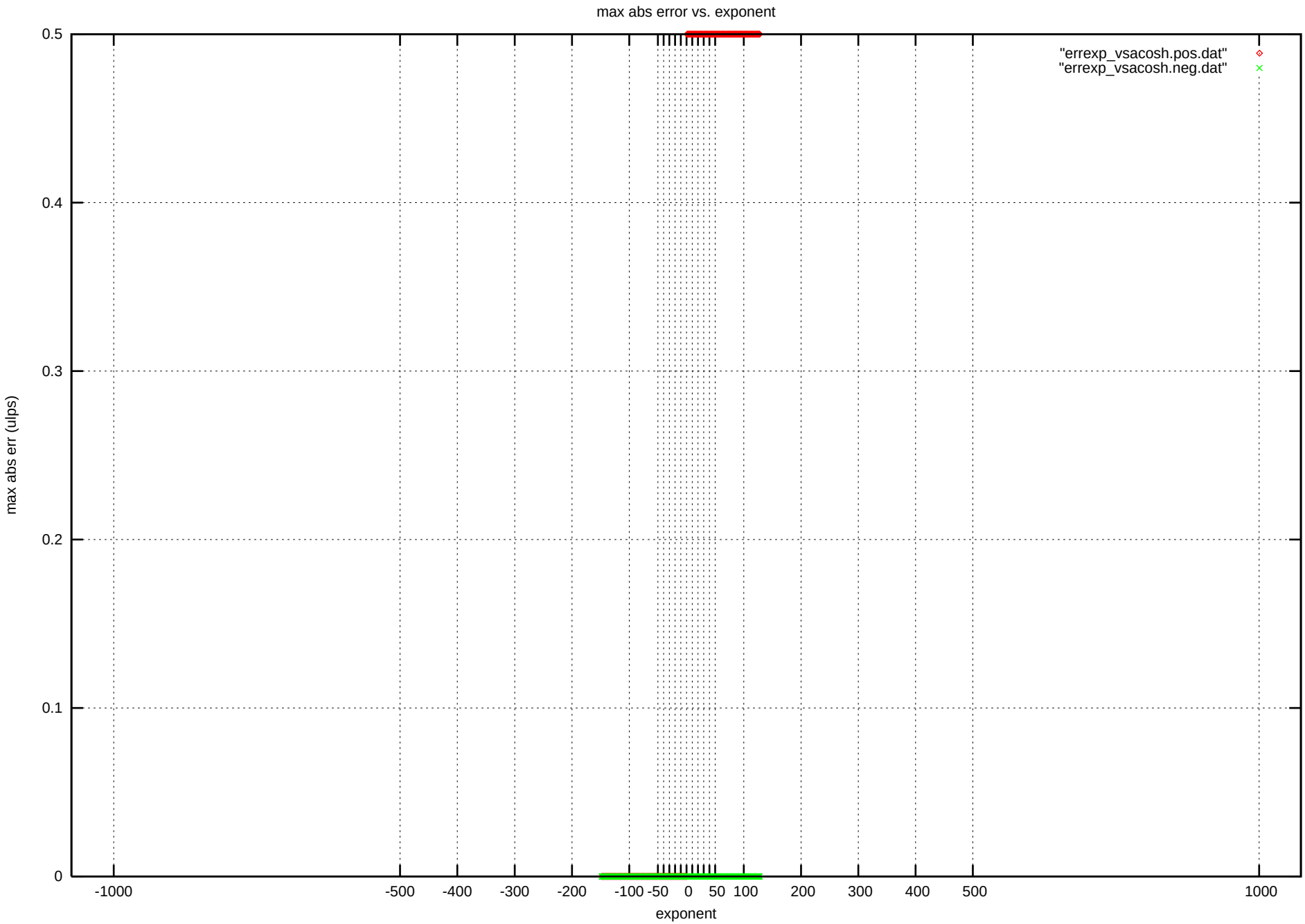

max abs error vs. exponent
"errexp_vtan.pos.dat"
"errexp_vtan.neg.dat"
max abs err (ulps)
exponent
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

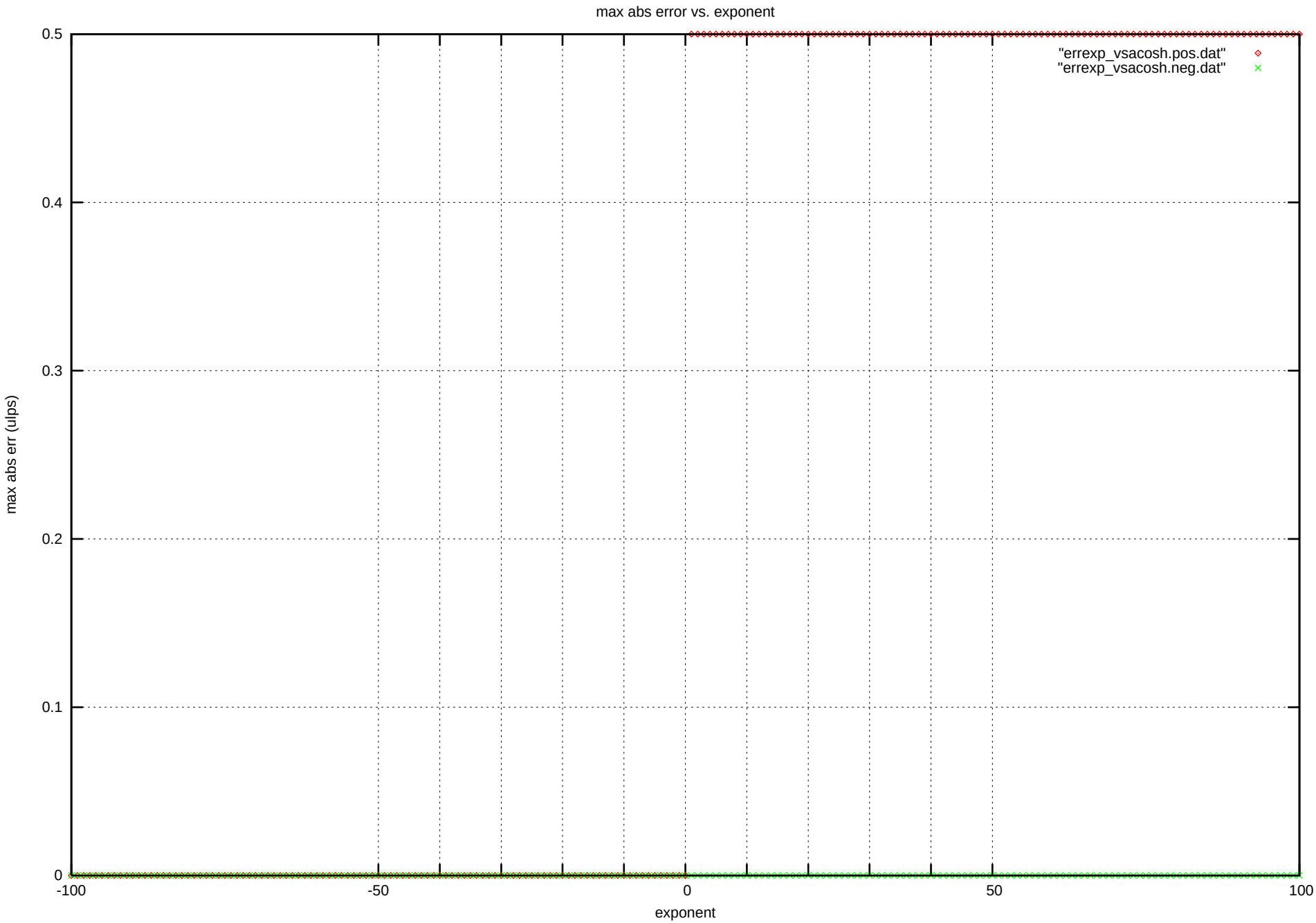

max abs error vs. exponent
"errexp_vtan.pos.dat"
"errexp_vtan.neg.dat"
max abs err (ulps)
exponent
3
2.5
2
1.5
1
0.5
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

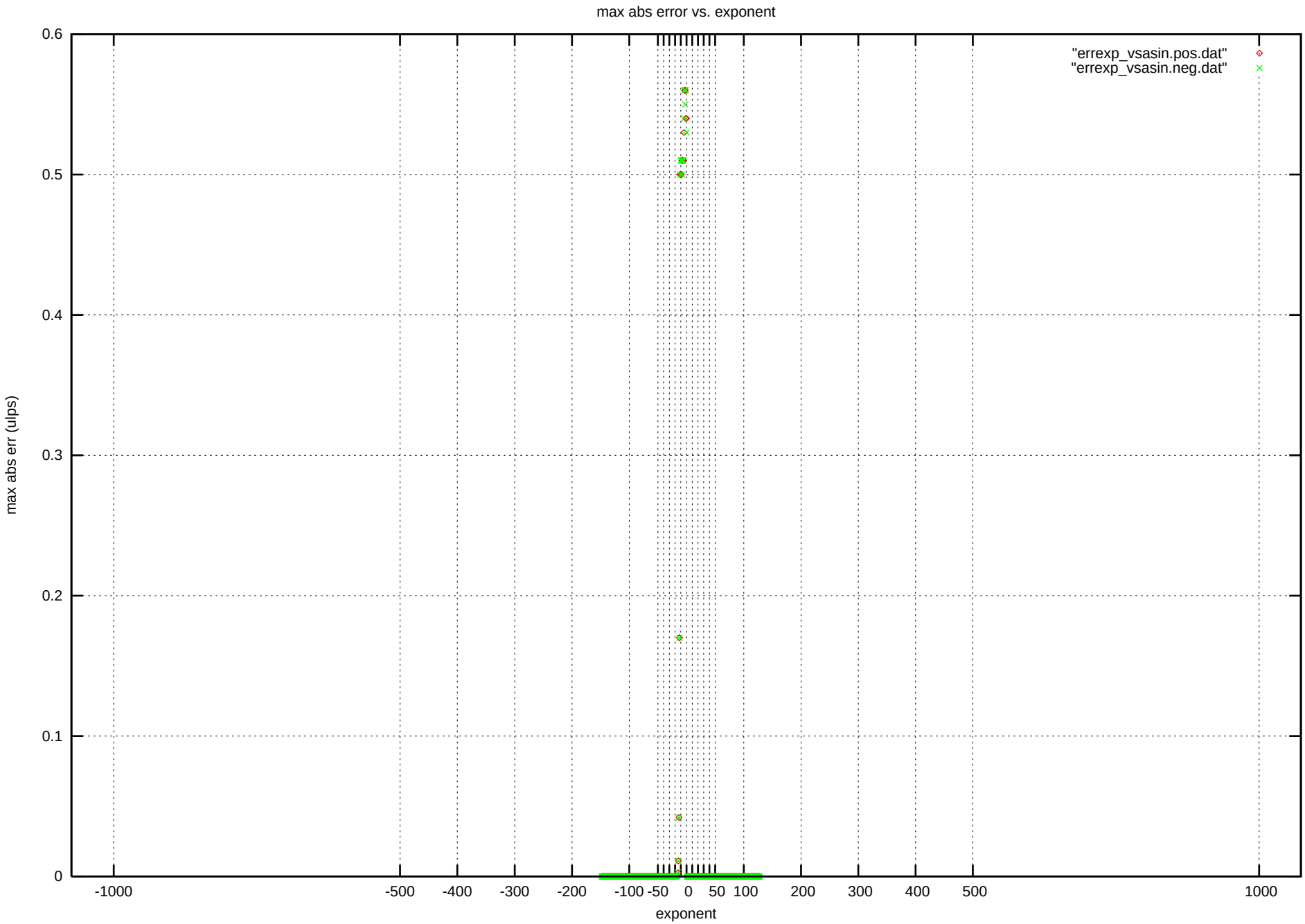

max abs error vs. exponent
"errexp_vtan.pos.dat"
"errexp_vtan.neg.dat"
max abs err (ulps)
exponent
3
2.5
2
1.5
1
0.5
0
-100
-50
0
50
100

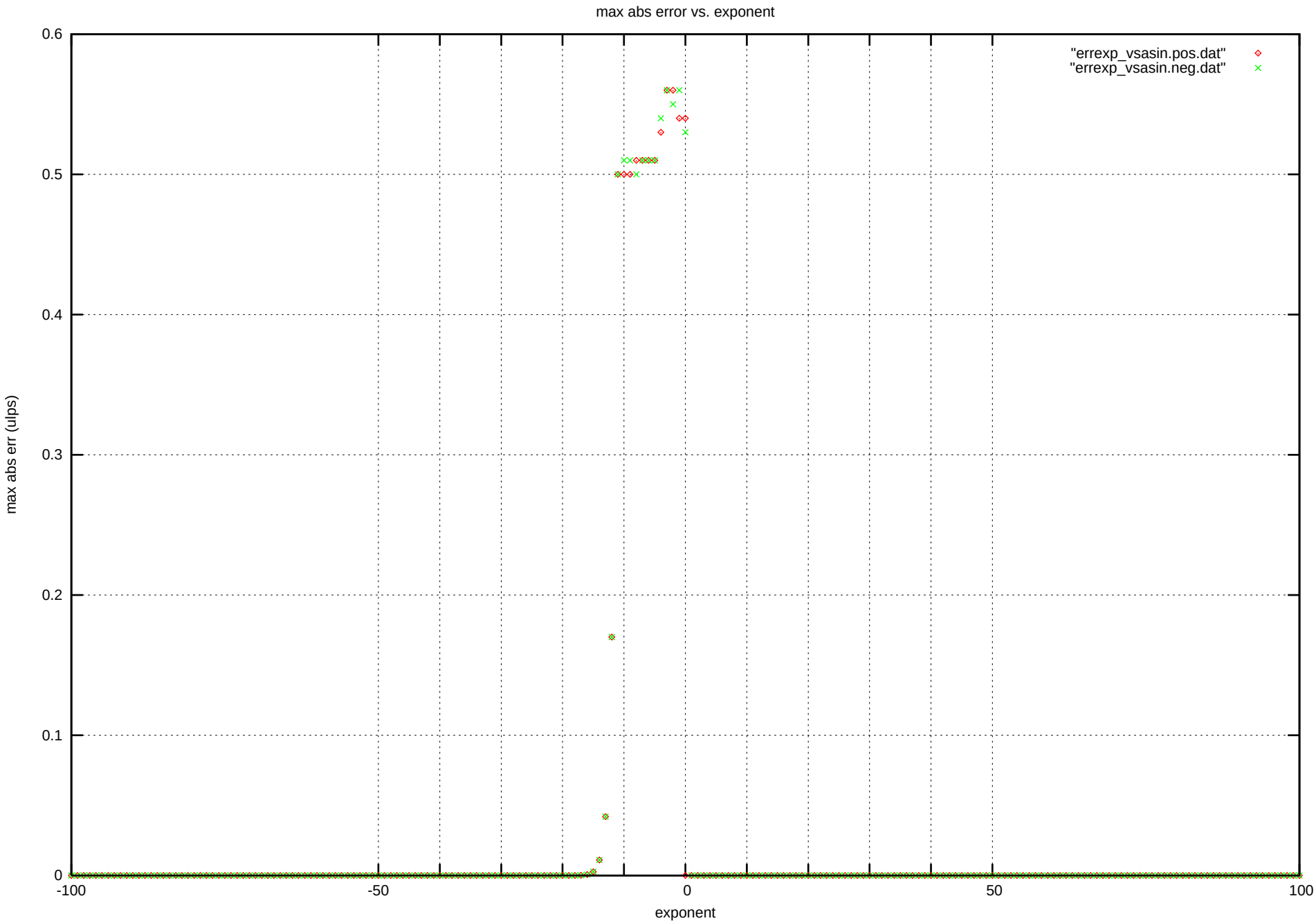

max abs error vs. exponent
"errexp_vsacos.pos.dat"
"errexp_vsacos.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

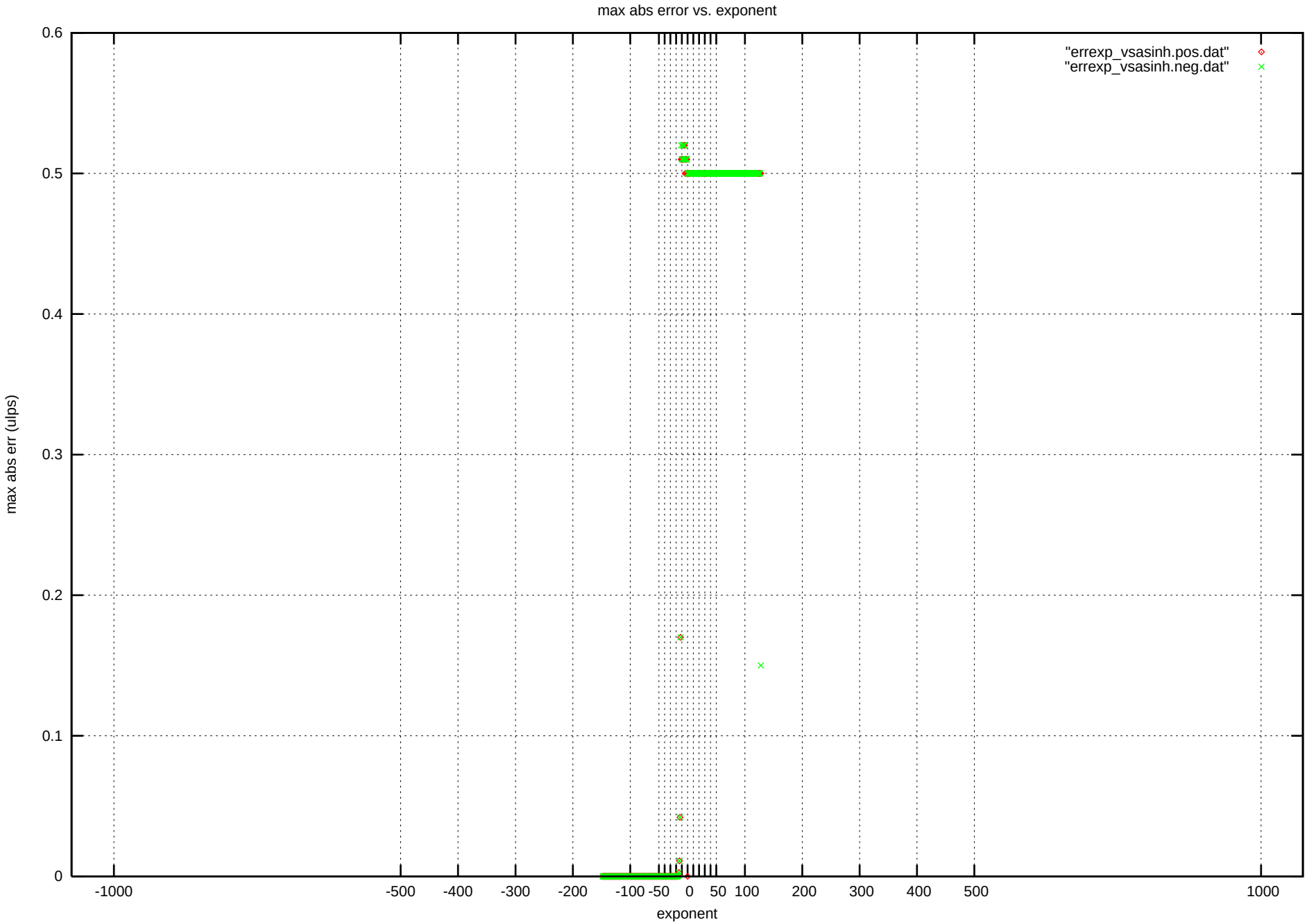

max abs error vs. exponent
"errexp_vsacos.pos.dat"
"errexp_vsacos.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
-100
-50
0
50
100

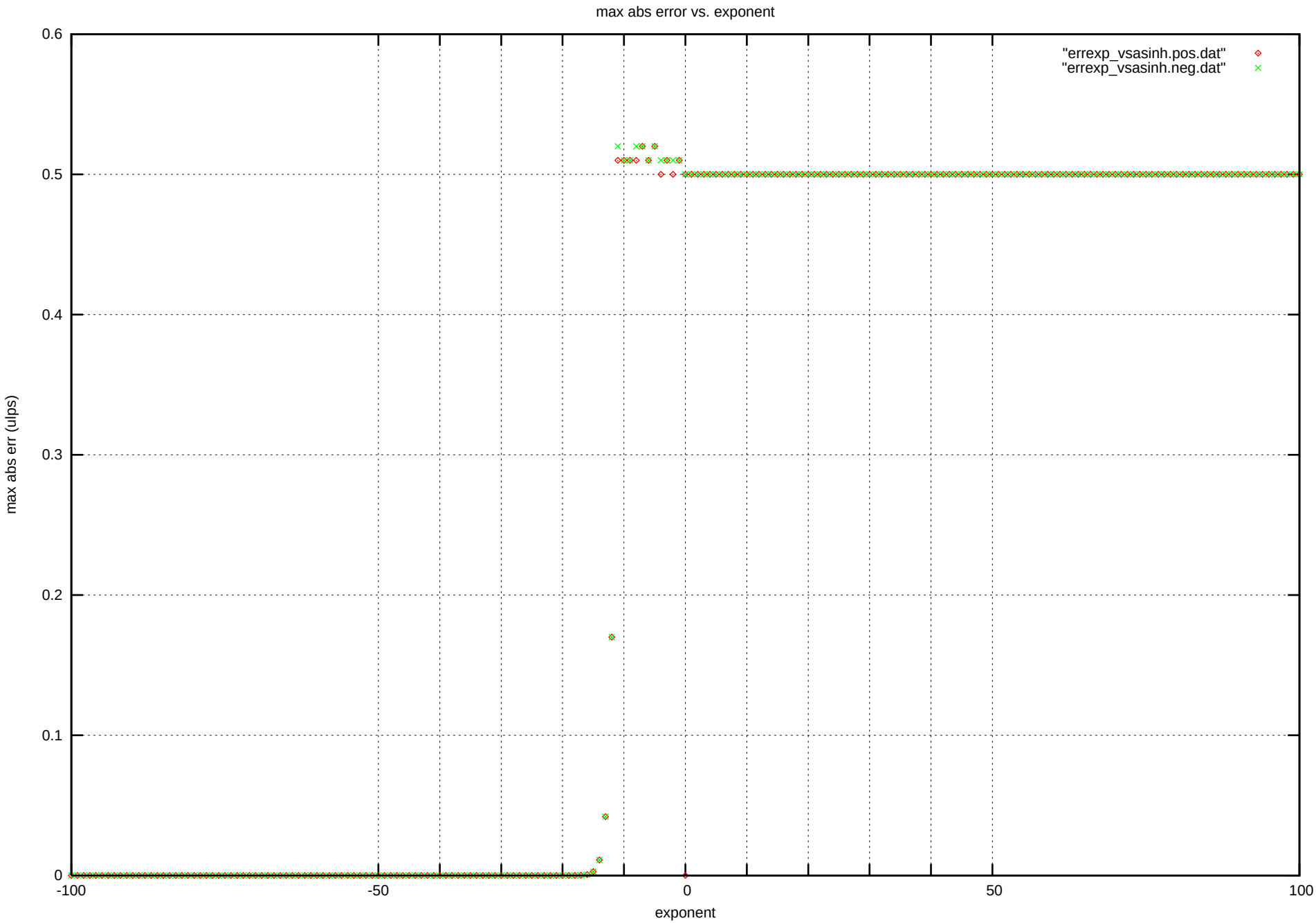

max abs error vs. exponent
"errexp_vsacosh.pos.dat"
"errexp_vsacosh.neg.dat"
max abs err (ulps)
0.5
0.4
0.3
0.2
0.1
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent

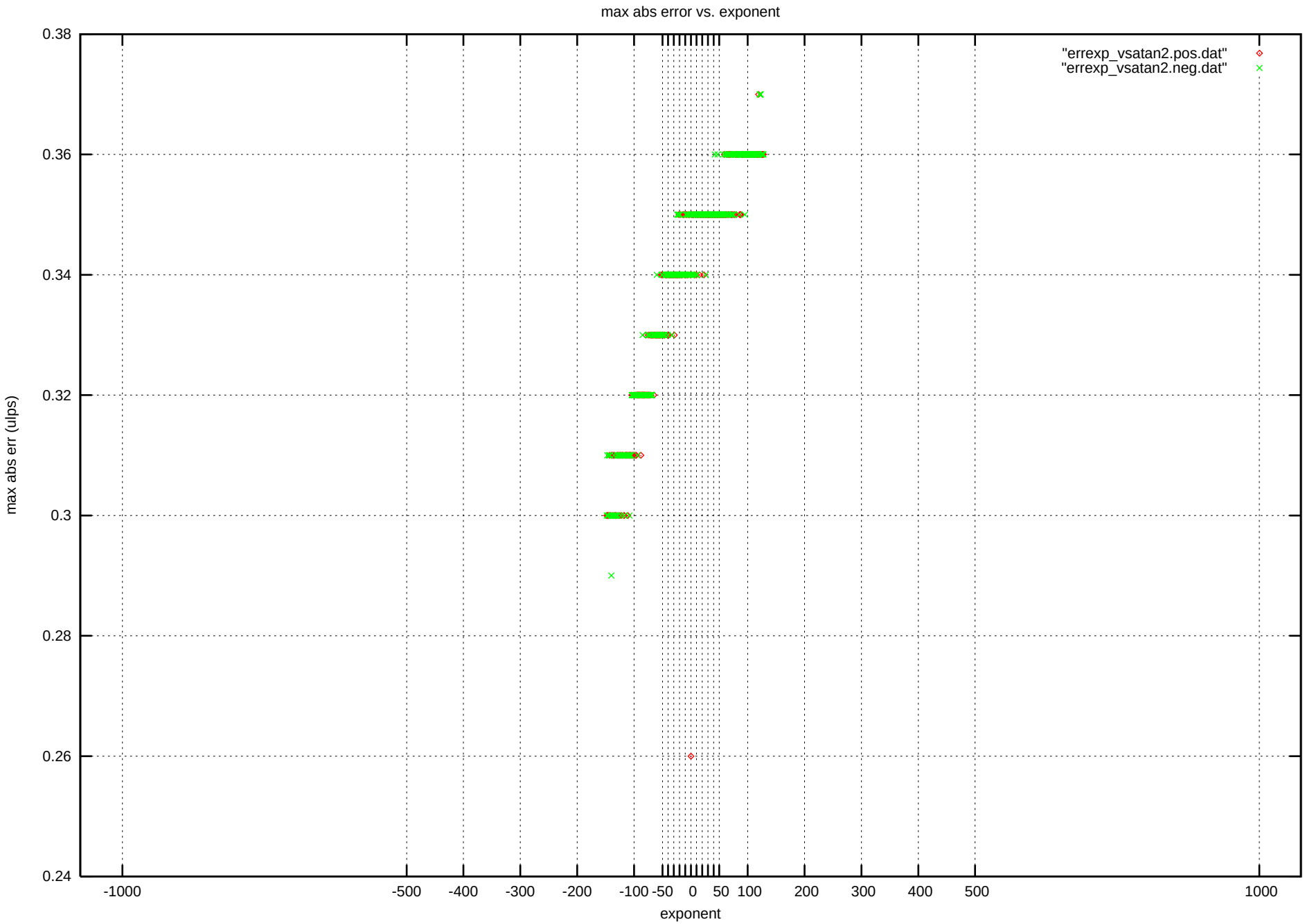

max abs error vs. exponent
"errexp_vsacosh.pos.dat"
"errexp_vsacosh.neg.dat"
max abs err (ulps)
exponent
0.5
0.4
0.3
0.2
0.1
0
-100
-50
0
50
100

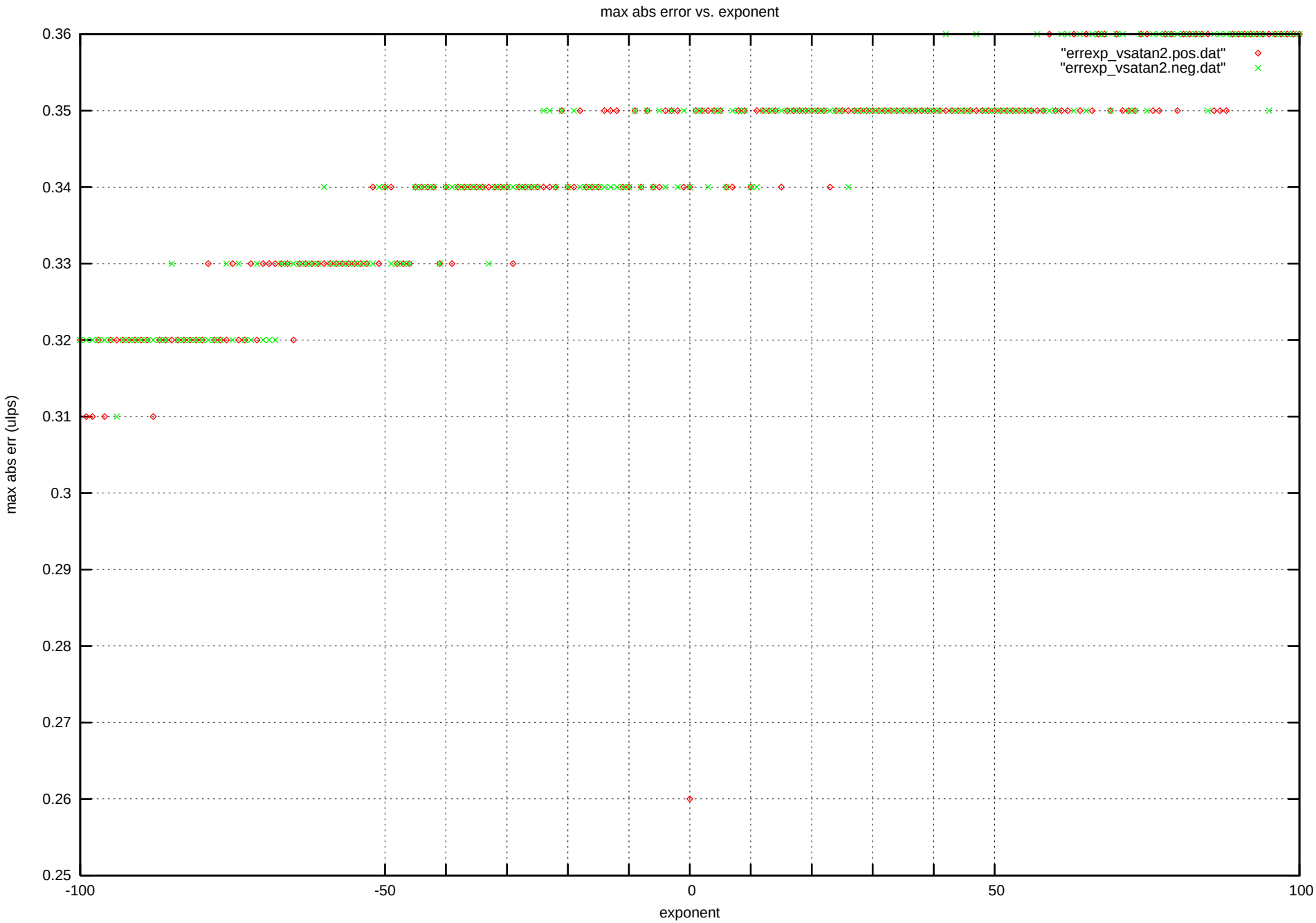

max abs error vs. exponent
"errexp_vsasin.pos.dat"
"errexp_vsasin.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000

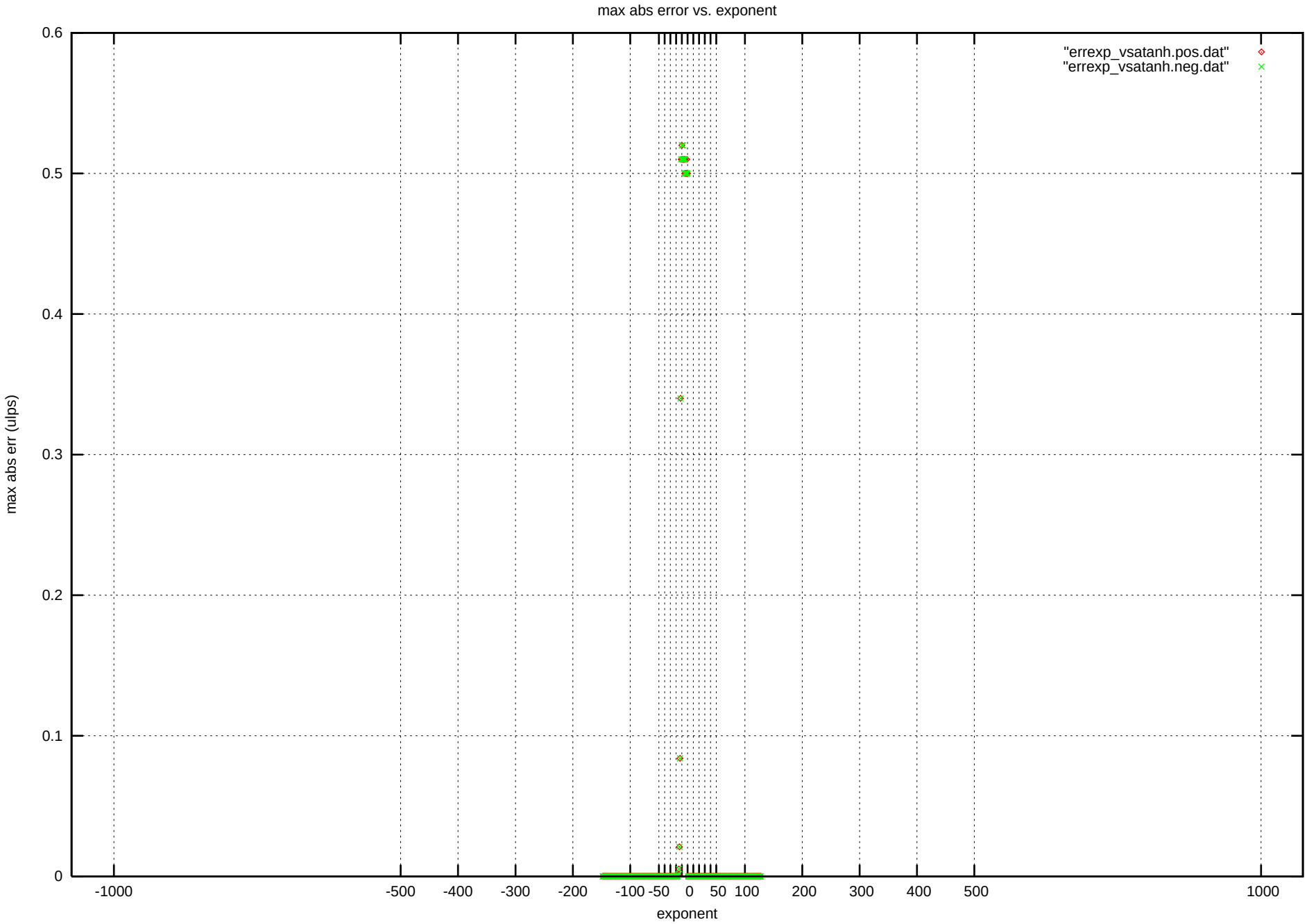

max abs error vs. exponent
"errexp_vsasin.pos.dat"
"errexp_vsasin.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsasinh.pos.dat"
"errexp_vsasinh.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vsasinh.pos.dat"
"errexp_vsasinh.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsatan2.pos.dat"
"errexp_vsatan2.neg.dat"
max abs err (ulps)
0.38
0.36
0.34
0.32
0.3
0.28
0.26
0.24
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent


max abs error vs. exponent
"errexp_vsatan2.pos.dat"
"errexp_vsatan2.neg.dat"
max abs err (ulps)
exponent
0.36
0.35
0.34
0.33
0.32
0.31
0.3
0.29
0.28
0.27
0.26
0.25
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsatanh.pos.dat"
"errexp_vsatanh.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
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-500
-400
-300
-200
-100
-50
0
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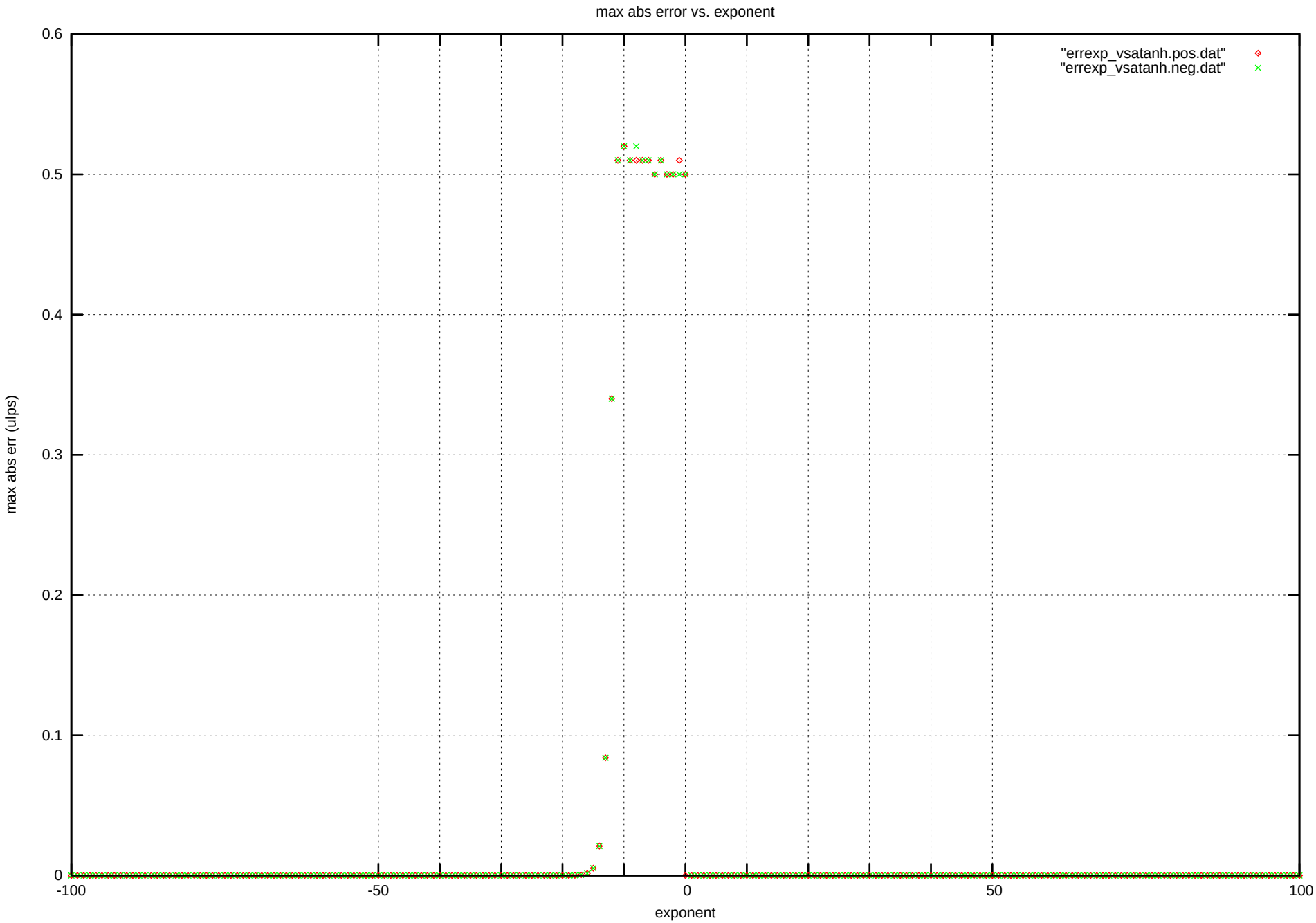
1000


max abs error vs. exponent
"errexp_vsatanh.pos.dat"
"errexp_vsatanh.neg.dat"
max abs err (ulps)
exponent
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0.4
0.3
0.2
0.1
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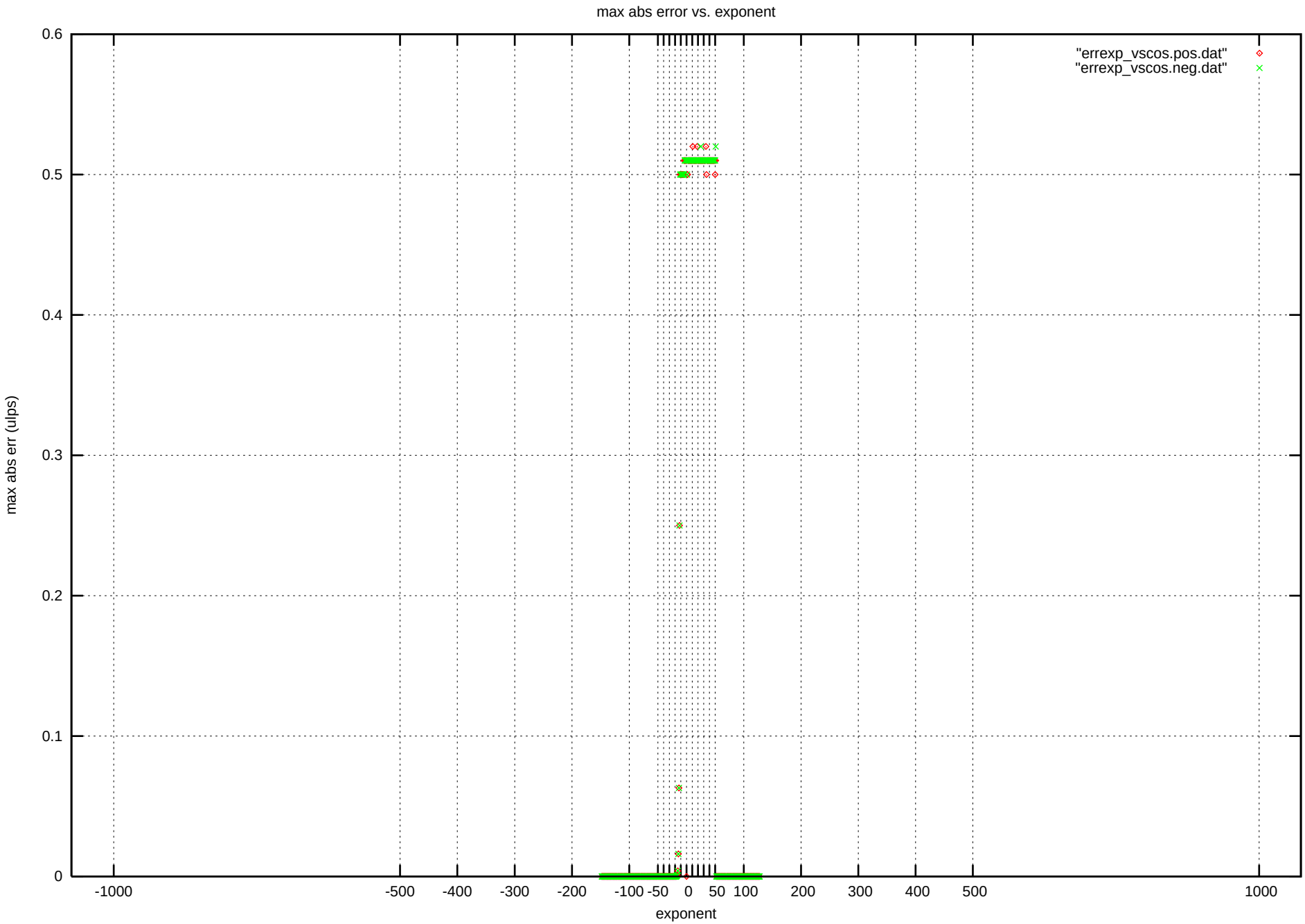
-100
-50
0
50
100


max abs error vs. exponent
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"errexp_vscos.neg.dat"
max abs err (ulps)
exponent
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0.5
0.4
0.3
0.2
0.1
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-500
-400
-300
-200
-100
-50
0
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300
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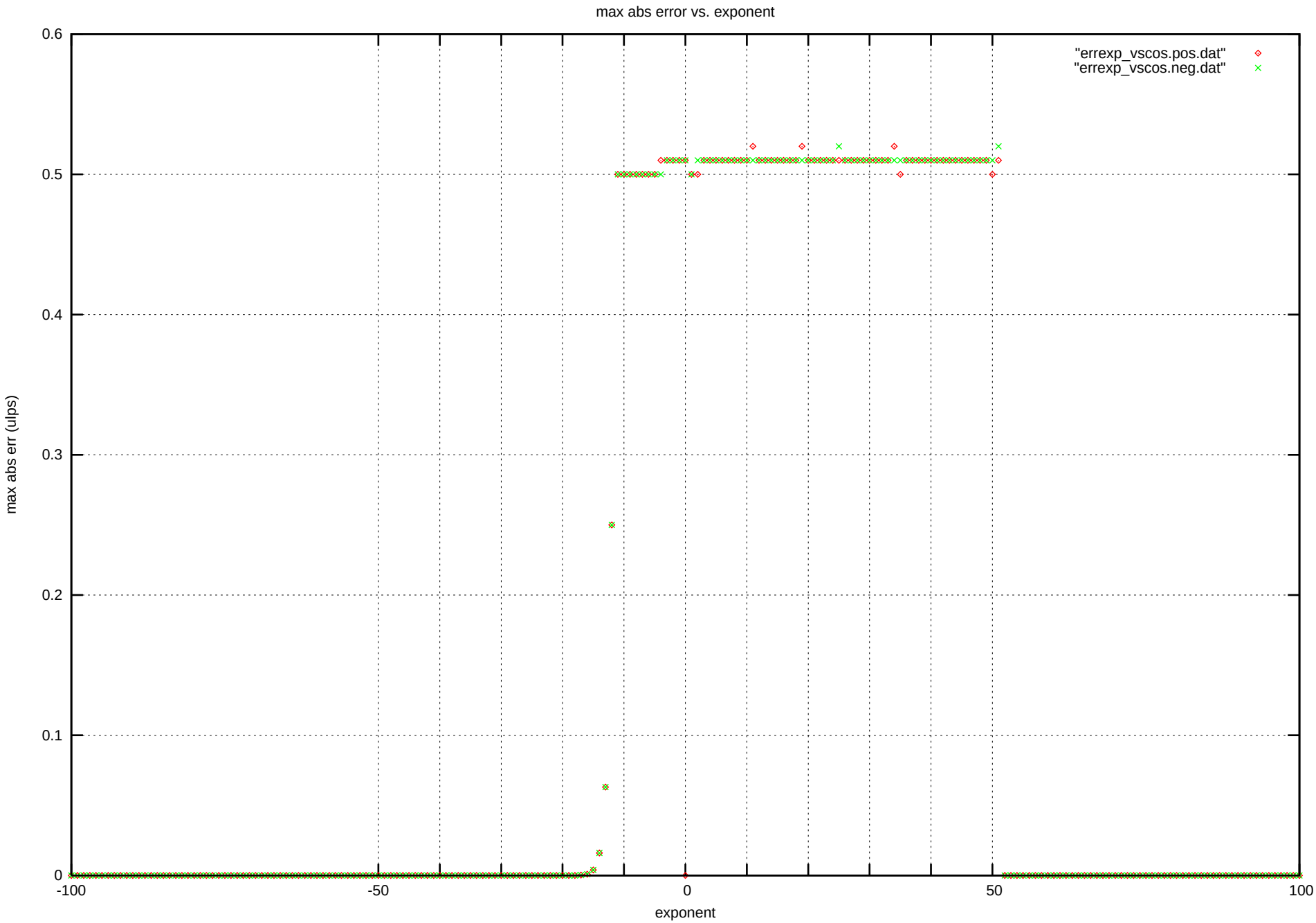
500
1000


max abs error vs. exponent
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max abs err (ulps)
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0.3
0.4
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0.6
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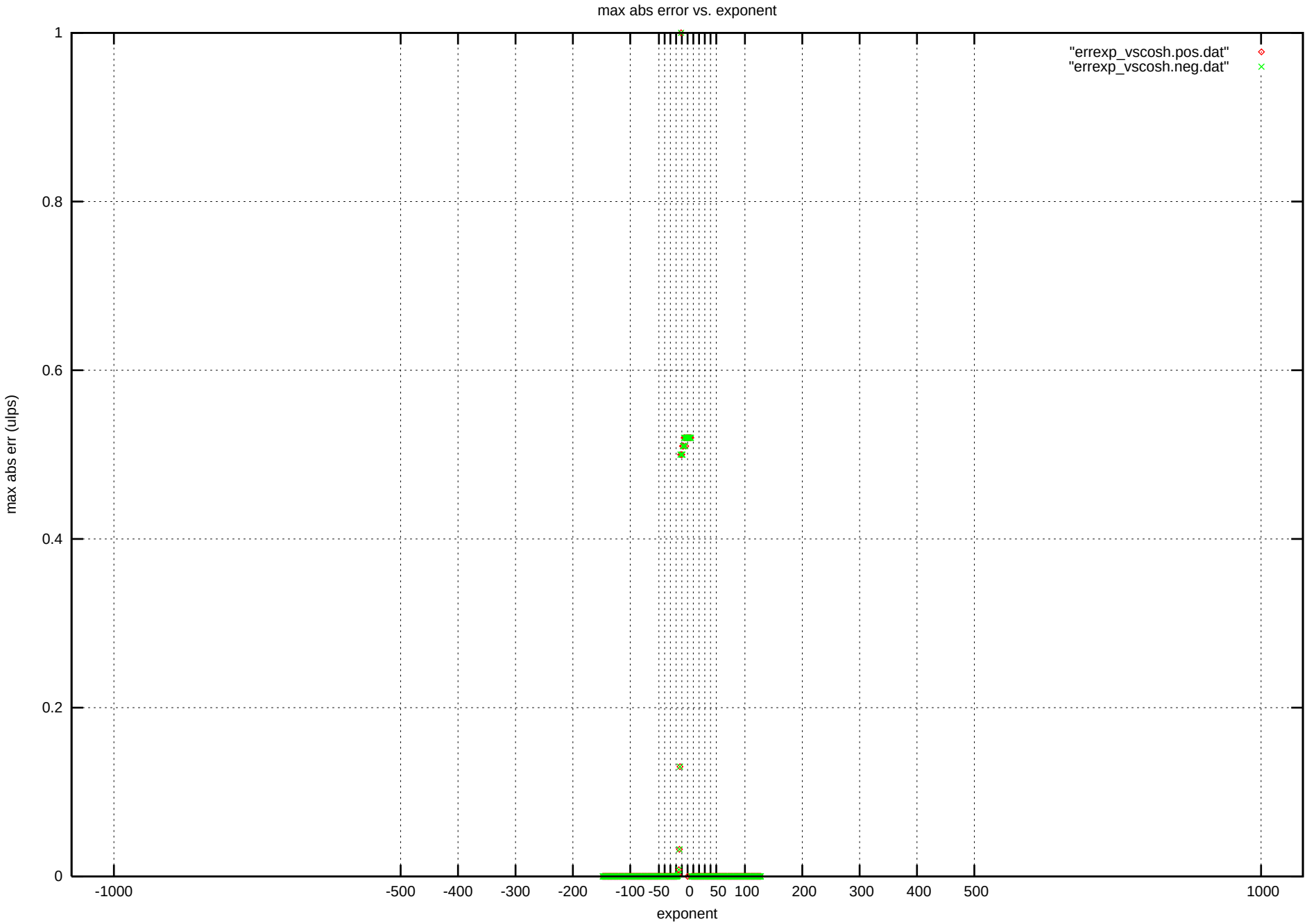
-50
0
50
100


max abs error vs. exponent
"errexp_vscosh.pos.dat"
"errexp_vscosh.neg.dat"
max abs err (ulps)
exponent
1
0.8
0.6
0.4
0.2
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-500
-400
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-200
-100
-50
0
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300
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500
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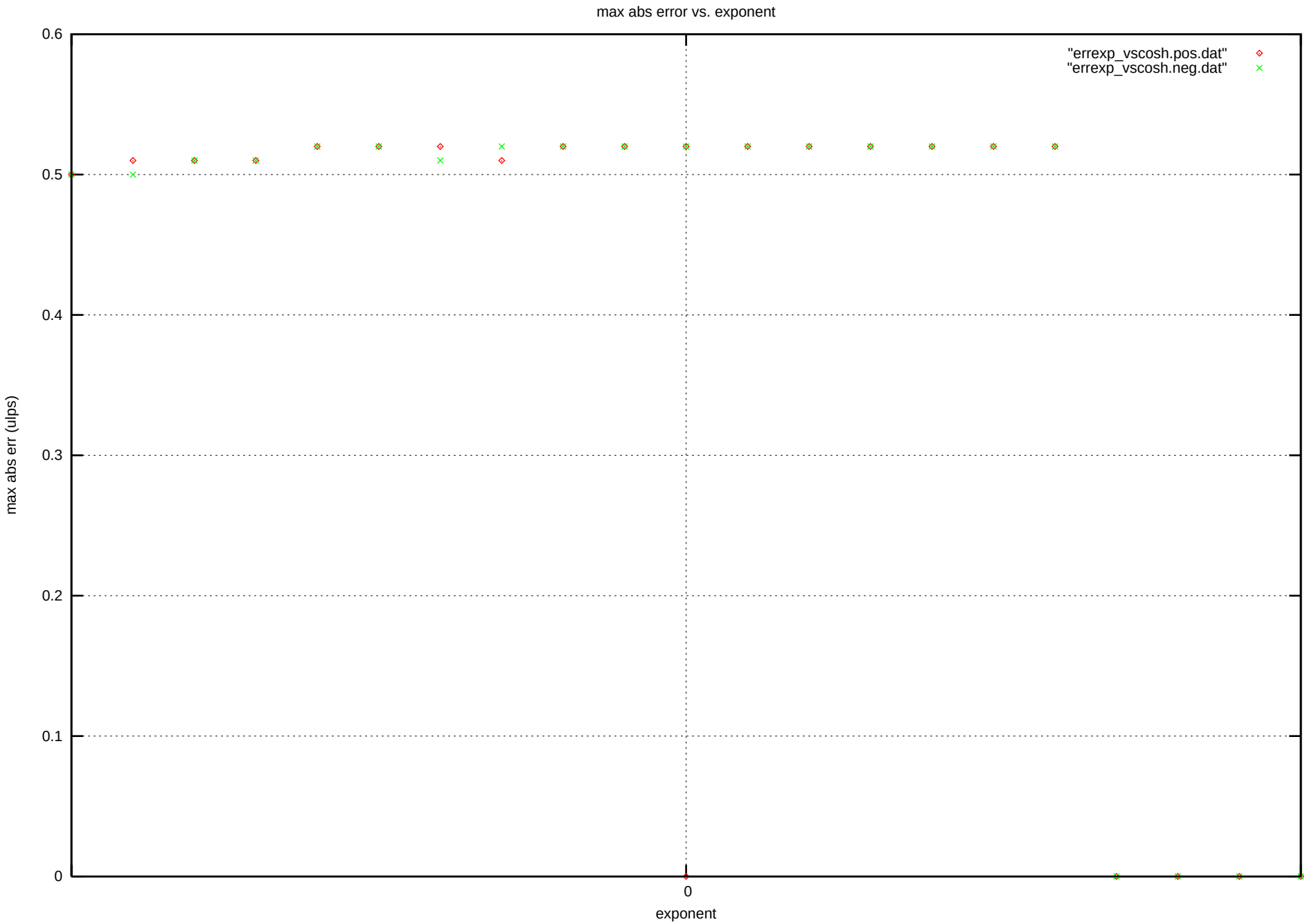
max abs error vs. exponent
"errexp_vscosh.pos.dat"
"errexp_vscosh.neg.dat"
max abs err (ulps)
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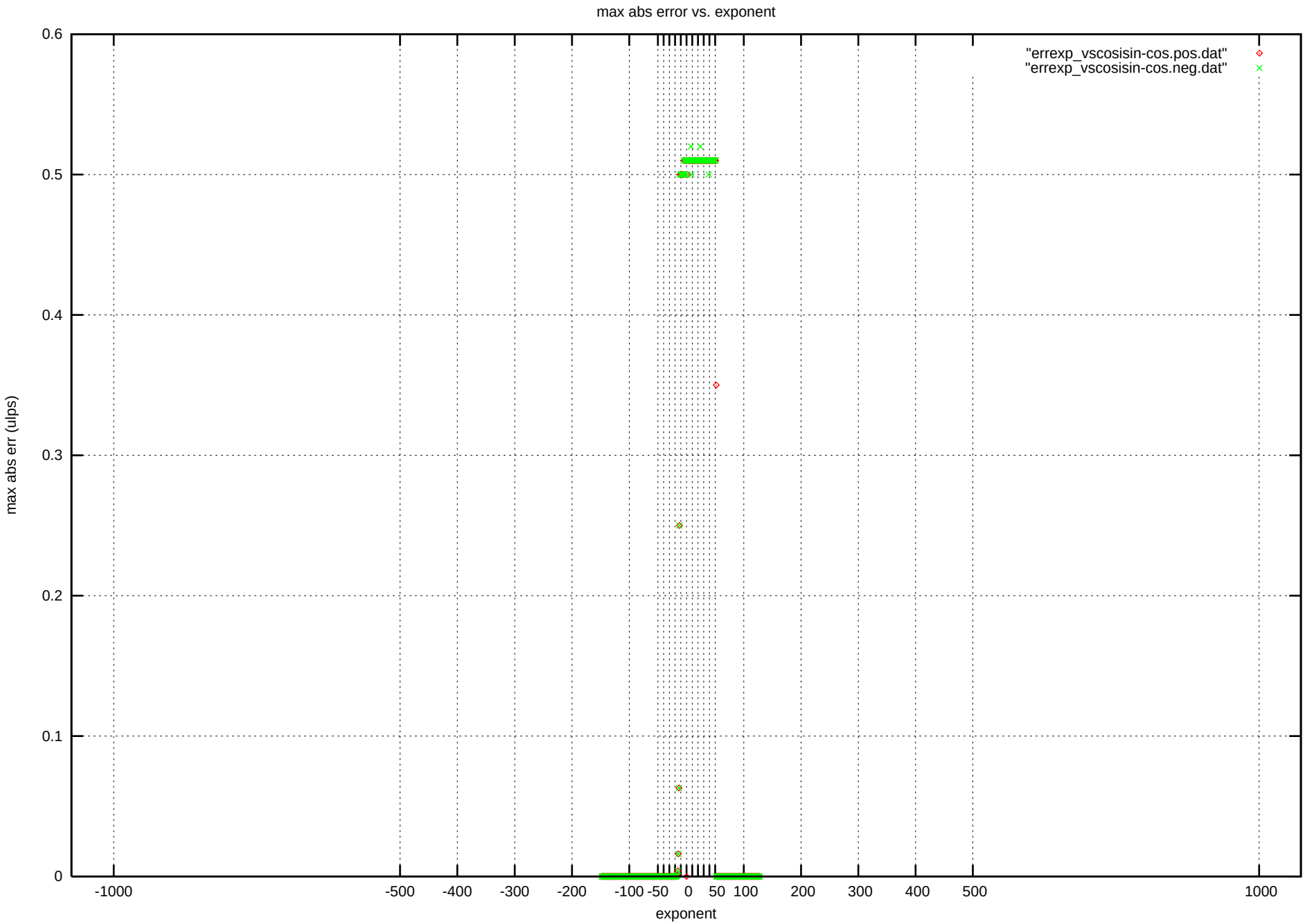
0.5
0.4
0.3
0.2
0.1
0
0
exponent


max abs error vs. exponent
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"errexp_vscosisin-cos.neg.dat"
max abs err (ulps)
exponent
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0.5
0.4
0.3
0.2
0.1
0
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-500
-400
-300
-200
-100
-50
0
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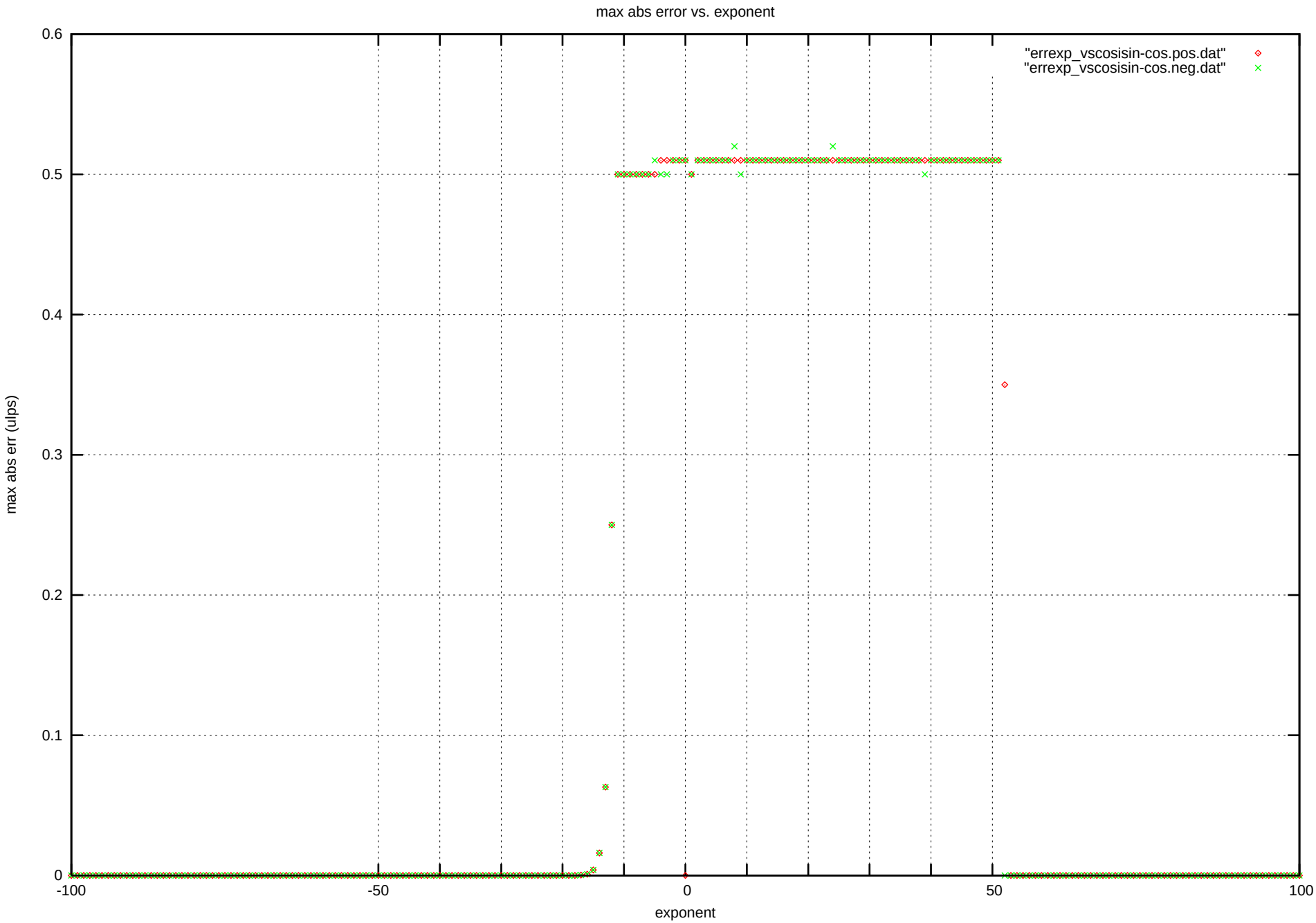
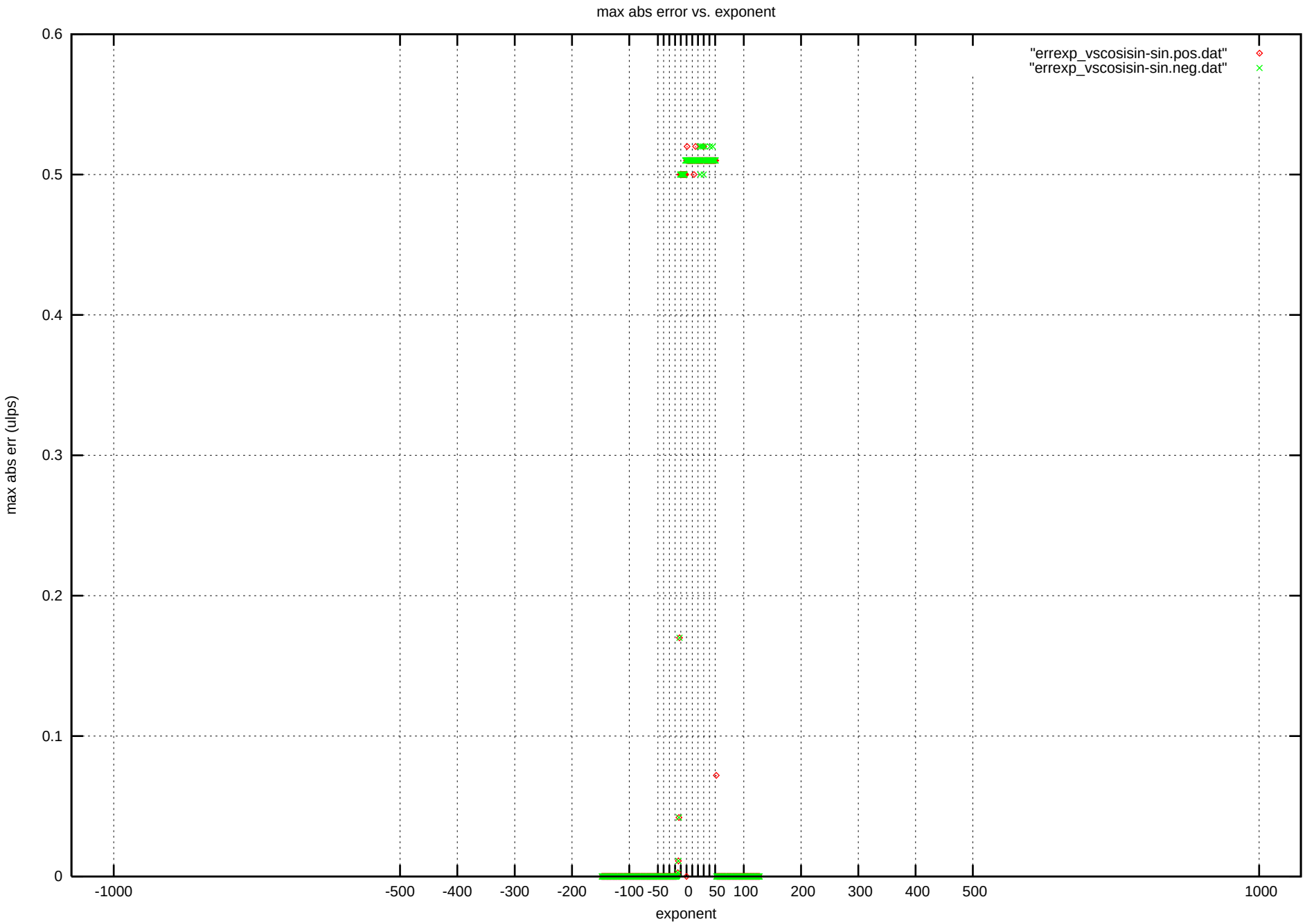
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vscosisin-cos.pos.dat"
"errexp_vscosisin-cos.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vscosisin-sin.pos.dat"
"errexp_vscosisin-sin.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
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-500
-400
-300
-200
-100
-50
0
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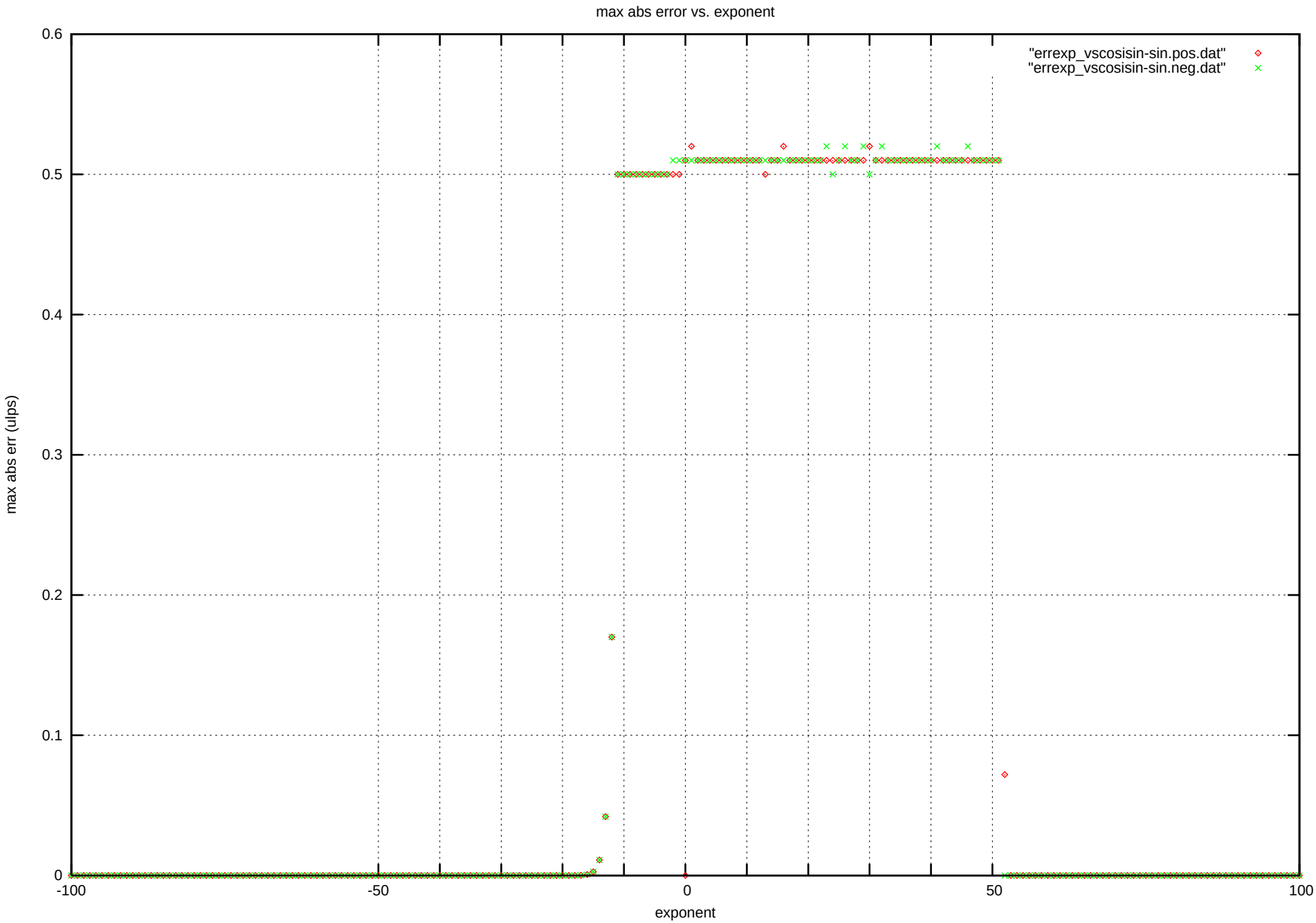
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vscosisin-sin.pos.dat"
"errexp_vscosisin-sin.neg.dat"
max abs err (ulps)
exponent
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0.5
0.4
0.3
0.2
0.1
0
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-50
0
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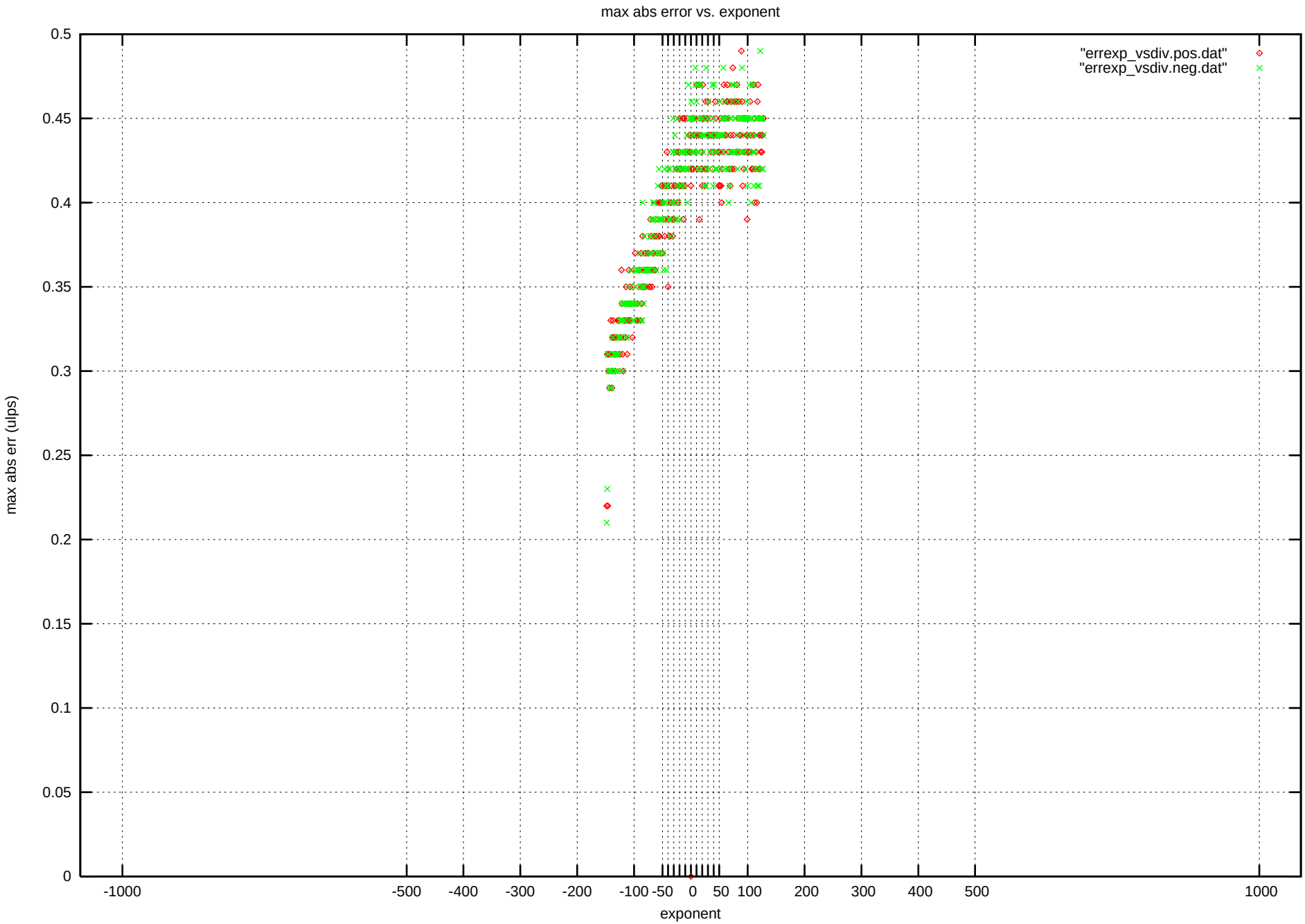
max abs error vs. exponent
"errexp_vsdiv.pos.dat"
"errexp_vsdiv.neg.dat"
max abs err (ulps)
exponent
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0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
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-500
-400
-300
-200
-100
-50
0
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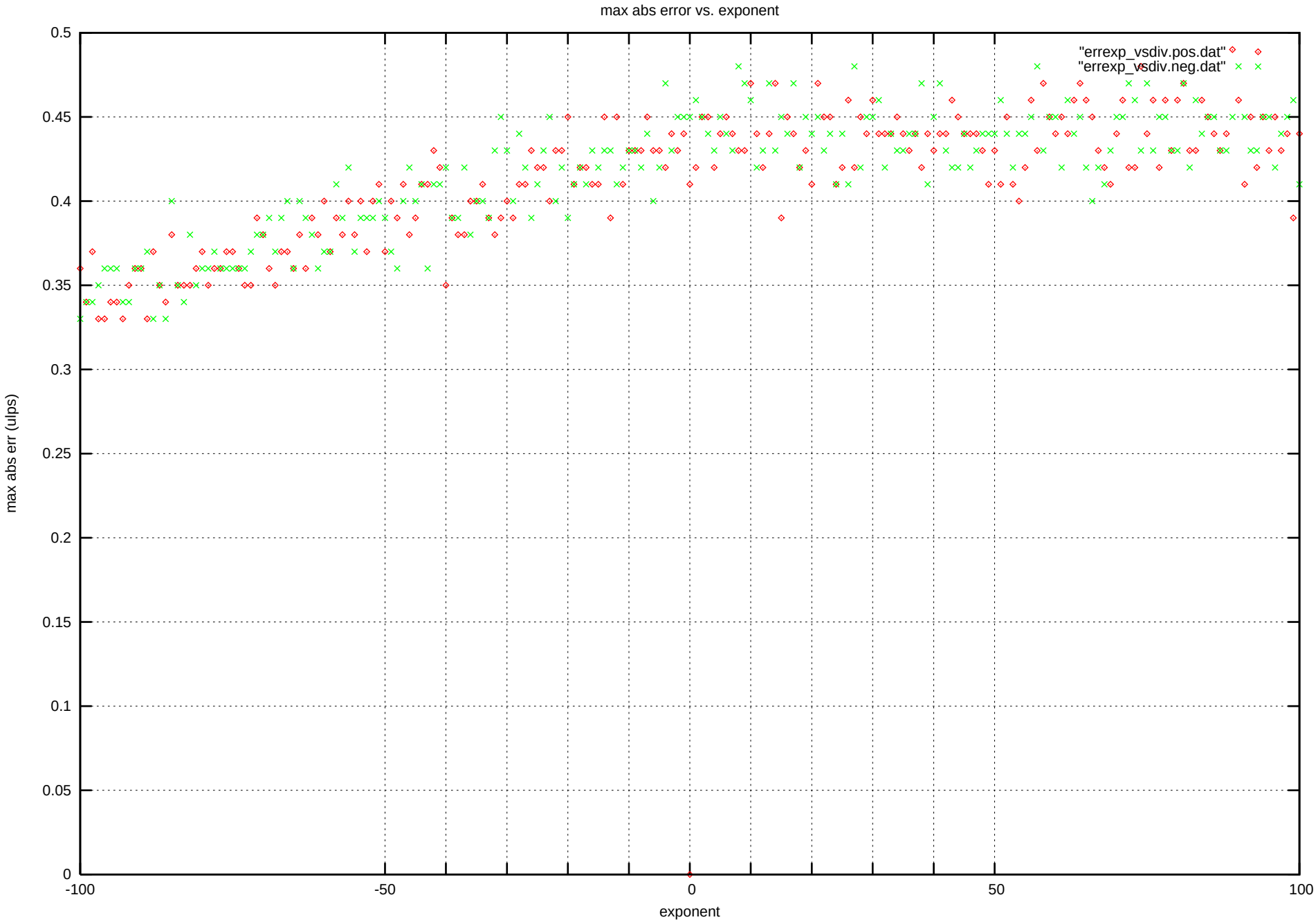
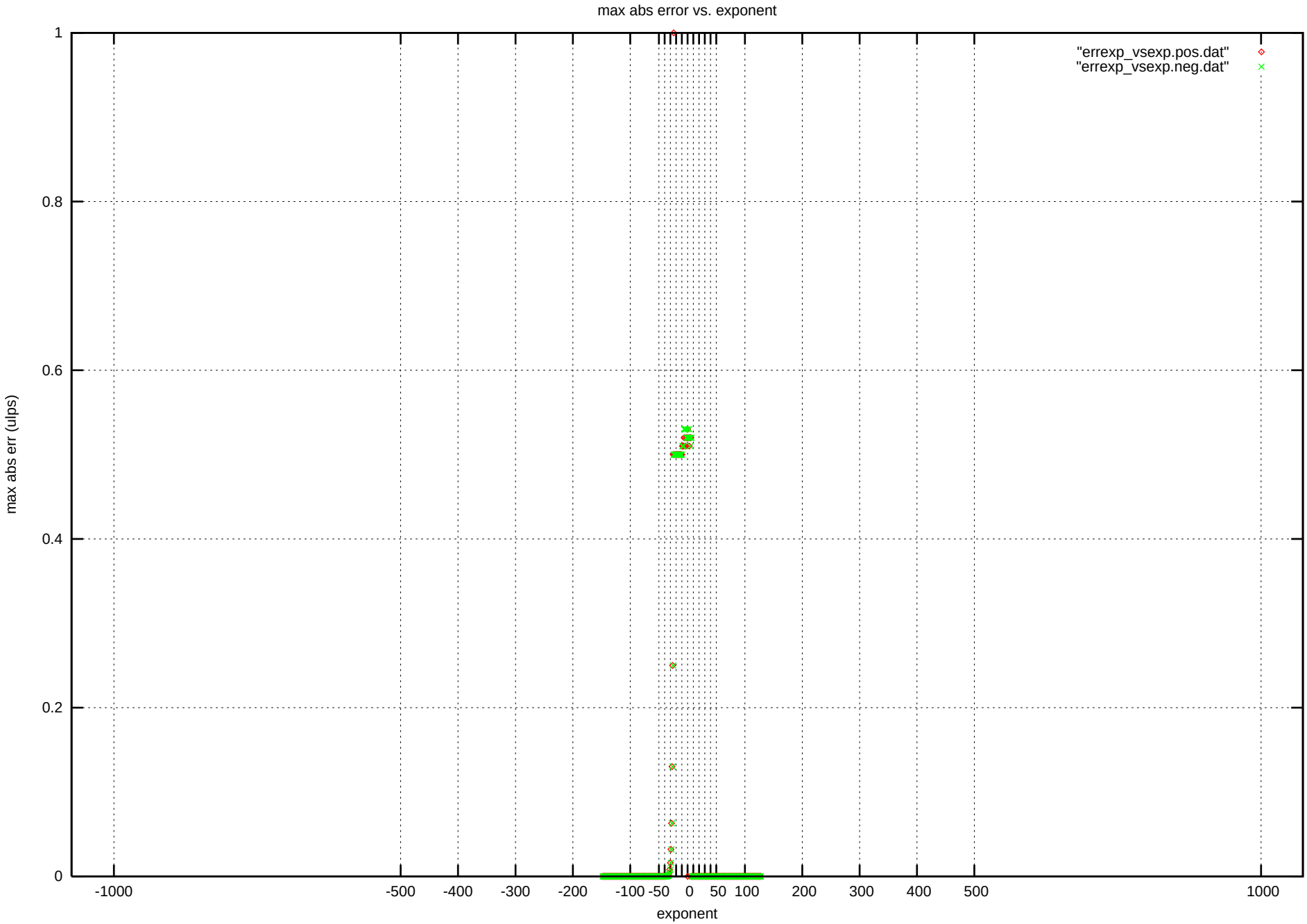
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vsdiv.pos.dat"
"errexp_vsdiv.neg.dat"
max abs err (ulps)
exponent
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsexp.pos.dat"
"errexp_vsexp.neg.dat"
max abs err (ulps)
exponent
1
0.8
0.6
0.4
0.2
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
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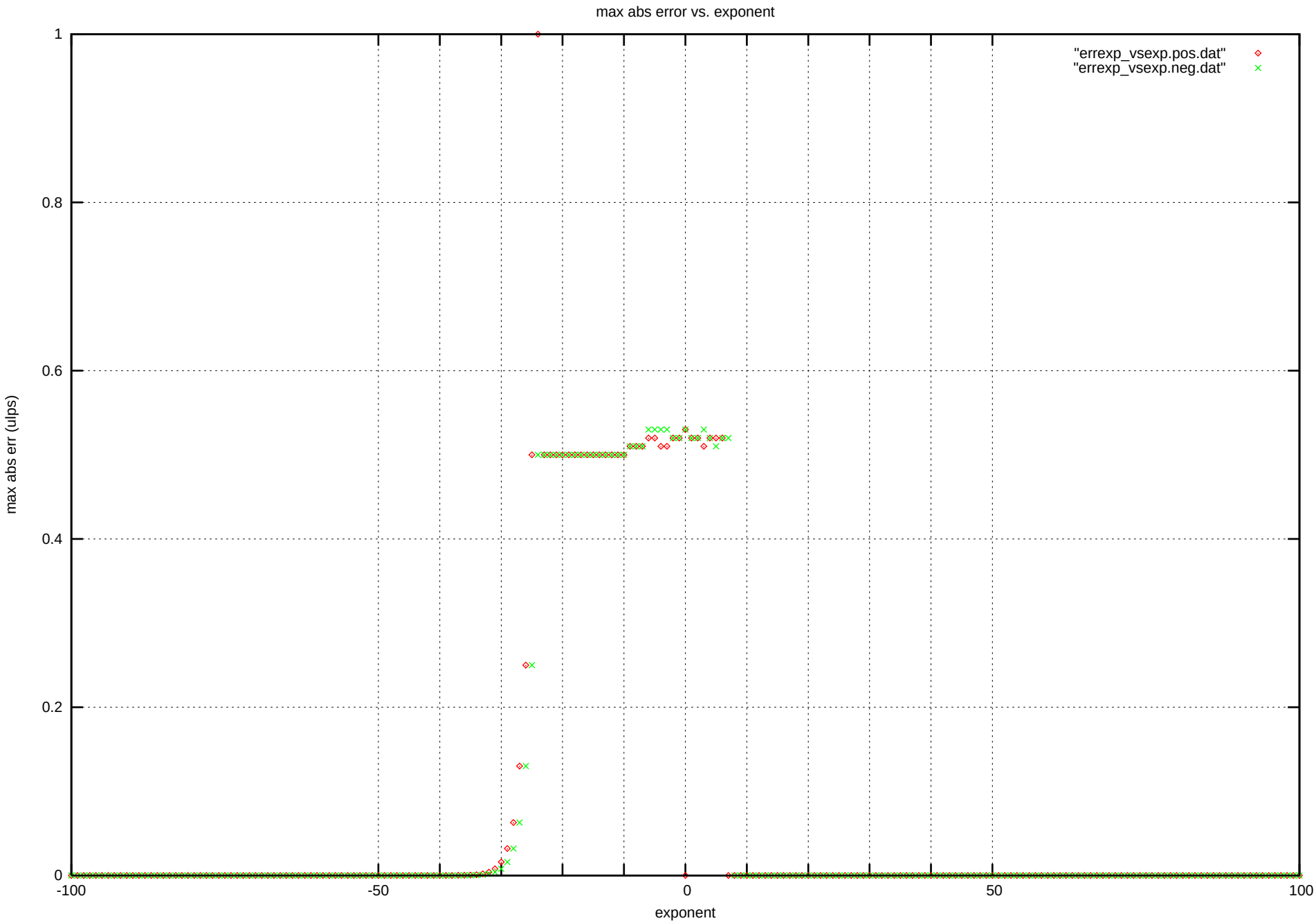
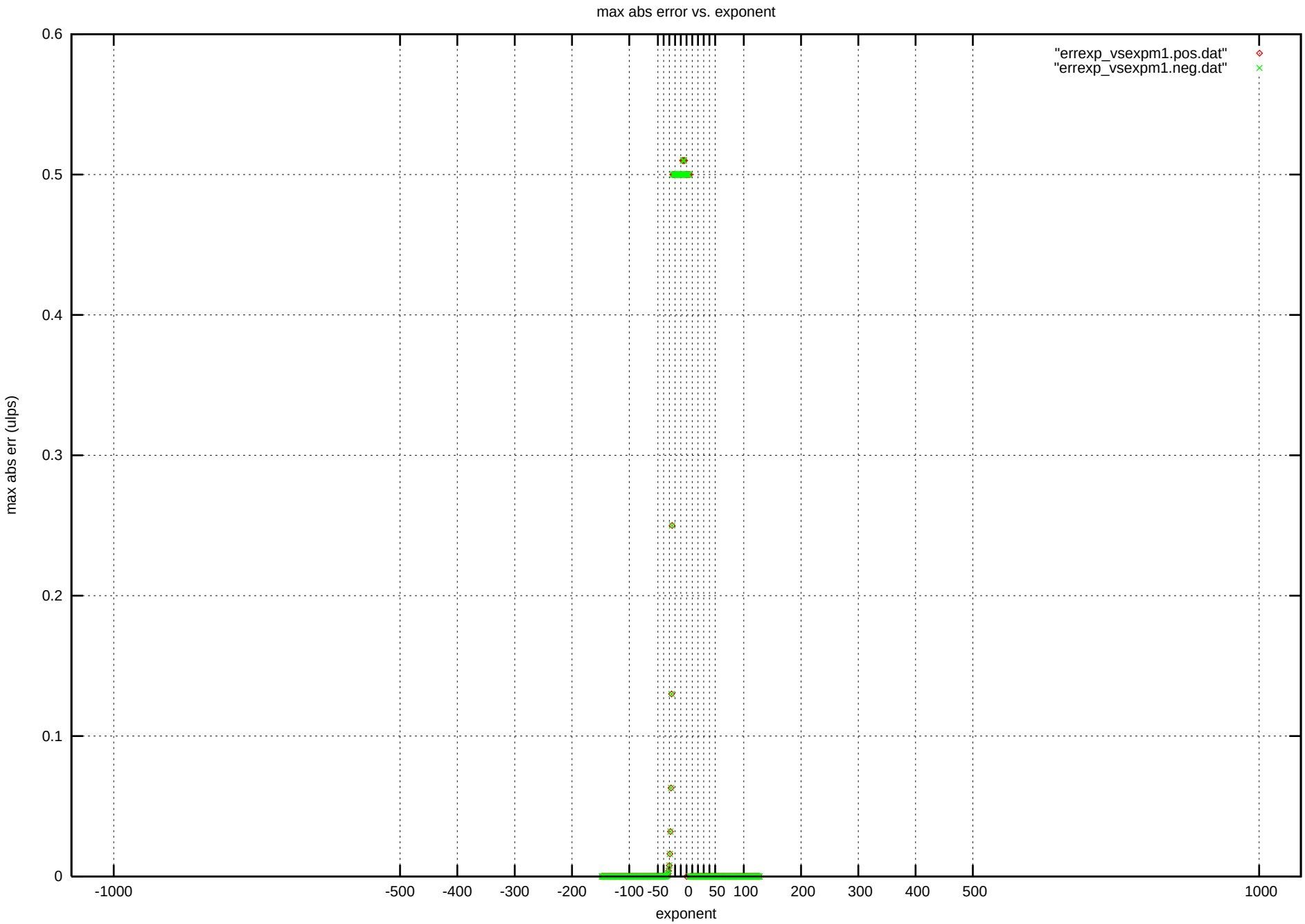
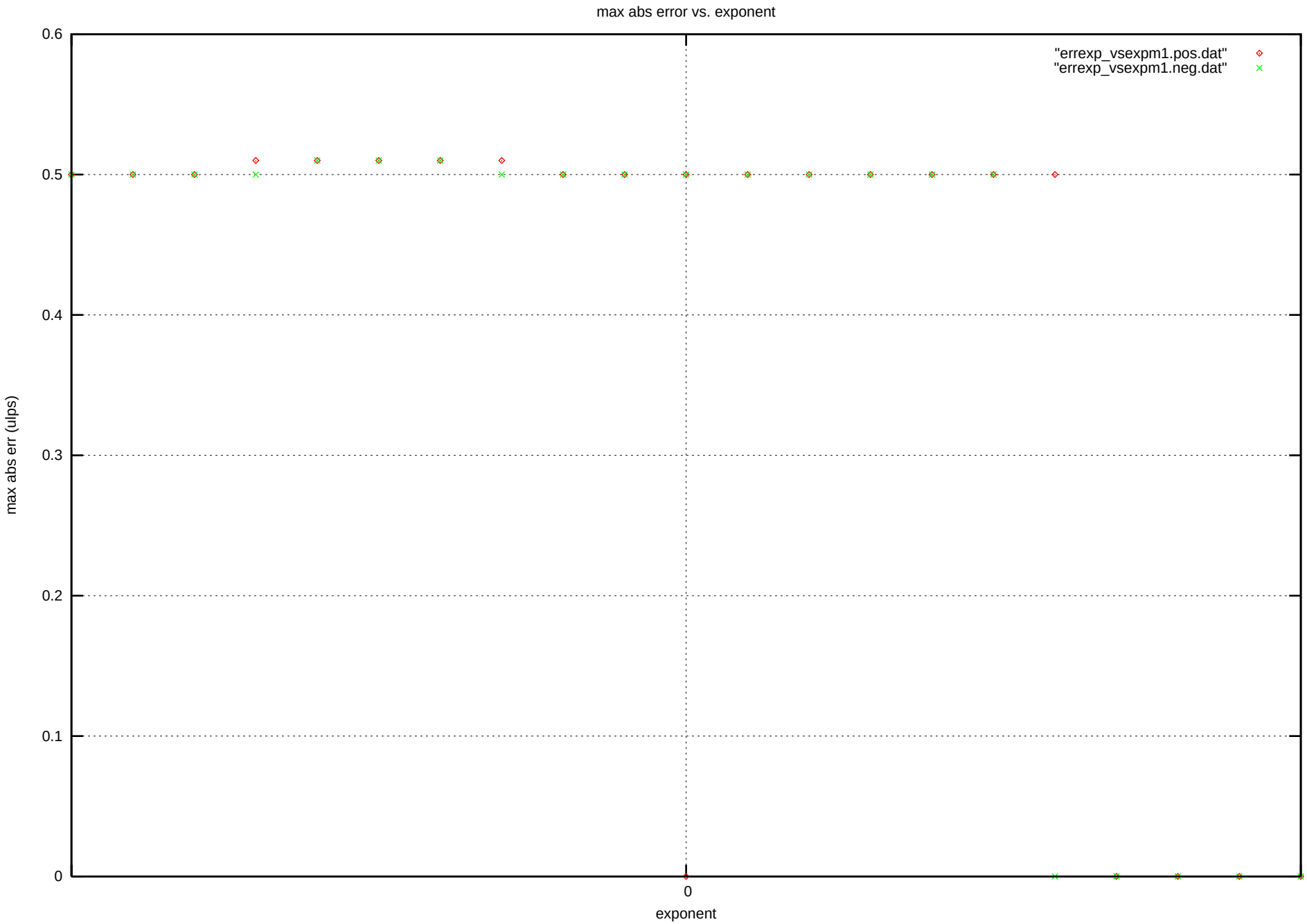
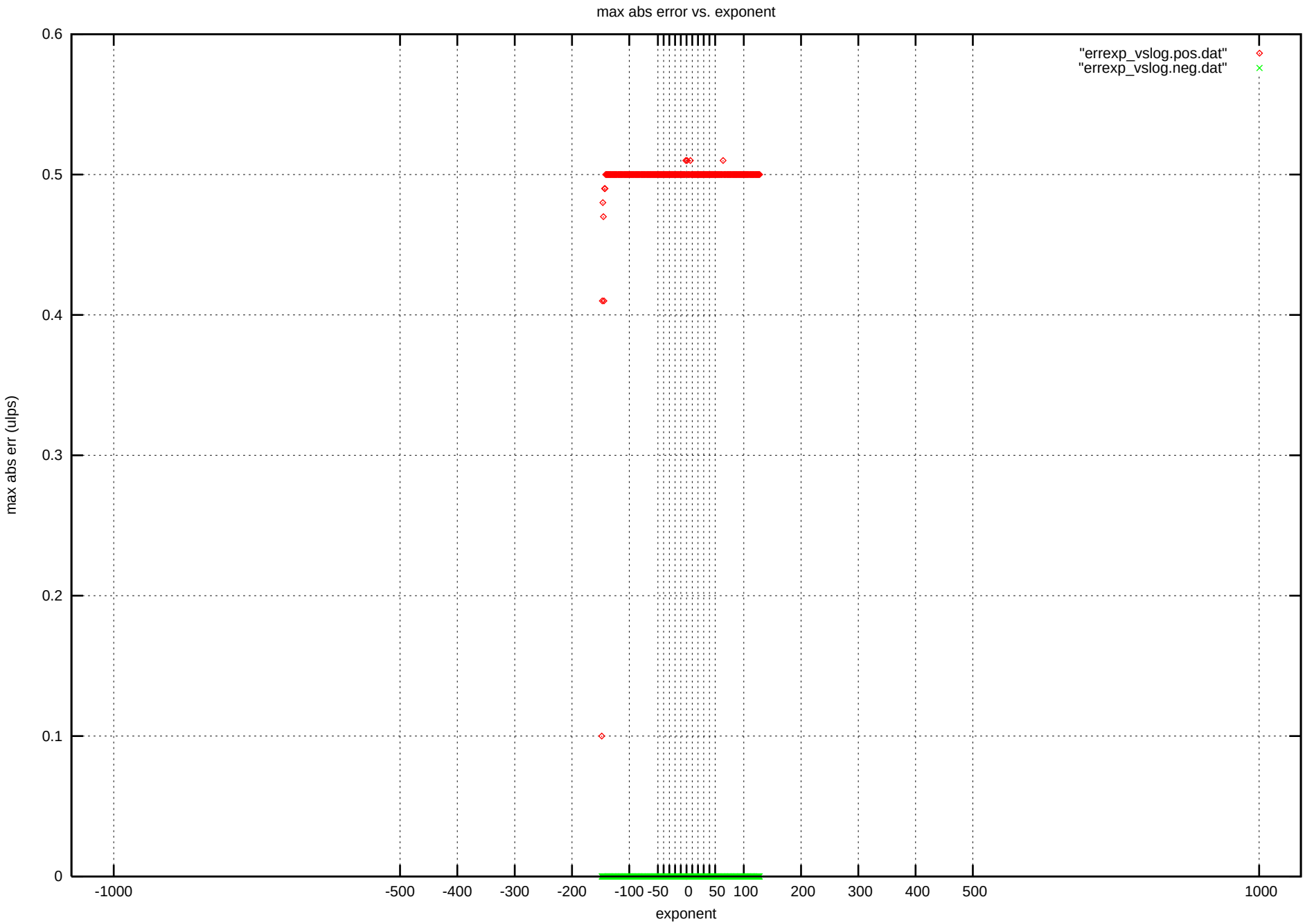

max abs error vs. exponent
"errexp_vsexp.pos.dat"
"errexp_vsexp.neg.dat"
max abs err (ulps)
exponent
1
0.8
0.6
0.4
0.2
0
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsexpm1.pos.dat"
"errexp_vsexpm1.neg.dat"
max abs err (ulps)
0.6
0.5
0.4
0.3
0.2
0.1
0
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent


max abs error vs. exponent
"errexp_vsexpm1.pos.dat"
"errexp_vsexpm1.neg.dat"
max abs err (ulps)
0.6
0.5
0.4
0.3
0.2
0.1
0
0
exponent


max abs error vs. exponent
"errexp_vslog.pos.dat"
"errexp_vslog.neg.dat"
max abs err (ulps)
exponent
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0.1
0.2
0.3
0.4
0.5
0.6
-1000
-500
-400
-300
-200
-100
-50
0
50
100
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300
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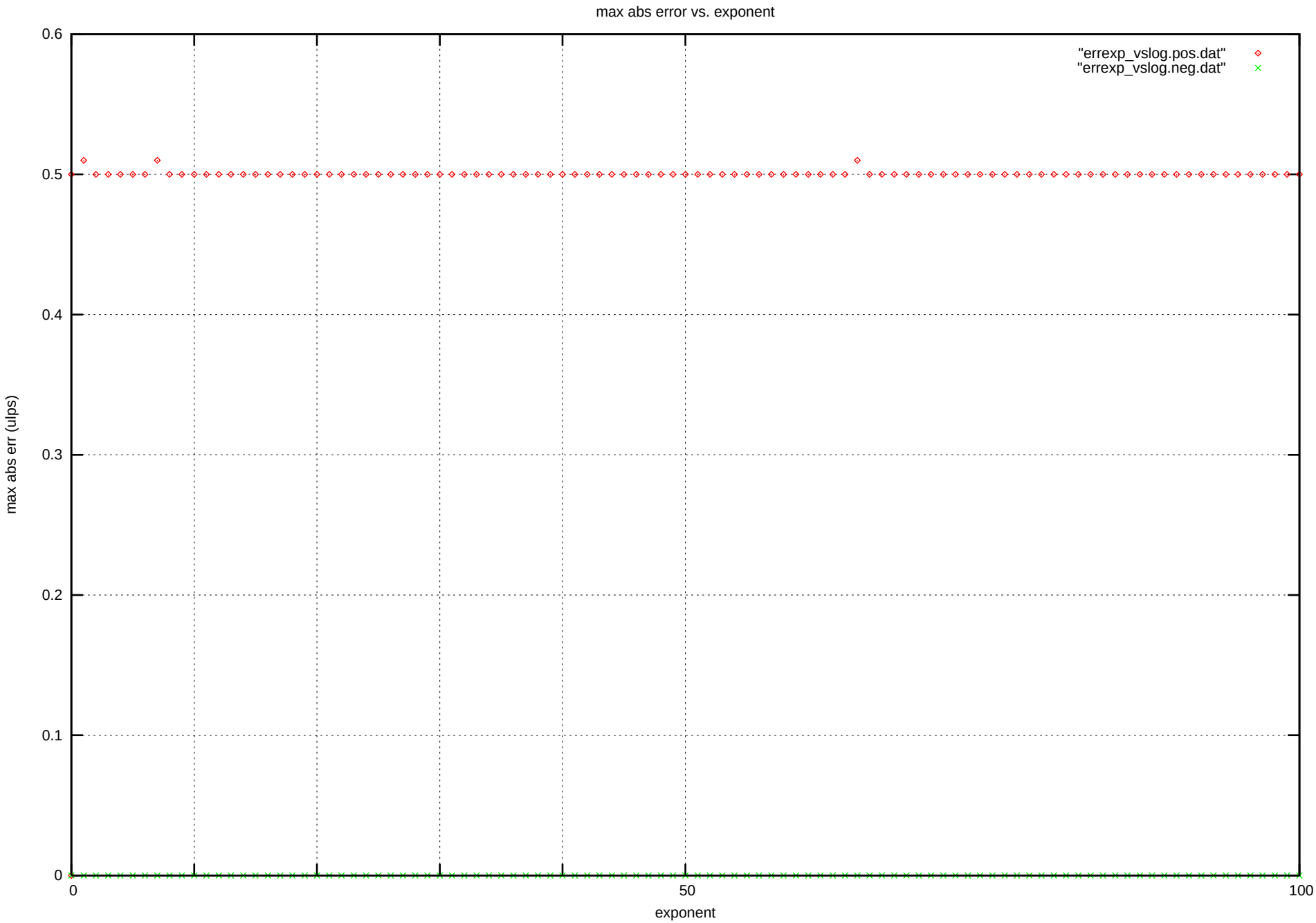
500
1000


max abs error vs. exponent
"errexp_vslog.pos.dat"
"errexp_vslog.neg.dat"
max abs err (ulps)
exponent
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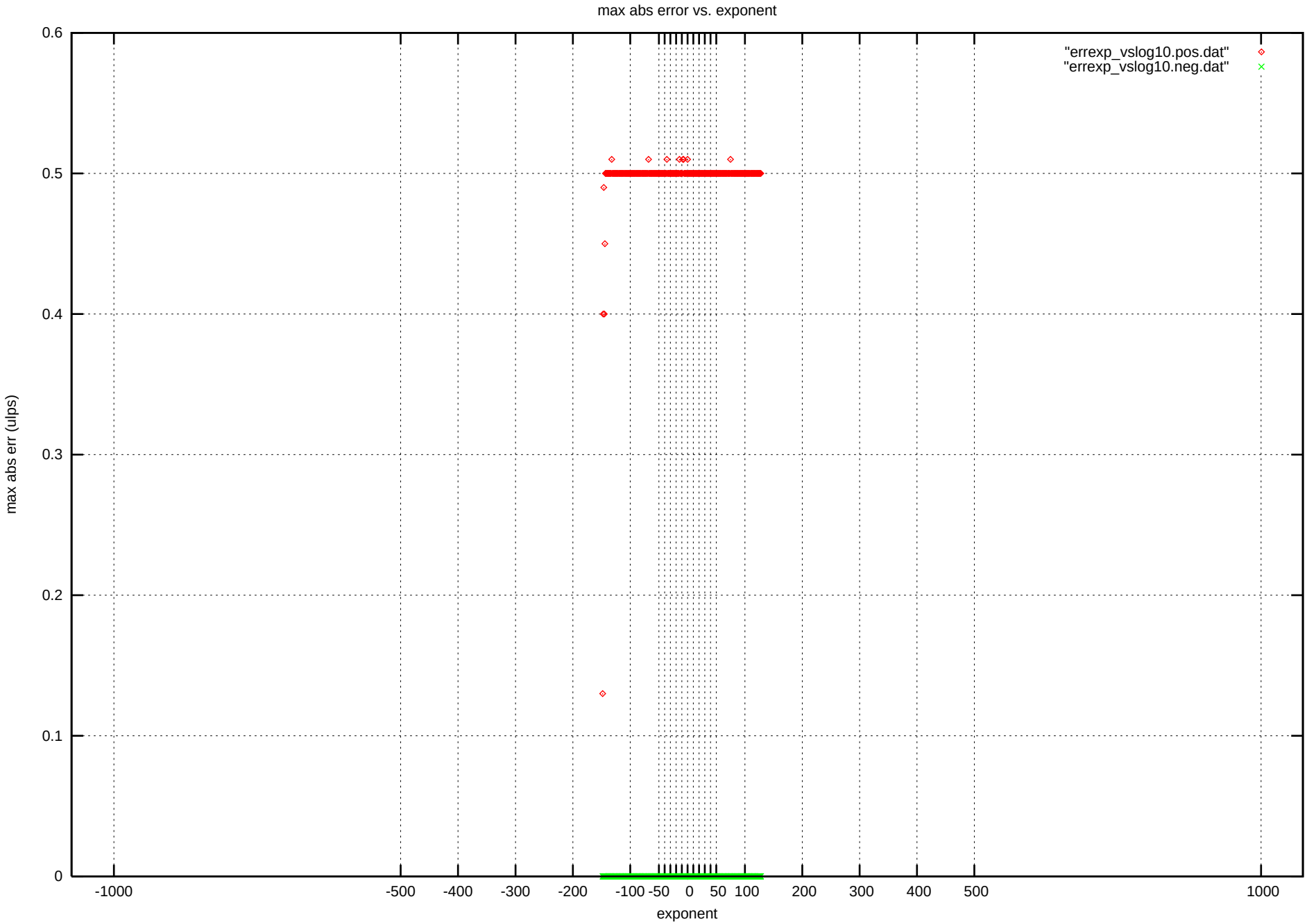
0.5
0.4
0.3
0.2
0.1
0
0
50
100


max abs error vs. exponent
"errexp_vslog10.pos.dat"
"errexp_vslog10.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
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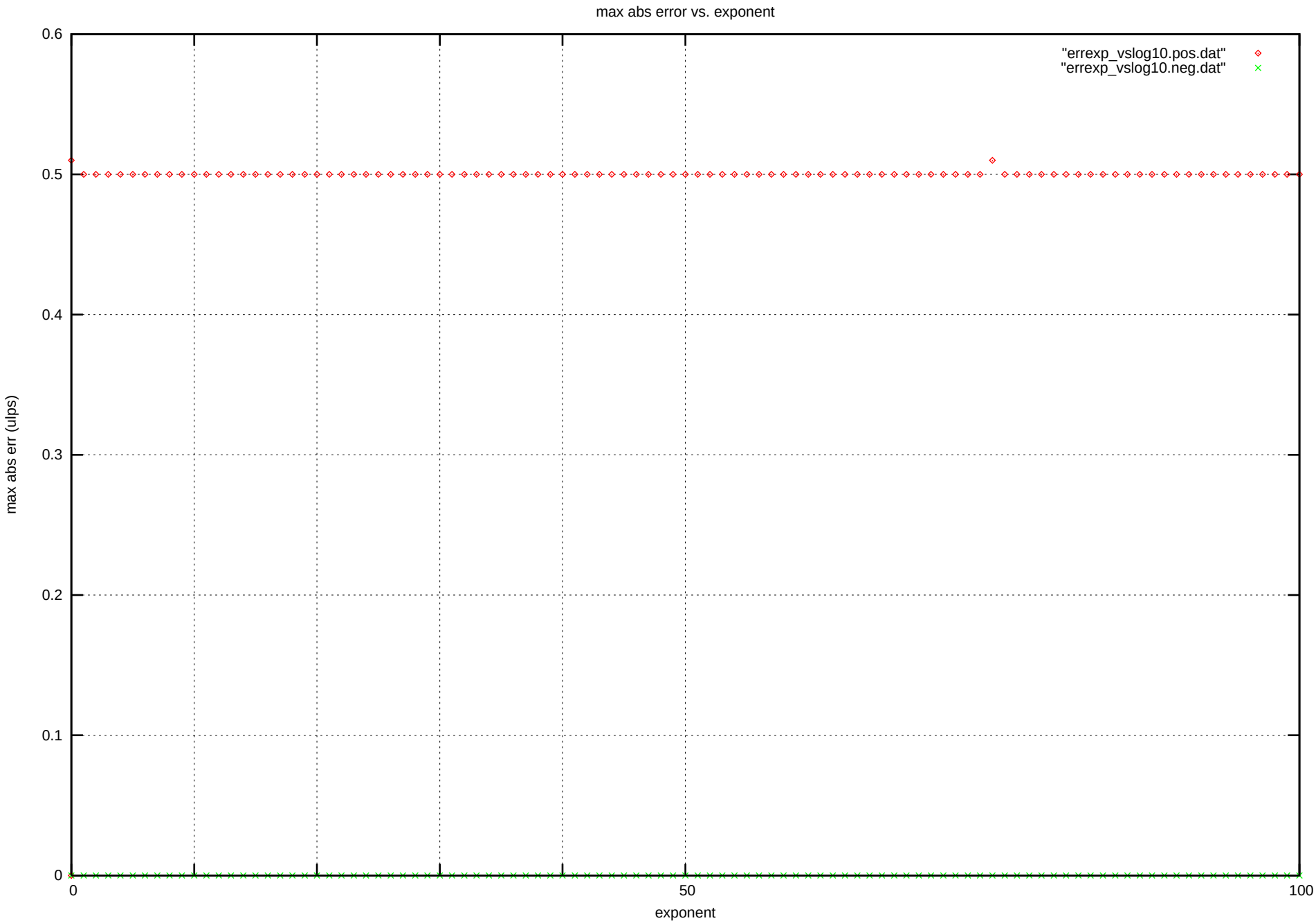
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vslog10.pos.dat"
"errexp_vslog10.neg.dat"
max abs err (ulps)
exponent
0
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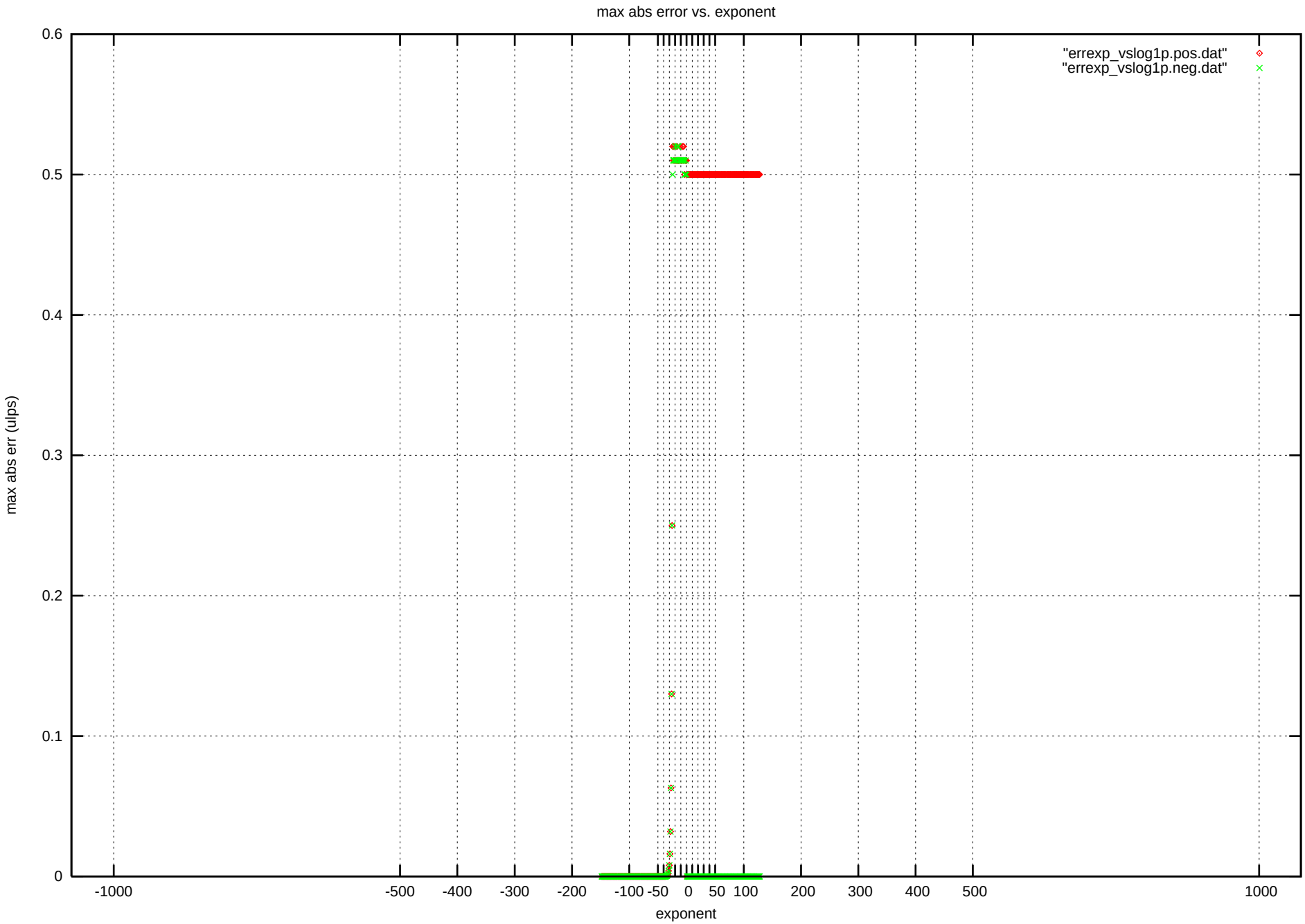
0.2
0.3
0.4
0.5
0.6
0
50
100


max abs error vs. exponent
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"errexp_vslog1p.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
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-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
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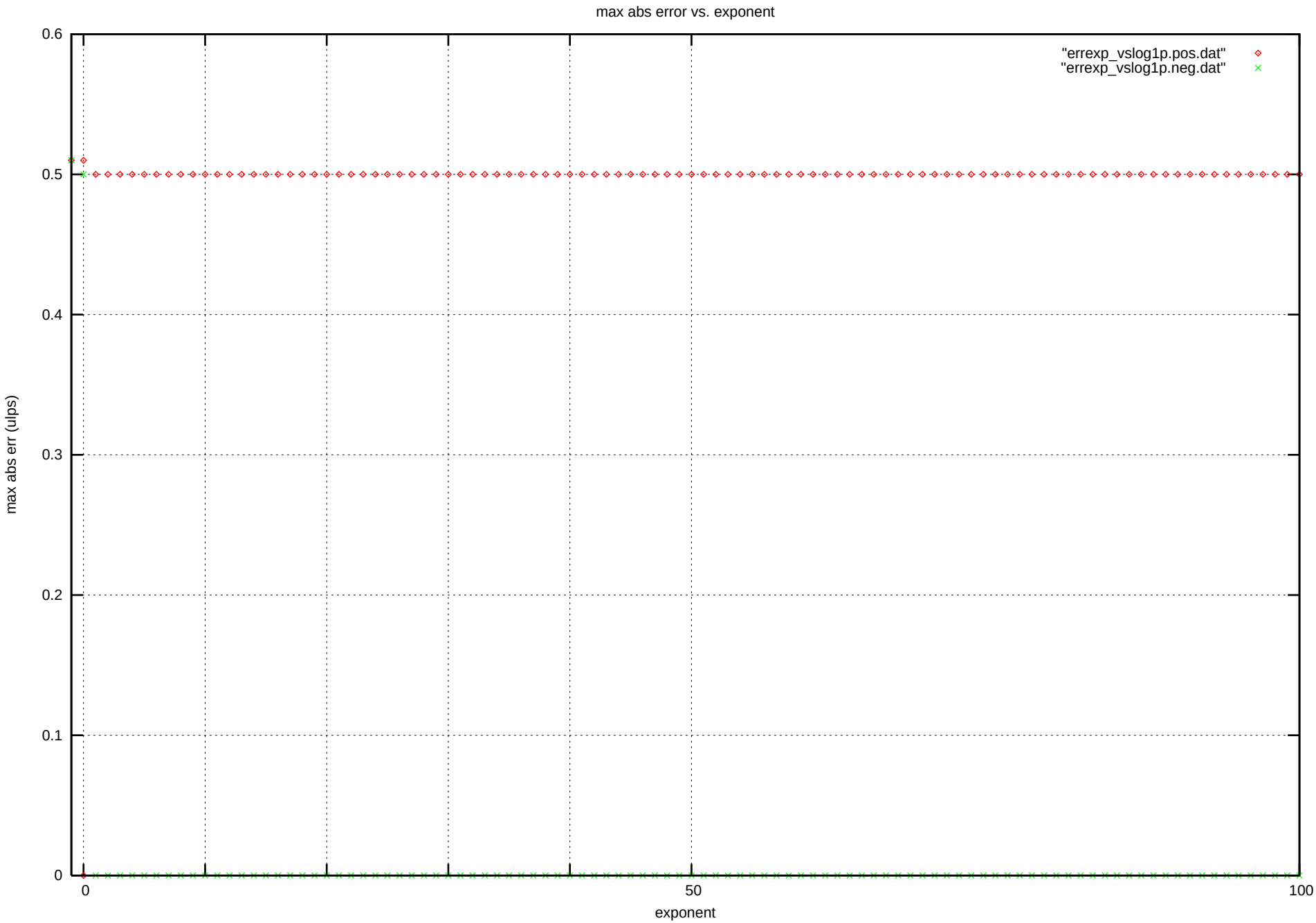
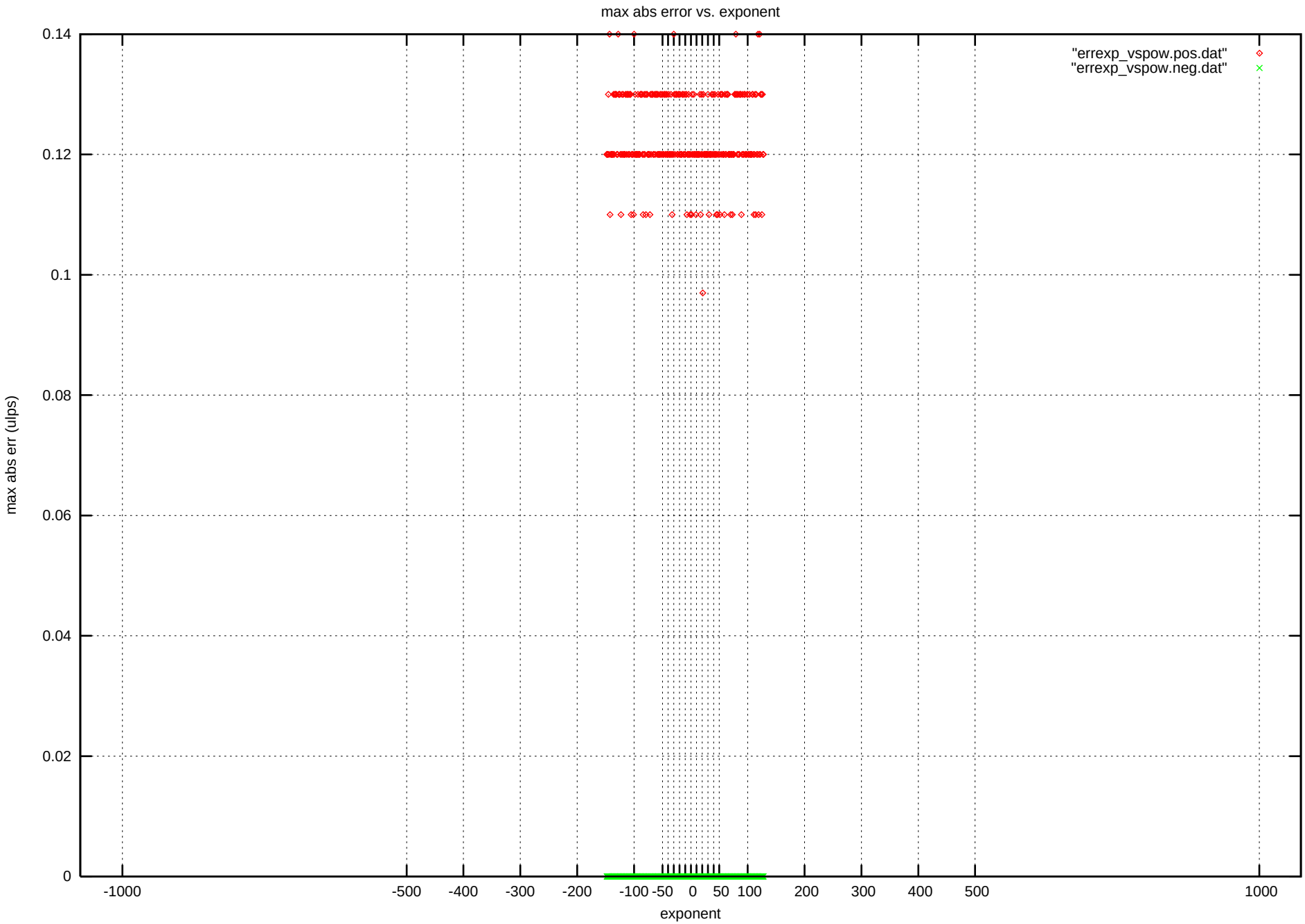

max abs error vs. exponent
"errexp_vslog1p.pos.dat"
"errexp_vslog1p.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100


max abs error vs. exponent
"errexp_vspow.pos.dat"
"errexp_vspow.neg.dat"
max abs err (ulps)
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
-1000
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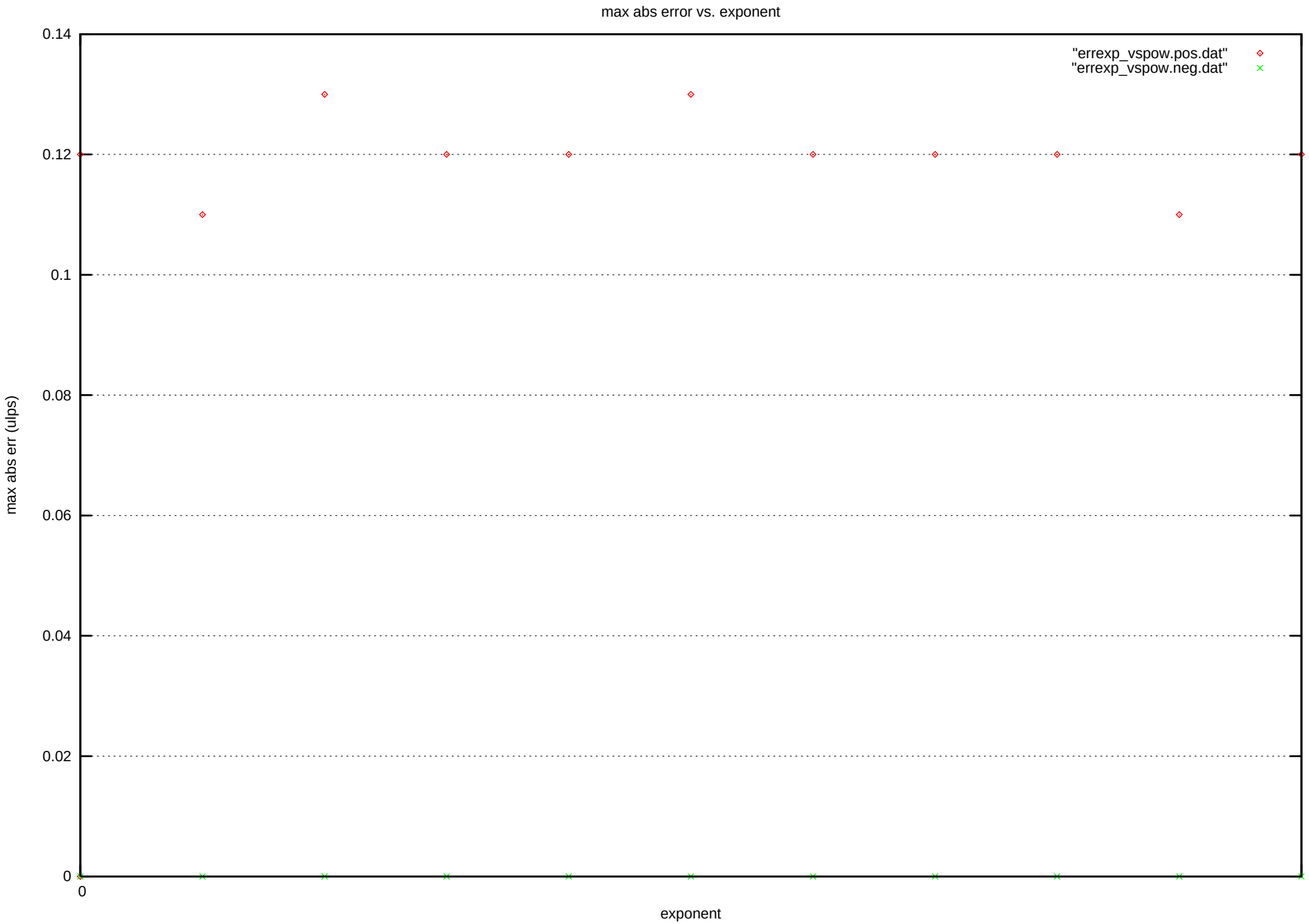
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000
exponent


max abs error vs. exponent
"errexp_vspow.pos.dat"
"errexp_vspow.neg.dat"
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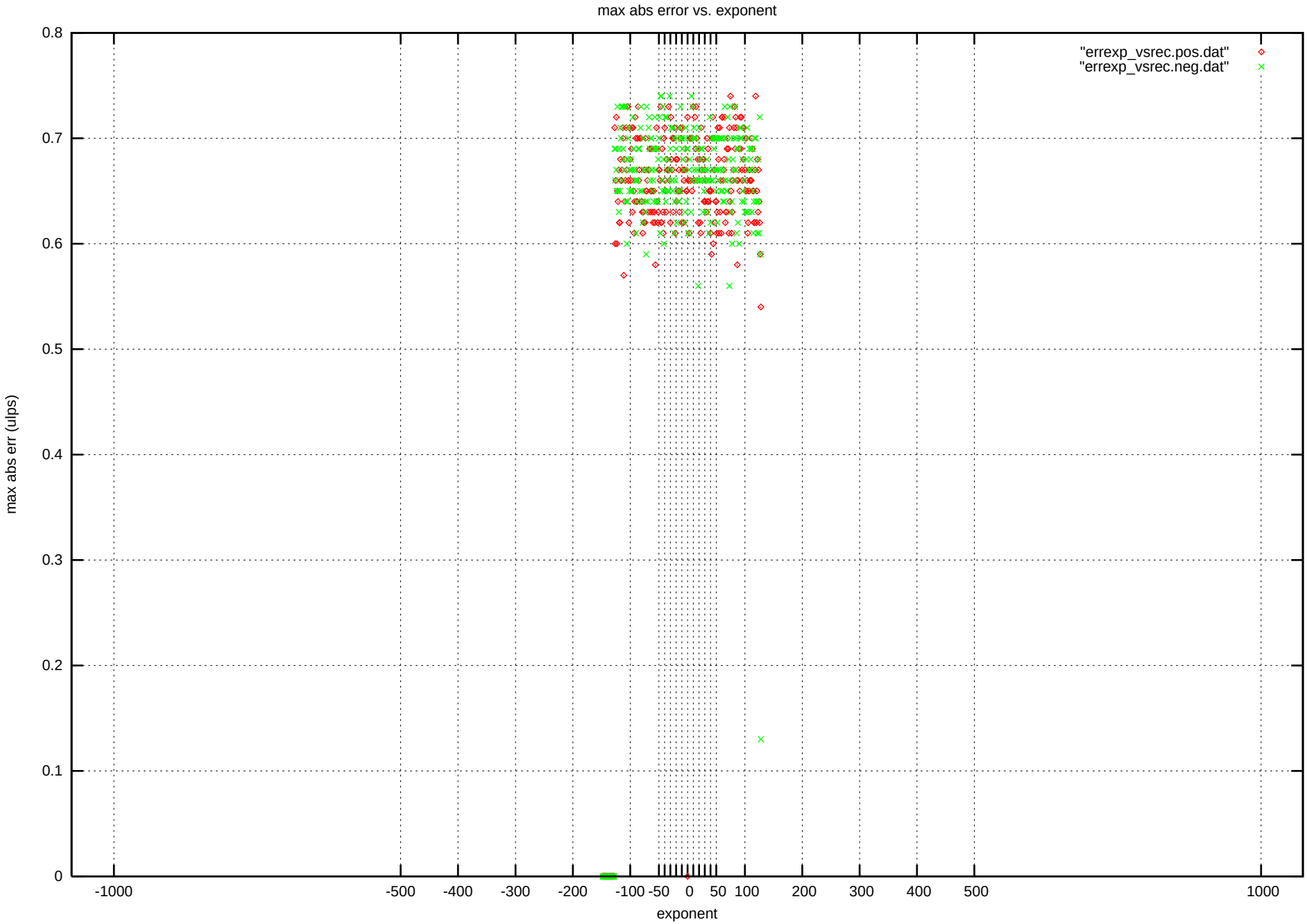
0.12
0.1
0.08
0.06
0.04
0.02
0
max abs err (ulps)
0
exponent


max abs error vs. exponent
"errexp_vsrec.pos.dat"
"errexp_vsrec.neg.dat"
max abs err (ulps)
exponent
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0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
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-500
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-300
-200
-100
-50
0
50
100
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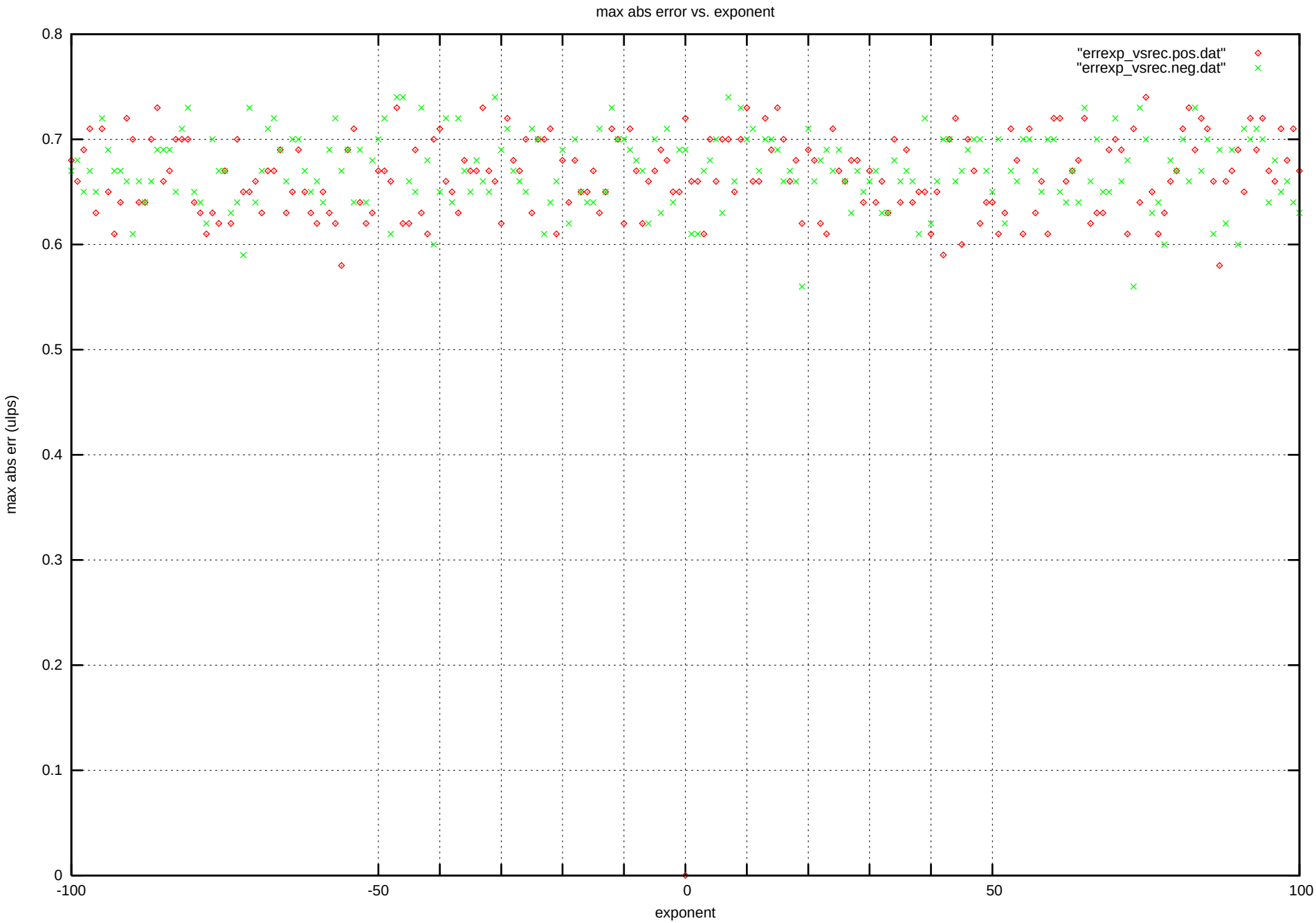
300
400
500
1000


max abs error vs. exponent
"errexp_vsrec.pos.dat"
"errexp_vsrec.neg.dat"
max abs err (ulps)
exponent
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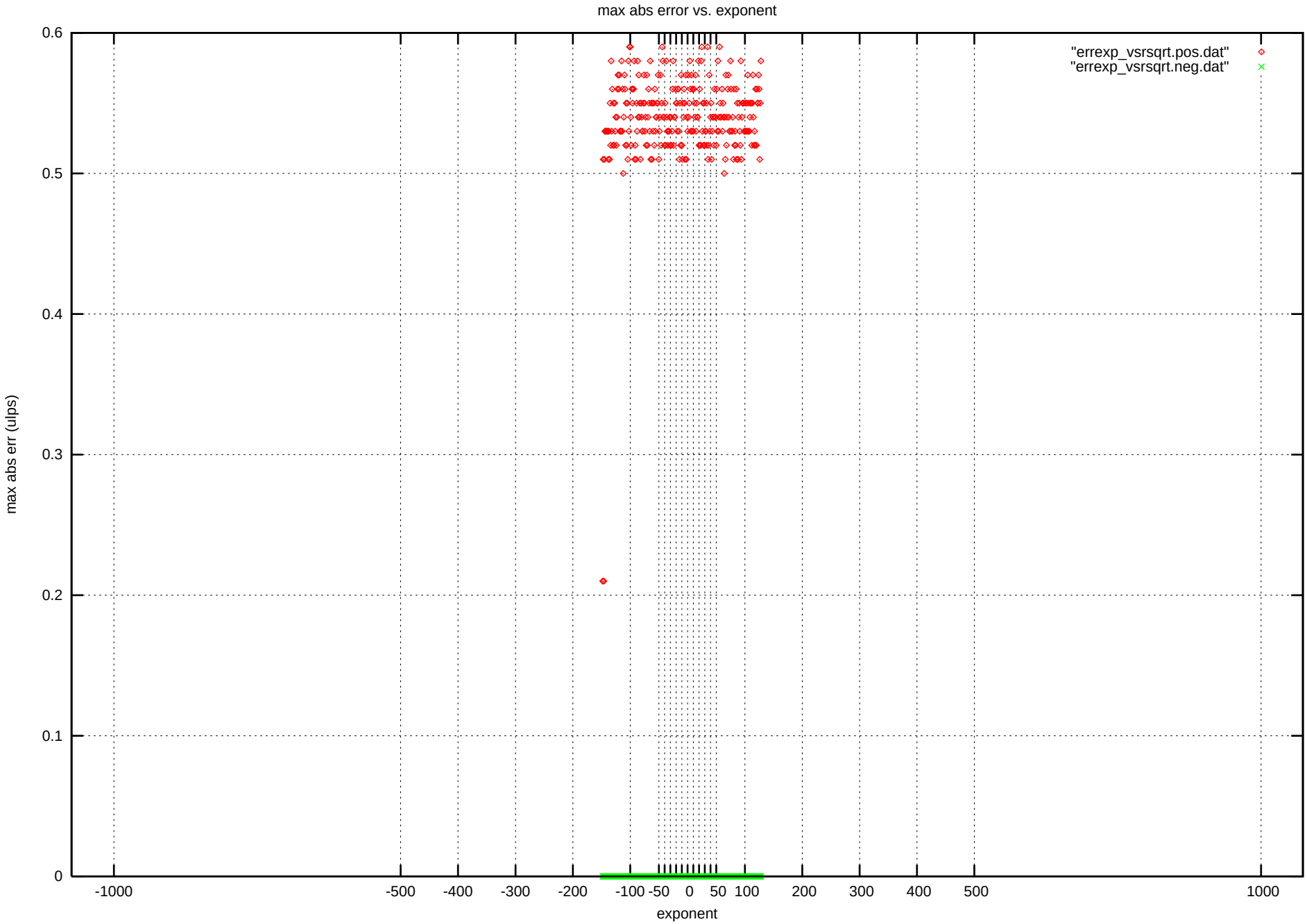
0.3
0.4
0.5
0.6
0.7
0.8
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vsrsqrt.pos.dat"
"errexp_vsrsqrt.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
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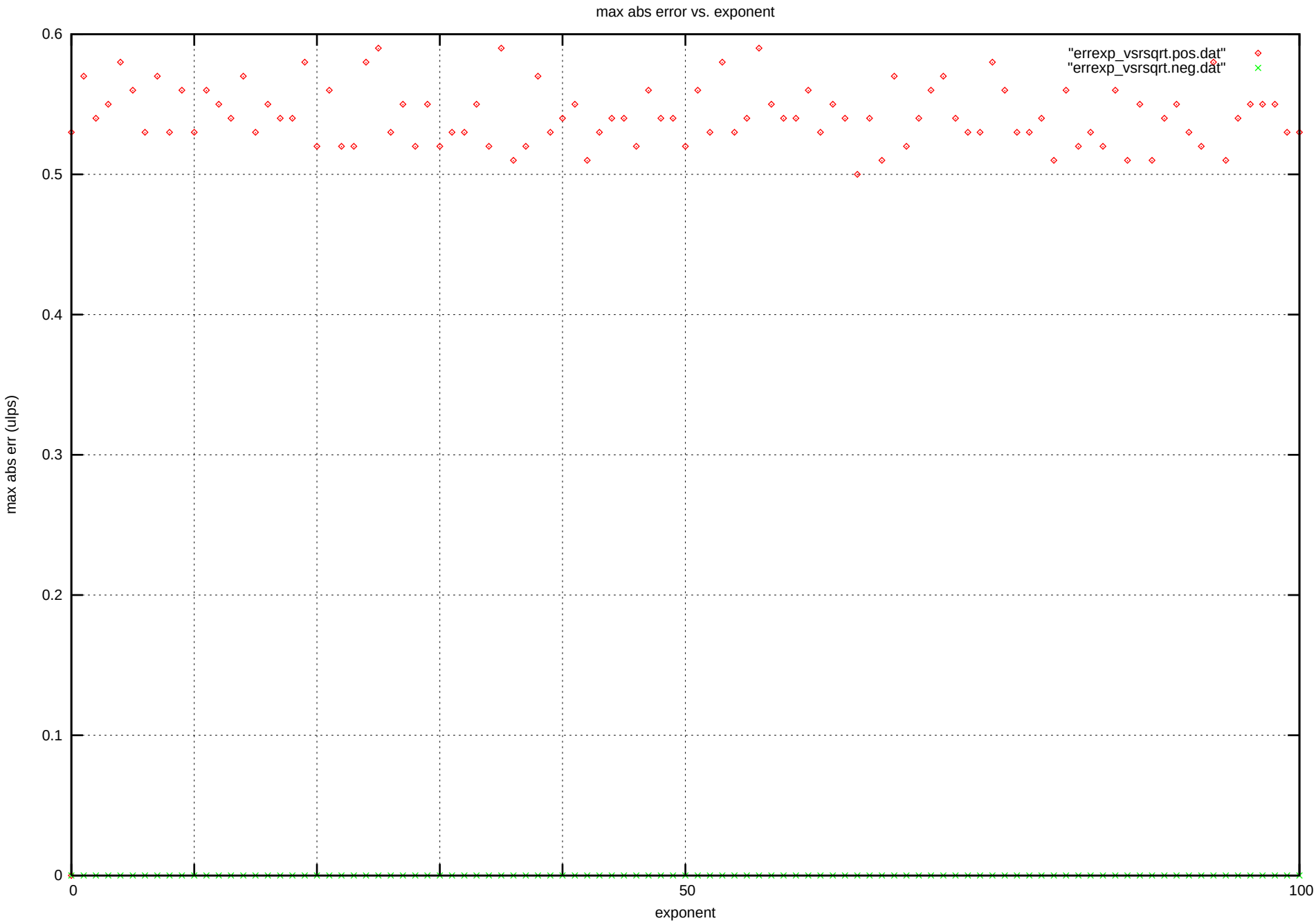
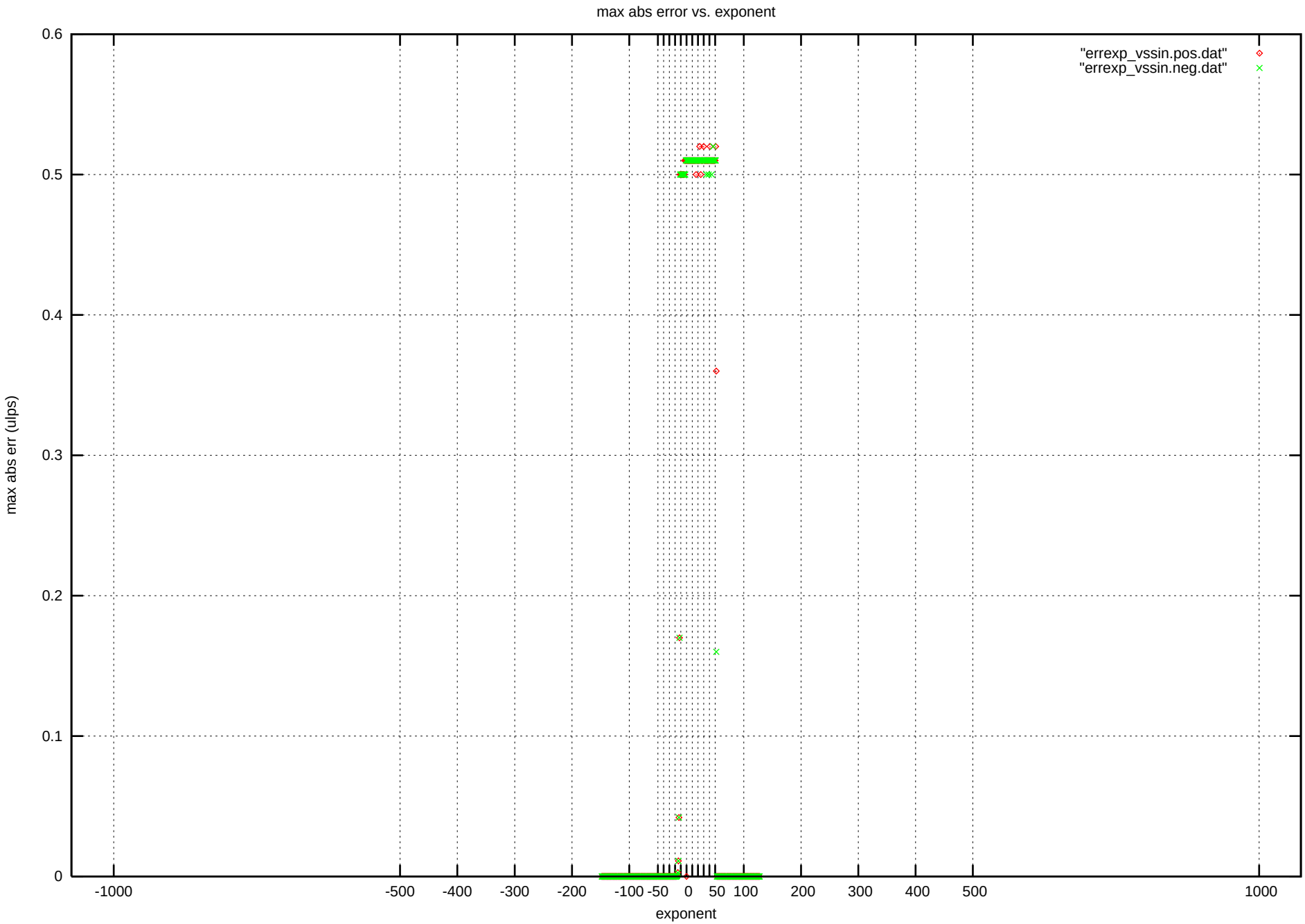
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vsrsqrt.pos.dat"
"errexp_vsrsqrt.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
0
0
50
100


max abs error vs. exponent
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"errexp_vssin.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
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-500
-400
-300
-200
-100
-50
0
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500
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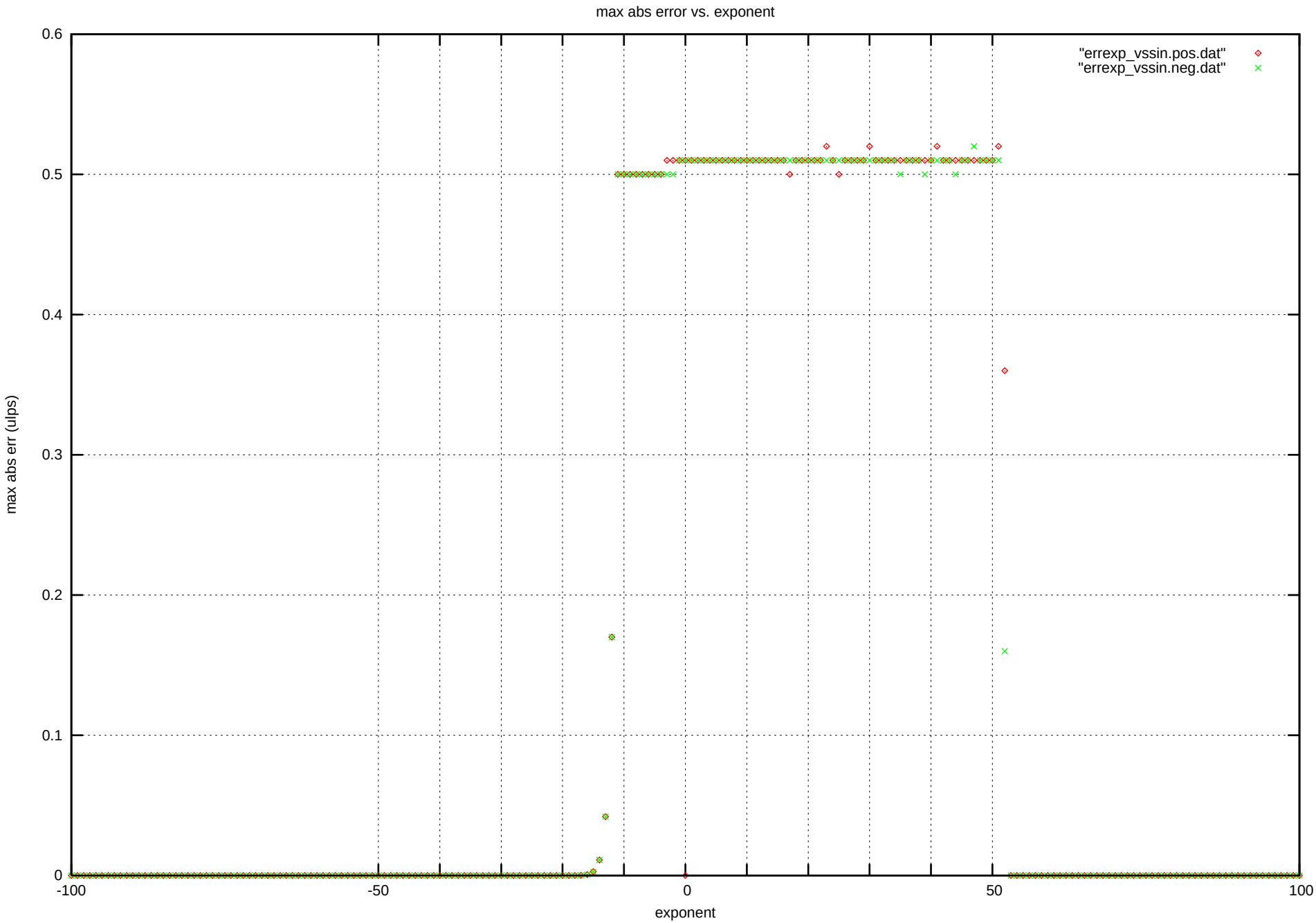
max abs error vs. exponent
"errexp_vssin.pos.dat"
"errexp_vssin.neg.dat"
max abs err (ulps)
exponent
0.6
0.5
0.4
0.3
0.2
0.1
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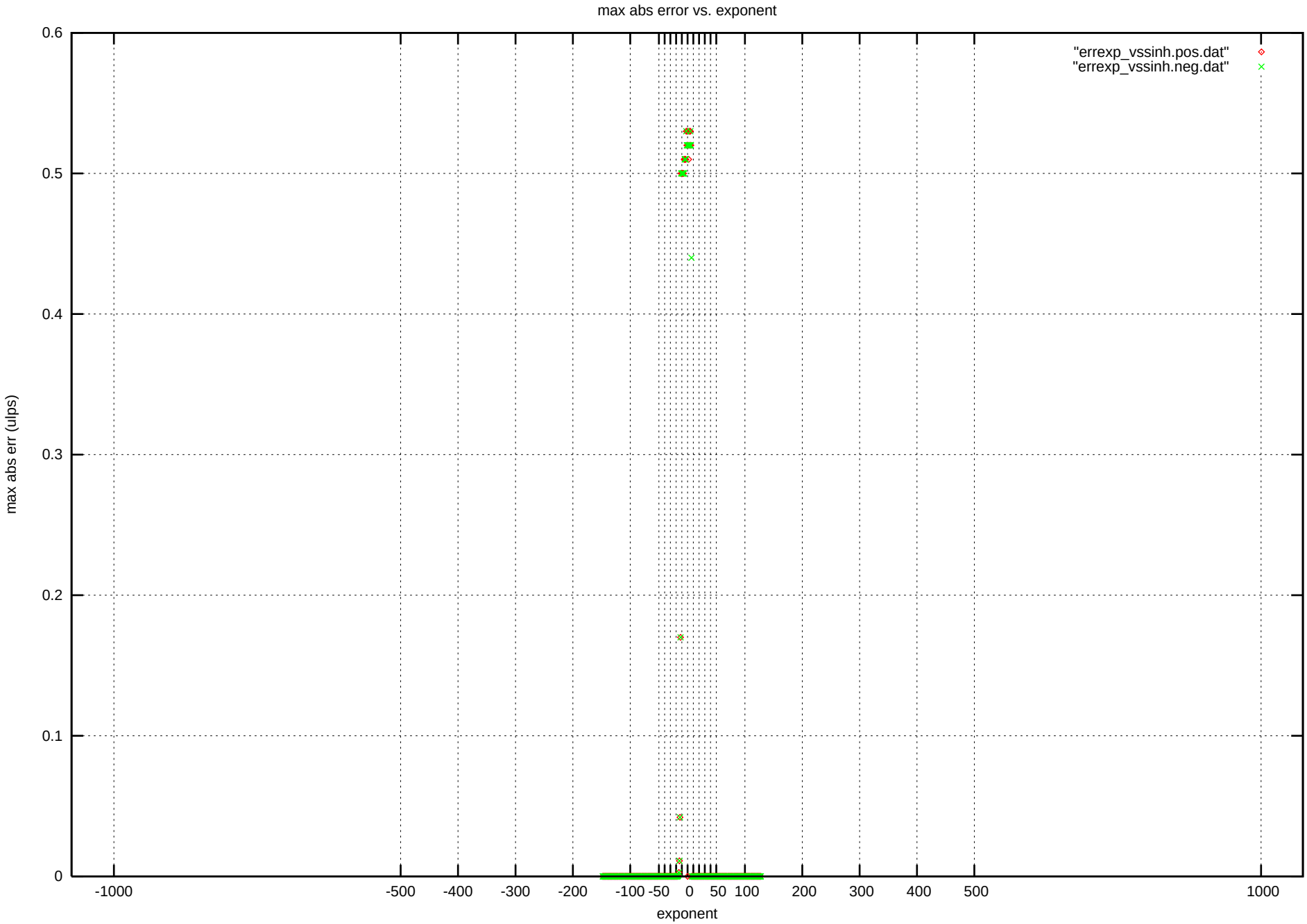
-100
-50
0
50
100


max abs error vs. exponent
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"errexp_vssinh.neg.dat"
max abs err (ulps)
exponent
0
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0.2
0.3
0.4
0.5
0.6
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-300
-200
-100
-50
0
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200
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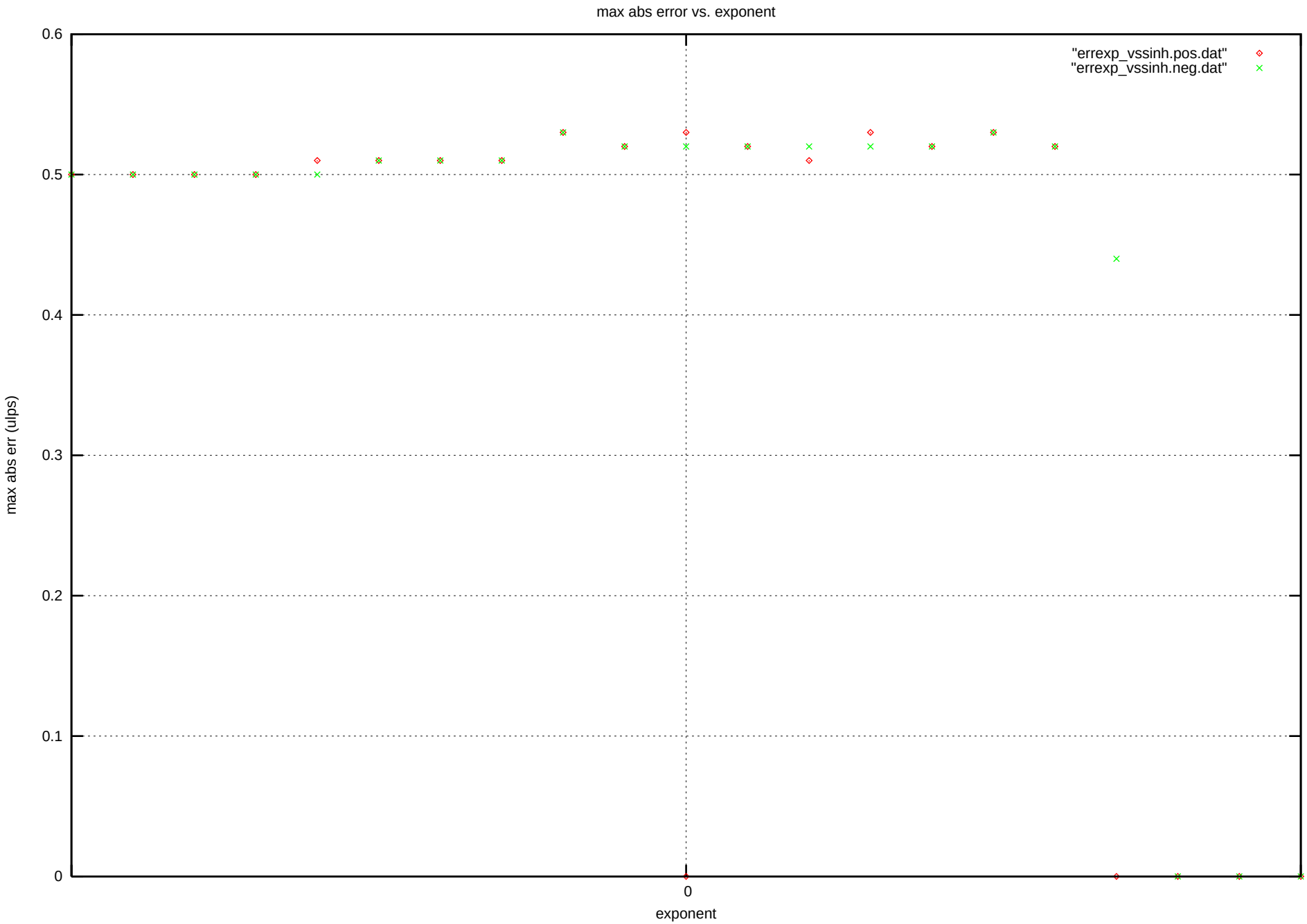
400
500
1000


max abs error vs. exponent
"errexp_vssinh.pos.dat"
"errexp_vssinh.neg.dat"
max abs err (ulps)
exponent
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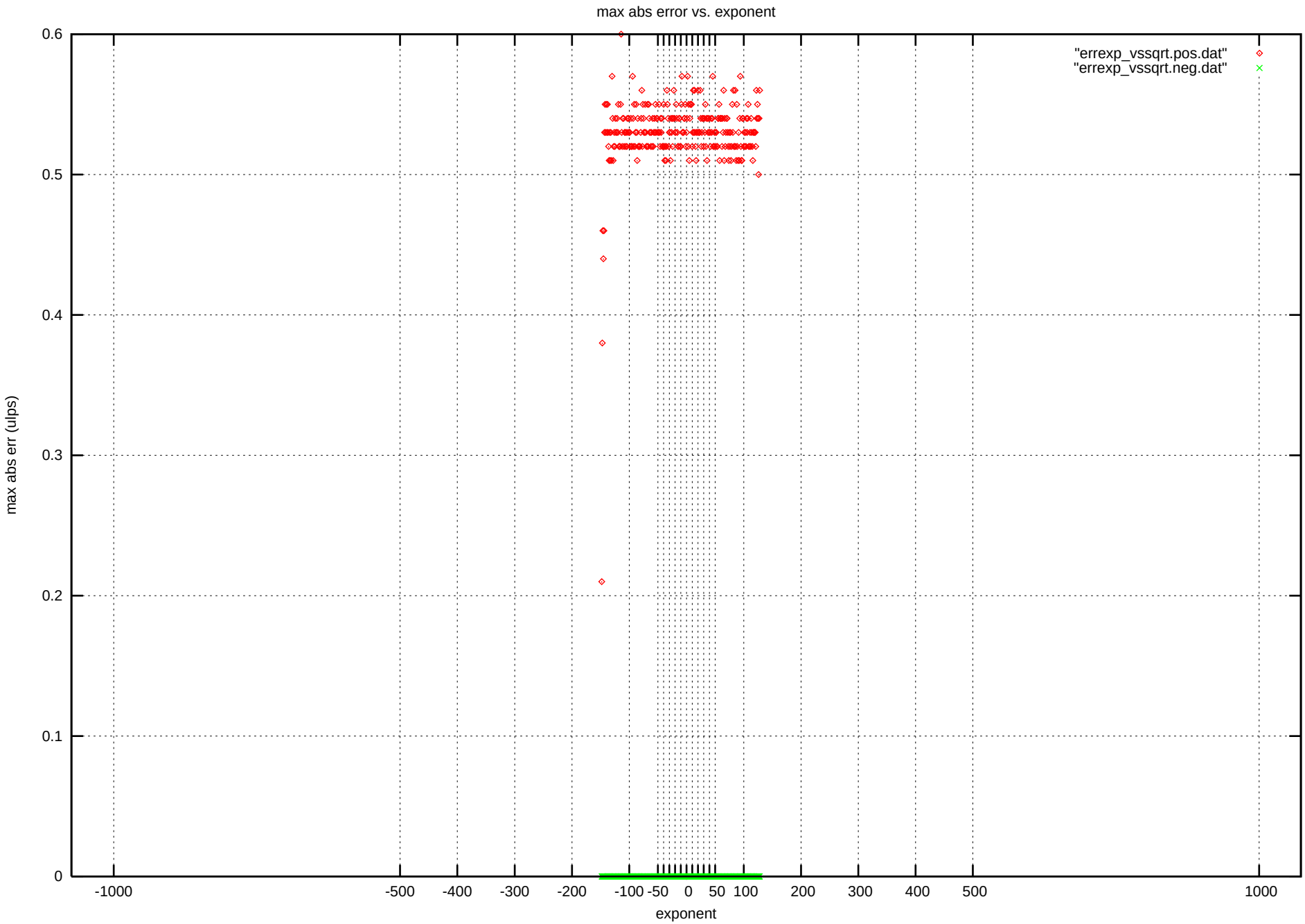
0.5
0.4
0.3
0.2
0.1
0
0


max abs error vs. exponent
"errexp_vssqrt.pos.dat"
"errexp_vssqrt.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
-1000
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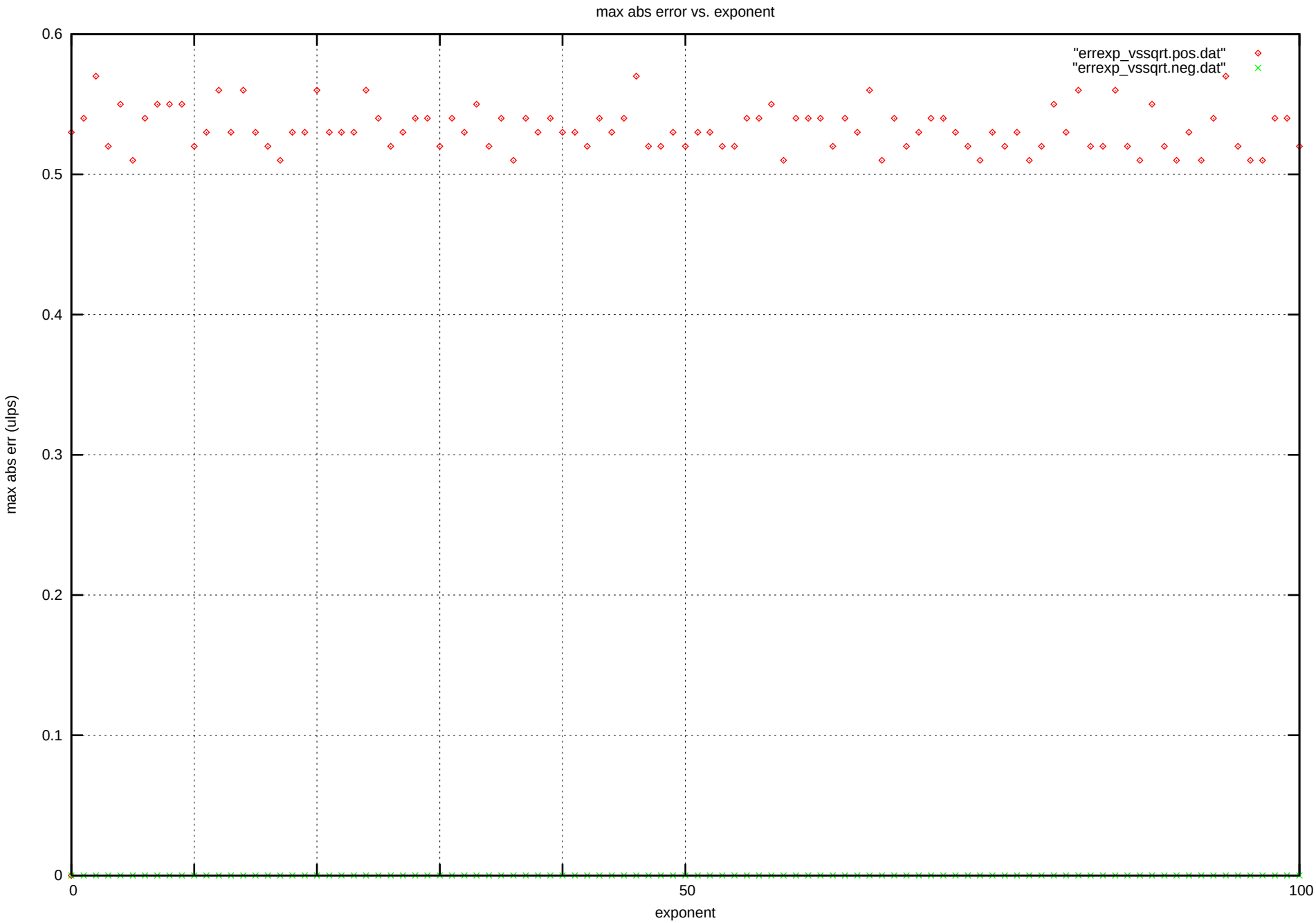
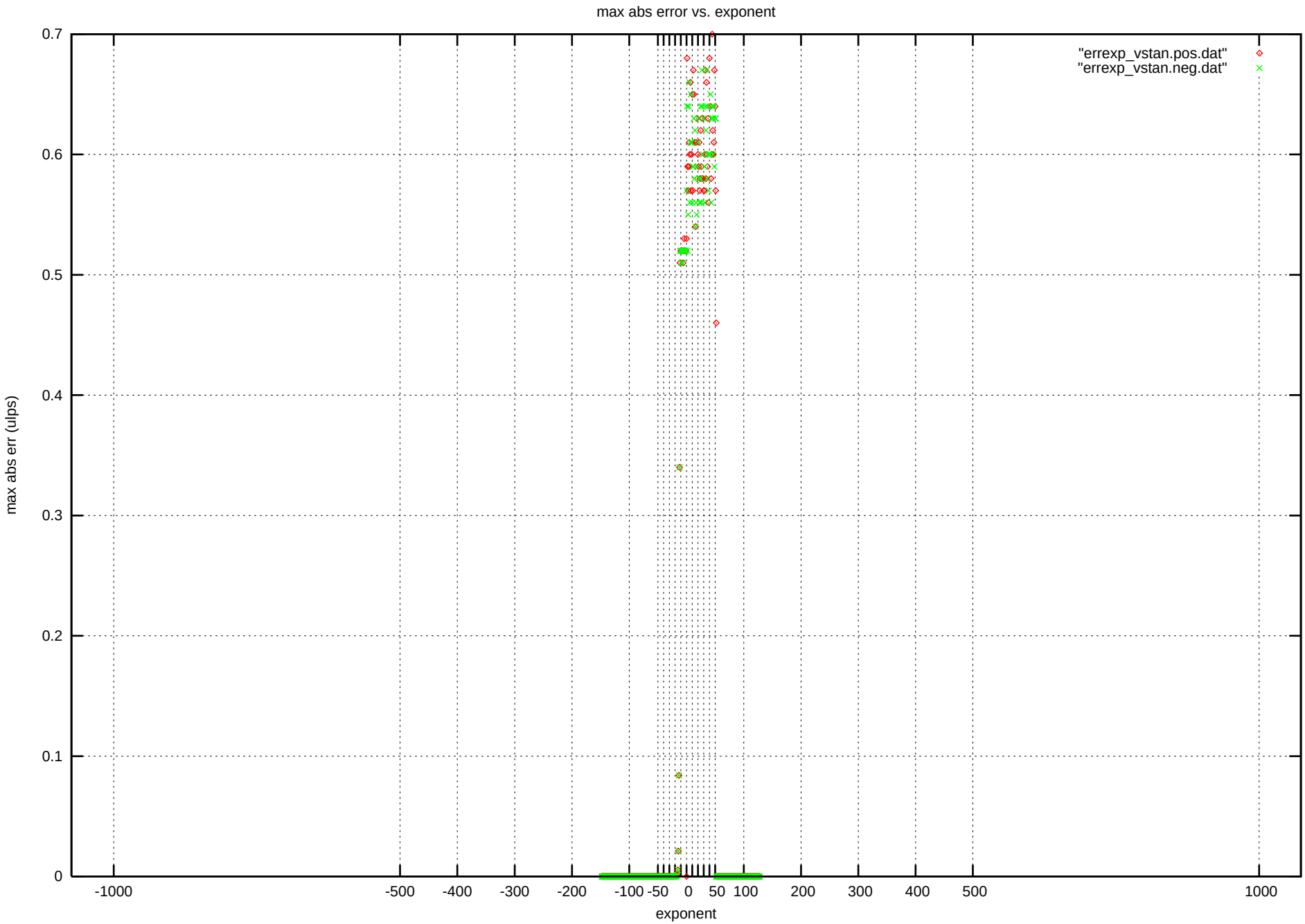
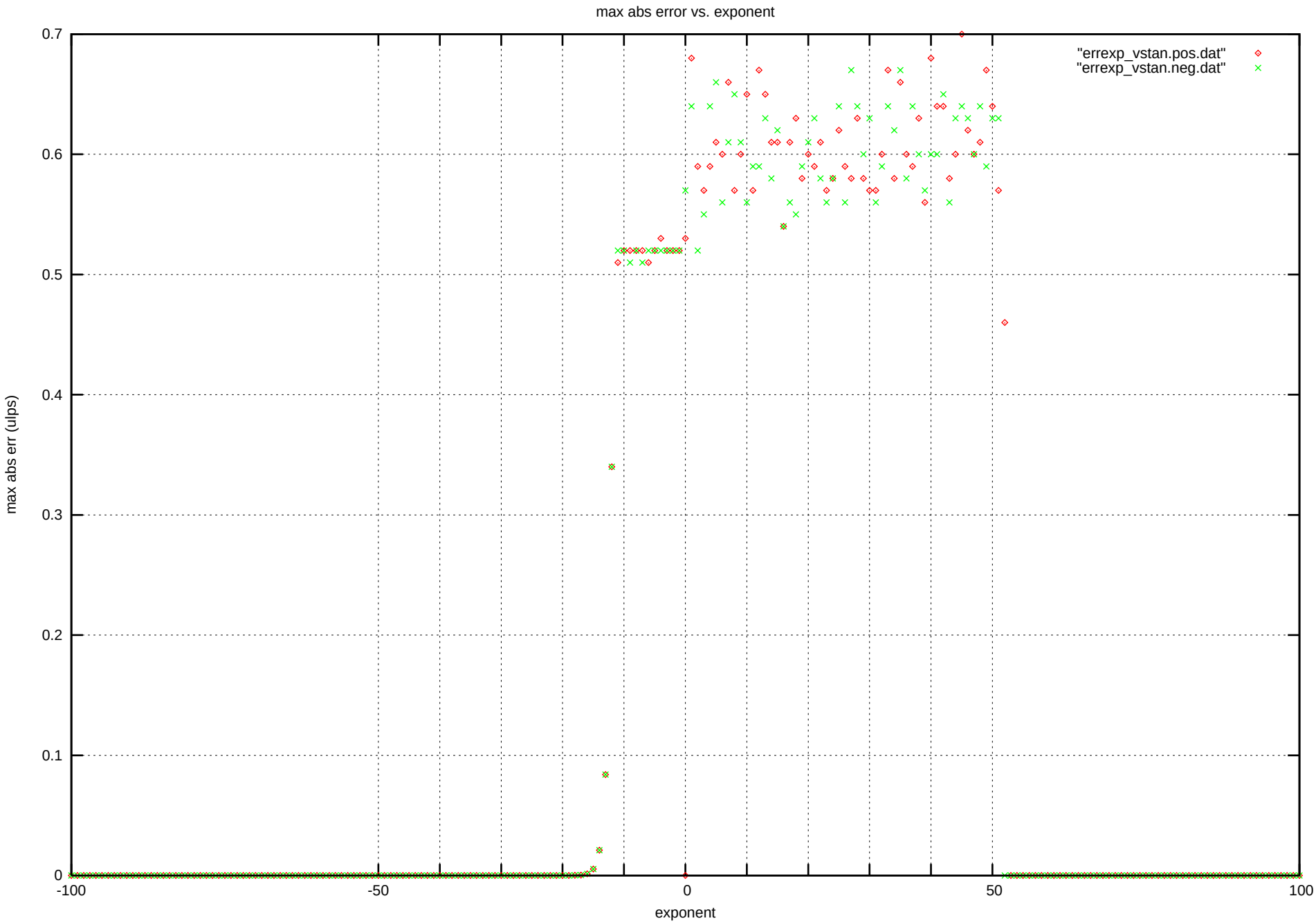
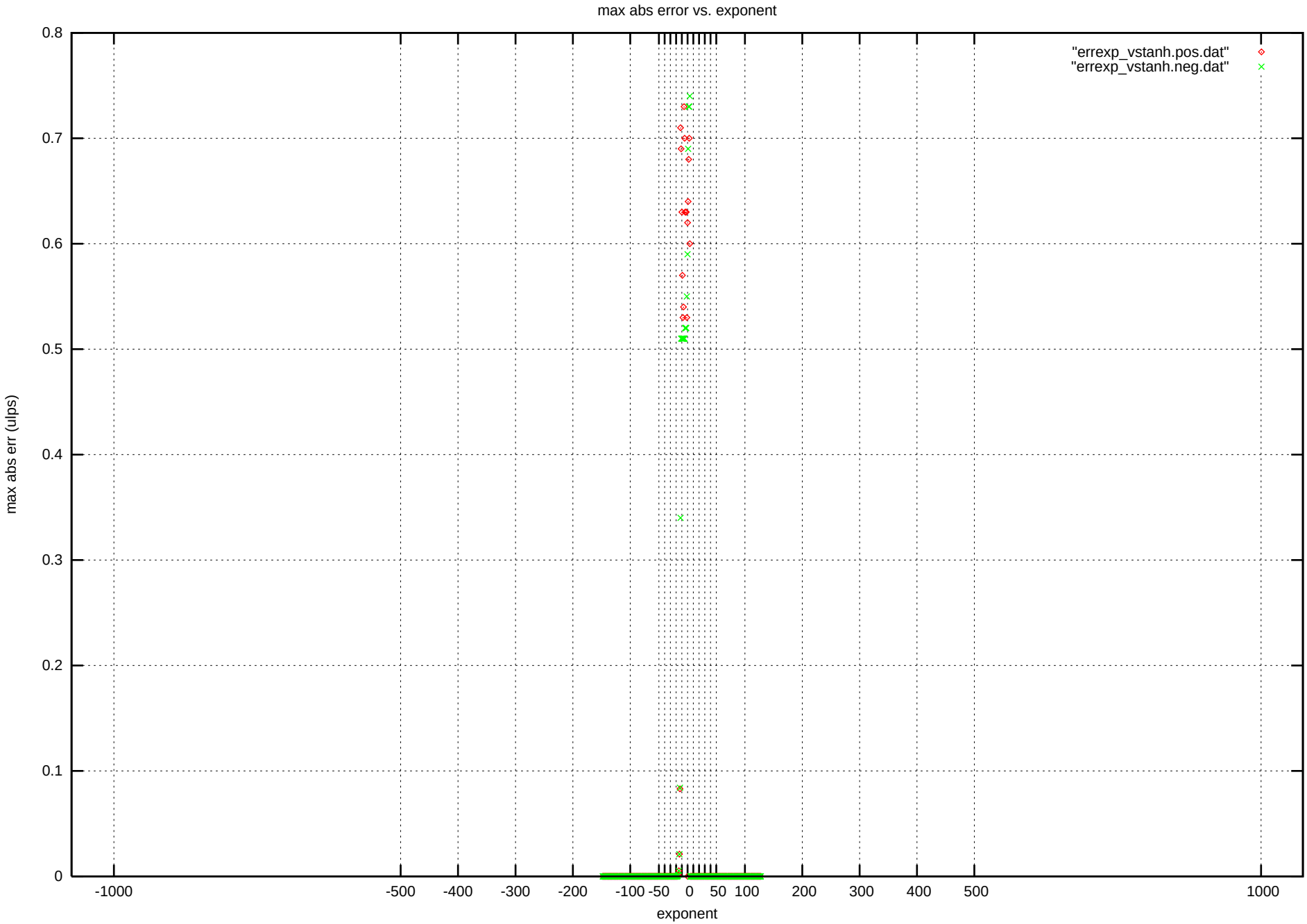
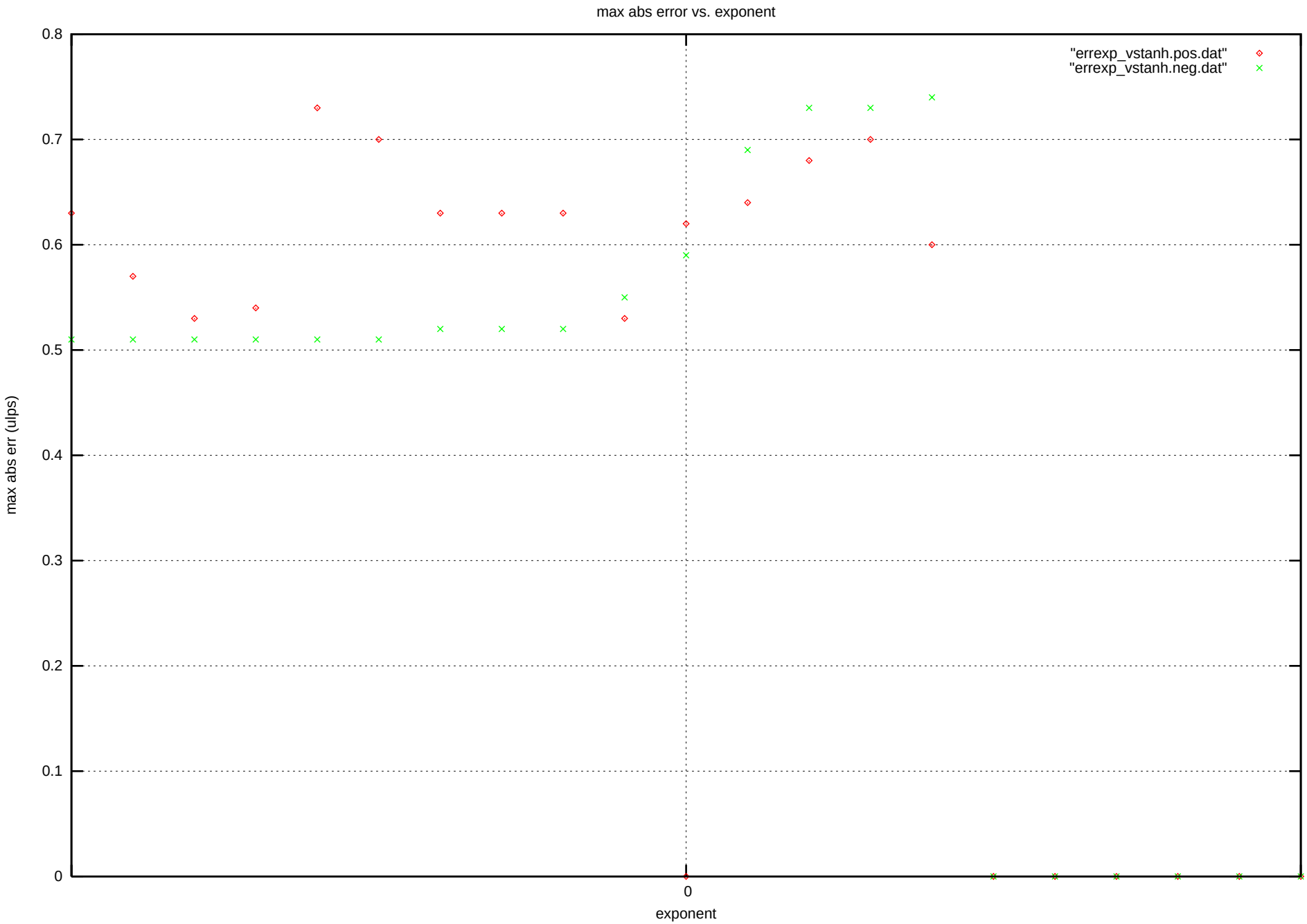
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vssqrt.pos.dat"
"errexp_vssqrt.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
0
50
100


max abs error vs. exponent
"errexp_vstan.pos.dat"
"errexp_vstan.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vstan.pos.dat"
"errexp_vstan.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
-100
-50
0
50
100


max abs error vs. exponent
"errexp_vstanh.pos.dat"
"errexp_vstanh.neg.dat"
max abs err (ulps)
exponent
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
-1000
-500
-400
-300
-200
-100
-50
0
50
100
200
300
400
500
1000


max abs error vs. exponent
"errexp_vstanh.pos.dat"
"errexp_vstanh.neg.dat"
max abs err (ulps)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
exponent