

```
1
2
3     typedef double XFLOAT
4     typedef double OTA_FLOAT
5
6
7 {
8
9 static const int qual_aNumberOfBarkBands_8k = 42
10
11 static const XFLOAT qual_aCentreOfBandHz_8k[] = {
12 7.867213391919682,
13 31.634143268655833,
14 63.655891799098754,
15 96.124605518591650,
16 129.044974350629590,
17 162.421731986685330,
18 196.259656269227240,
19 230.563569577955180,
20 265.338339219281240,
21 300.588877819080660,
22 336.320143718741180,
23 372.537141374536420,
24 409.244921760350960,
25 446.448582773784950,
26 484.568596610231450,
27 526.600592888287570,
28 570.303849242400700,
29 619.423353339182310,
30 672.121604306886980,
31 728.525756853291340,
32 785.675989853772080,
33 846.835700313003260,
34 909.691610194635130,
35 977.063272971177870,
36 1049.861745293105300,
37 1129.636141508770800,
38 1217.257669480493400,
39 1312.109392538742400,
40 1412.501516206835000,
41 1517.999395469417500,
42 1628.894311753134400,
43 1746.194538120266300,
44 1871.568772689906600,
45 2008.776338188902900,
46 2158.979388843049500,
47 2326.743242983026000,
48 2513.787152431817500,
49 2722.488782060286700,
50 2952.586614693790600,
51 3205.835247616510500,
52 3492.680347943505200,
53 3820.219598636514500,
54 }
55
56 static const XFLOAT qual_aWidthOfBandHz_8k[] = {
57 15.734426783839364,
58 31.799432969632942,
59 32.244064091252888,
60 32.693363347732898,
61 33.147374316342976,
62 33.606140955768495,
63 34.069707609315316,
64 34.538119008140654,
65 35.011420274511437,
66 35.489656925087445,
67 35.972874874233582,
68 36.461120437356840,
```

```
69 36.954440334272249,
70 37.452881692595838,
71 40.269643618288683,
72 42.311851299831915,
73 45.992602608514972,
74 51.348464384927752,
75 55.040530971124099,
76 56.775280701042107,
77 58.699369764471726,
78 62.445866689437935,
79 64.820925522595871,
80 69.195364254347510,
81 76.745707044252754,
82 84.016159884609124,
83 90.825685663805416,
84 97.931212000520645,
85 103.348886555479570,
86 107.801940408289740,
87 113.552247862722650,
88 121.490447376823570,
89 130.420569222977520,
90 143.431701144088950,
91 158.486701426626040,
92 176.872776192240510,
93 198.314560971309220,
94 219.549588310402210,
95 240.600248510215810,
96 268.703054594721380,
97 306.059403679688330,
98 349.937364906109000,
99 }
100
101 static const XFLOAT qual_aCentreOfBandBark_8k[] = {
102 0.078672133919197,
103 0.316341432686558,
104 0.636558917990988,
105 0.961246055185916,
106 1.290449743506296,
107 1.624217319866853,
108 1.962596562692272,
109 2.305635695779552,
110 2.653383392192812,
111 3.005888778190807,
112 3.363201437187412,
113 3.725371413745364,
114 4.092449217603510,
115 4.464485827737850,
116 4.841532696456650,
117 5.223641753529887,
118 5.610865410353339,
119 6.003256564147557,
120 6.400868602192050,
121 6.803755406094938,
122 7.211971356098372,
123 7.625571335420021,
124 8.044610734630901,
125 8.469145456069862,
126 8.899231918295030,
127 9.334927060572479,
128 9.776288347402467,
129 10.223373773083535,
130 10.676241866314763,
131 11.134951694836506,
132 11.599562870109931,
133 12.070135552035641,
134 12.546730453711742,
135 13.029408846231640,
136 13.518232563521924,
```

```
137 14.013264007220629,
138 14.514566151596222,
139 15.022202548507657,
140 15.536237332405801,
141 16.056735225376602,
142 16.583761542226299,
143 17.117382195609046,
144 }
145
146 static const XFLOAT qual_aWidthOfBandBark_8k[] = {
147 0.157344267838394,
148 0.317994329696329,
149 0.322440640912529,
150 0.326933633477329,
151 0.331473743163430,
152 0.336061409557685,
153 0.340697076093153,
154 0.345381190081407,
155 0.350114202745114,
156 0.354896569250875,
157 0.359728748742336,
158 0.364611204373568,
159 0.369544403342723,
160 0.374528816925959,
161 0.379564920511640,
162 0.384653193634836,
163 0.389794120012067,
164 0.394988187576368,
165 0.400235888512618,
166 0.405537719293158,
167 0.410894180713711,
168 0.416305777929586,
169 0.421773020492172,
170 0.427296422385751,
171 0.432876502064586,
172 0.438513782490313,
173 0.444208791169663,
174 0.449962060192473,
175 0.455774126269983,
176 0.461645530773504,
177 0.467576819773344,
178 0.473568544078077,
179 0.479621259274124,
180 0.485735525765673,
181 0.491911908814897,
182 0.498150978582512,
183 0.504453310168675,
184 0.510819483654194,
185 0.517250084142097,
186 0.523745701799506,
187 0.530306931899883,
188 0.536934374865616,
189 }
190
191 static const int qual_aNumberOfHzBandsInBarkBand_8k[] = {
192 1,
193 1,
194 1,
195 1,
196 1,
197 1,
198 1,
199 1,
200 2,
201 1,
202 1,
203 1,
204 1,
```

```
205 1,
206 2,
207 1,
208 1,
209 2,
210 2,
211 2,
212 2,
213 2,
214 2,
215 2,
216 2,
217 3,
218 3,
219 3,
220 3,
221 4,
222 3,
223 4,
224 5,
225 4,
226 5,
227 6,
228 6,
229 7,
230 8,
231 9,
232 9,
233 11,
234 }
235
236 static const XFLOAT qual_aPowerDensityCorrectionFactor_8k[] = {
237 100.00000000000000,
238 99.99999999999986,
239 100.00000000000000,
240 100.00000000000010,
241 99.99999999999986,
242 99.99999999999972,
243 100.00000000000070,
244 99.99999999999929,
245 50.00000000000043,
246 99.99999999999972,
247 100.00000000000030,
248 100.00000000000030,
249 99.99999999999957,
250 99.99999999999929,
251 53.047109258683179,
252 109.99999999999800,
253 117.992037968892770,
254 64.99999999999829,
255 68.760114411115339,
256 69.99999999999957,
257 71.428816127929494,
258 75.00000000000043,
259 76.843375907443658,
260 80.968808336850344,
261 88.646192018066856,
262 63.864324786237937,
263 68.155401595909368,
264 72.547755069712835,
265 75.584871685804970,
266 58.379174725066441,
267 80.950867722489420,
268 64.135619276263355,
269 54.384815810859074,
270 73.821912098150136,
271 64.437025648941329,
272 59.176429033466867,
```

```
273 65.521280487781439,  
274 61.399824997118699,  
275 58.144081530037795,  
276 57.004563192383280,  
277 64.126260403615447,  
278 59.248372255360252,  
279 }  
280  
281 static const XFLOAT qual_aT1_8k = 0.0770938698  
282  
283 static const XFLOAT qual_aT20_8k[] = {  
284 0.077093869803673,  
285 0.094148285639443,  
286 0.123060081399139,  
287 0.134563351000337,  
288 0.140713988142163,  
289 0.144538671555516,  
290 0.147145804624606,  
291 0.149036440839478,  
292 0.150469979113058,  
293 0.151594125484436,  
294 0.152499151486982,  
295 0.153243331192947,  
296 0.153865961872396,  
297 0.154394505989731,  
298 0.154853350584443,  
299 0.155283509987372,  
300 0.155664529012082,  
301 0.156029468822096,  
302 0.156362429750768,  
303 0.156666052939686,  
304 0.156929705866242,  
305 0.157172829423245,  
306 0.157388947729925,  
307 0.157589984149038,  
308 0.157778443865027,  
309 0.157957277586417,  
310 0.158126877377476,  
311 0.158285103596123,  
312 0.158429561637651,  
313 0.158560891131512,  
314 0.158680694803320,  
315 0.158790937830731,  
316 0.158893559432919,  
317 0.158991247911919,  
318 0.159084008063799,  
319 0.159173505995100,  
320 0.159259252660801,  
321 0.159341063403773,  
322 0.159417894862328,  
323 0.159489740611646,  
324 0.159558564108577,  
325 0.159624540563461,  
326 }  
327  
328 static const XFLOAT qual_aAbsoluteThresholdPower_8k[] = {  
329 102329299228.075360000000000,  
330 1995262314.968882800000000,  
331 11220184.543019630000000,  
332 245470.891568502850000,  
333 29512.092266663902000,  
334 6165.950018614822500,  
335 1659.586907437561400,  
336 724.435960074990590,  
337 281.838293126445480,  
338 154.881661891248110,  
339 77.624711662869160,  
340 48.977881936844611,
```

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341 30.199517204020161,  
342 19.952623149688797,  
343 15.488166189124811,  
344 11.481536214968829,  
345 8.912509381337454,  
346 7.244359600749901,  
347 6.165950018614822,  
348 5.248074602497725,  
349 4.677351412871983,  
350 4.265795188015927,  
351 4.073802778041127,  
352 3.981071705534972,  
353 3.981071705534972,  
354 3.981071705534972,  
355 3.981071705534972,  
356 4.168693834703354,  
357 4.570881896148750,  
358 4.897788193684463,  
359 5.370317963702527,  
360 5.888436553555890,  
361 6.309573444801933,  
362 6.918309709189366,  
363 7.413102413009173,  
364 7.762471166286917,  
365 7.943282347242816,  
366 7.943282347242816,  
367 8.128305161640991,  
368 8.317637711026709,  
369 8.317637711026709,  
370 8.317637711026709,  
371 }  
372  
373 static const int qual_aNumberOfBarkBands_16k = 49  
374  
375 static const XFLOAT qual_aCentreOfBandHz_16k[] = {  
376 7.867213391919682,  
377 31.634143268655833,  
378 63.655891799098754,  
379 96.124605518591650,  
380 129.044974350629590,  
381 162.421731986685330,  
382 196.259656269227240,  
383 230.563569577955180,  
384 265.338339219281240,  
385 300.588877819080660,  
386 336.320143718741180,  
387 372.537141374536420,  
388 409.244921760350960,  
389 446.448582773784950,  
390 484.568596610231450,  
391 526.600592888287570,  
392 570.303849242400700,  
393 619.423353339182310,  
394 672.121604306886980,  
395 728.525756853291340,  
396 785.675989853772080,  
397 846.835700313003260,  
398 909.691610194635130,  
399 977.063272971177870,  
400 1049.861745293105300,  
401 1129.636141508770800,  
402 1217.257669480493400,  
403 1312.109392538742400,  
404 1412.501516206835000,  
405 1517.999395469417500,  
406 1628.894311753134400,  
407 1746.194538120266300,  
408 1871.568772689906600,
```

```
409 2008.776338188902900,
410 2158.979388843049500,
411 2326.743242983026000,
412 2513.787152431817500,
413 2722.488782060286700,
414 2952.586614693790600,
415 3205.835247616510500,
416 3492.680347943505200,
417 3820.219598636514500,
418 4193.939129343916600,
419 4619.845883795305800,
420 5100.437353963356100,
421 5636.200046593819900,
422 6234.312434981934500,
423 6946.734992943288500,
424 7796.472853895668800,
425 }
426
427 static const XFLOAT qual_aWidthOfBandHz_16k[] = {
428 15.734426783839364,
429 31.799432969632942,
430 32.244064091252888,
431 32.693363347732898,
432 33.147374316342976,
433 33.606140955768495,
434 34.069707609315316,
435 34.538119008140654,
436 35.011420274511437,
437 35.489656925087445,
438 35.972874874233582,
439 36.461120437356840,
440 36.954440334272249,
441 37.452881692595838,
442 40.269643618288683,
443 42.311851299831915,
444 45.992602608514972,
445 51.348464384927752,
446 55.040530971124099,
447 56.775280701042107,
448 58.699369764471726,
449 62.445866689437935,
450 64.820925522595871,
451 69.195364254347510,
452 76.745707044252754,
453 84.016159884609124,
454 90.825685663805416,
455 97.931212000520645,
456 103.348886555479570,
457 107.801940408289740,
458 113.552247862722650,
459 121.490447376823570,
460 130.420569222977520,
461 143.431701144088950,
462 158.486701426626040,
463 176.872776192240510,
464 198.314560971309220,
465 219.549588310402210,
466 240.600248510215810,
467 268.703054594721380,
468 306.059403679688330,
469 349.937364906109000,
470 398.686610359186490,
471 454.713611741021850,
472 506.841513852932620,
473 564.863198713552260,
474 637.262576607390660,
475 794.715709200185300,
476 931.068552669087690,
```

```
477 }
478
479 static const XFLOAT qual_aCentreOfBandBark_16k[] = {
480 0.078672133919197,
481 0.316341432686558,
482 0.636558917990988,
483 0.961246055185916,
484 1.290449743506296,
485 1.624217319866853,
486 1.962596562692272,
487 2.305635695779552,
488 2.653383392192812,
489 3.005888778190807,
490 3.363201437187412,
491 3.725371413745364,
492 4.092449217603510,
493 4.464485827737850,
494 4.841532696456650,
495 5.223641753529887,
496 5.610865410353339,
497 6.003256564147557,
498 6.400868602192050,
499 6.803755406094938,
500 7.211971356098372,
501 7.625571335420021,
502 8.044610734630901,
503 8.469145456069862,
504 8.899231918295030,
505 9.334927060572479,
506 9.776288347402467,
507 10.223373773083535,
508 10.676241866314763,
509 11.134951694836506,
510 11.599562870109931,
511 12.070135552035641,
512 12.546730453711742,
513 13.029408846231640,
514 13.518232563521924,
515 14.013264007220629,
516 14.514566151596222,
517 15.022202548507657,
518 15.536237332405801,
519 16.056735225376602,
520 16.583761542226299,
521 17.117382195609046,
522 17.657663701197311,
523 18.204673182895327,
524 18.758478378096022,
525 19.319147642981740,
526 19.886749957869128,
527 20.461354932598510,
528 21.043032811968168,
529 }
530
531 static const XFLOAT qual_aWidthOfBandBark_16k[] = {
532 0.157344267838394,
533 0.317994329696329,
534 0.322440640912529,
535 0.326933633477329,
536 0.331473743163430,
537 0.336061409557685,
538 0.340697076093153,
539 0.345381190081407,
540 0.350114202745114,
541 0.354896569250875,
542 0.359728748742336,
543 0.364611204373568,
544 0.369544403342723,
```



```
545 0.374528816925959,
546 0.379564920511640,
547 0.384653193634836,
548 0.389794120012067,
549 0.394988187576368,
550 0.400235888512618,
551 0.405537719293158,
552 0.410894180713711,
553 0.416305777929586,
554 0.421773020492172,
555 0.427296422385751,
556 0.432876502064586,
557 0.438513782490313,
558 0.444208791169663,
559 0.449962060192473,
560 0.455774126269983,
561 0.461645530773504,
562 0.467576819773344,
563 0.473568544078077,
564 0.479621259274124,
565 0.485735525765673,
566 0.491911908814897,
567 0.498150978582512,
568 0.504453310168675,
569 0.510819483654194,
570 0.517250084142097,
571 0.523745701799506,
572 0.530306931899883,
573 0.536934374865616,
574 0.543628636310913,
575 0.550390327085115,
576 0.557220063316276,
577 0.564118466455167,
578 0.571086163319610,
579 0.578123786139155,
580 0.585231972600159,
581 }
582
583 static const int qual_aNumberOfHzBandsInBarkBand_16k[] = {
584 1,
585 1,
586 1,
587 1,
588 1,
589 1,
590 1,
591 1,
592 2,
593 1,
594 1,
595 1,
596 1,
597 1,
598 2,
599 1,
600 1,
601 2,
602 2,
603 2,
604 2,
605 2,
606 2,
607 2,
608 2,
609 3,
610 3,
611 3,
612 3,
```

```
613 4,
614 3,
615 4,
616 5,
617 4,
618 5,
619 6,
620 6,
621 7,
622 8,
623 9,
624 9,
625 12,
626 12,
627 15,
628 16,
629 18,
630 21,
631 25,
632 20,
633 }
634
635 static const XFLOAT qual_aPowerDensityCorrectionFactor_16k[] = {
636 100.00000000000000,
637 99.99999999999986,
638 100.00000000000000,
639 100.00000000000010,
640 99.99999999999986,
641 99.99999999999972,
642 100.00000000000070,
643 99.99999999999929,
644 50.00000000000043,
645 99.99999999999972,
646 100.00000000000030,
647 100.00000000000030,
648 99.99999999999957,
649 99.99999999999929,
650 53.047109258683179,
651 109.99999999999800,
652 117.992037968892770,
653 64.99999999999829,
654 68.760114411115339,
655 69.99999999999957,
656 71.428816127929494,
657 75.00000000000043,
658 76.843375907443658,
659 80.968808336850344,
660 88.646192018066856,
661 63.864324786237937,
662 68.155401595909368,
663 72.547755069712835,
664 75.584871685804970,
665 58.379174725066441,
666 80.950867722489420,
667 64.135619276263355,
668 54.384815810859074,
669 73.821912098150136,
670 64.437025648941329,
671 59.176429033466867,
672 65.521280487781439,
673 61.399824997118699,
674 58.144081530037795,
675 57.004563192383280,
676 64.126260403615447,
677 54.311007900746894,
678 61.115036952537203,
679 55.077713562445773,
680 56.849343197156585,
```

```
681 55.628898331612412,  
682 53.137055194806393,  
683 54.985851006579821,  
684 79.546965670073760,  
685 }  
686  
687 static const XFLOAT qual_aT1_16k = 0.0770938698  
688  
689 static const XFLOAT qual_aT20_16k[] = {  
690 0.077093869803673,  
691 0.094148285639443,  
692 0.123060081399139,  
693 0.134563351000337,  
694 0.140713988142163,  
695 0.144538671555516,  
696 0.147145804624606,  
697 0.149036440839478,  
698 0.150469979113058,  
699 0.151594125484436,  
700 0.152499151486982,  
701 0.153243331192947,  
702 0.153865961872396,  
703 0.154394505989731,  
704 0.154853350584443,  
705 0.155283509987372,  
706 0.155664529012082,  
707 0.156029468822096,  
708 0.156362429750768,  
709 0.156666052939686,  
710 0.156929705866242,  
711 0.157172829423245,  
712 0.157388947729925,  
713 0.157589984149038,  
714 0.157778443865027,  
715 0.157957277586417,  
716 0.158126877377476,  
717 0.158285103596123,  
718 0.158429561637651,  
719 0.158560891131512,  
720 0.158680694803320,  
721 0.158790937830731,  
722 0.158893559432919,  
723 0.158991247911919,  
724 0.159084008063799,  
725 0.159173505995100,  
726 0.159259252660801,  
727 0.159341063403773,  
728 0.159417894862328,  
729 0.159489740611646,  
730 0.159558564108577,  
731 0.159624540563461,  
732 0.159687257264811,  
733 0.159746383260581,  
734 0.159801262701207,  
735 0.159851426442048,  
736 0.159897256404505,  
737 0.159941559333382,  
738 0.159983824994766,  
739 }  
740  
741 static const XFLOAT qual_aAbsoluteThresholdPower_16k[] = {  
742 102329299228.075360000000000,  
743 1995262314.968882800000000,  
744 11220184.543019630000000,  
745 245470.891568502850000,  
746 29512.092266663902000,  
747 6165.950018614822500,  
748 1659.586907437561400,
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749 724.435960074990590,
750 281.838293126445480,
751 154.881661891248110,
752 77.624711662869160,
753 48.977881936844611,
754 30.199517204020161,
755 19.952623149688797,
756 15.488166189124811,
757 11.481536214968829,
758 8.912509381337454,
759 7.244359600749901,
760 6.165950018614822,
761 5.248074602497725,
762 4.677351412871983,
763 4.265795188015927,
764 4.073802778041127,
765 3.981071705534972,
766 3.981071705534972,
767 3.981071705534972,
768 3.981071705534972,
769 4.168693834703354,
770 4.570881896148750,
771 4.897788193684463,
772 5.370317963702527,
773 5.888436553555890,
774 6.309573444801933,
775 6.918309709189366,
776 7.413102413009173,
777 7.762471166286917,
778 7.943282347242816,
779 7.943282347242816,
780 8.128305161640991,
781 8.317637711026709,
782 8.317637711026709,
783 8.317637711026709,
784 8.128305161640991,
785 7.585775750291840,
786 6.760829753919819,
787 5.888436553555890,
788 5.754399373371570,
789 6.606934480075959,
790 8.511380382023766,
791 }
792
793 static const int qual_aNumberOfBarkBands_48k = 63
794
795 static const XFLOAT qual_aCentreOfBandHz_48k[] = {
796 5.910603491964197,
797 23.797443115244512,
798 47.958879939743021,
799 72.540984377384163,
800 97.549265318945217,
801 122.989295827799850,
802 148.866713840940120,
803 175.187222877351190,
804 201.956592753813740,
805 229.180660308209920,
806 256.865330130409010,
807 285.016575300810250,
808 313.640438136621240,
809 342.743030945949840,
810 372.330536789790190,
811 402.409210251982070,
812 432.985378217225730,
813 464.065440657234320,
814 497.221458567616080,
815 532.539540963797090,
816 569.472929105829850,

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817 610.621808571419820,
818 654.429401632319810,
819 702.093572015565660,
820 750.803535707967510,
821 800.458340206575710,
822 854.331696206153420,
823 909.063191581837710,
824 967.774627918571010,
825 1029.896844548295600,
826 1098.619215137328000,
827 1173.720257940167800,
828 1254.169496431909700,
829 1340.822789979333500,
830 1431.973653931604300,
831 1527.049915220804200,
832 1627.551769290355700,
833 1733.227435980363500,
834 1846.263670199879000,
835 1968.793810035118900,
836 2101.915043737582400,
837 2249.206520871338900,
838 2412.974855582727300,
839 2595.473393024933600,
840 2796.582747622492700,
841 3016.424742000808200,
842 3260.628330270893900,
843 3535.777932688708500,
844 3848.250218409411000,
845 4203.877374532146900,
846 4607.335464729203500,
847 5061.849338360401800,
848 5566.583563042058800,
849 6129.101797698542200,
850 6782.607399760106100,
851 7576.721253229217800,
852 8517.627097876013100,
853 9628.002979959626800,
854 11034.310560620694000,
855 12732.344379300084000,
856 14849.382859505577000,
857 17518.196174942277000,
858 21306.839738544175000,
859 }
860
861 static const XFLOAT qual_aWidthOfBandHz_48k[] = {
862 11.821206983928395,
863 23.952472262632238,
864 24.370401386364776,
865 24.793807488917508,
866 25.222754394204600,
867 25.657306623504667,
868 26.097529402775848,
869 26.543488670046258,
870 26.995251082878895,
871 27.452884025913505,
872 27.916455618484633,
873 28.386034722317845,
874 28.861690949304034,
875 29.343494669353220,
876 29.831517018327531,
877 30.325829906056242,
878 30.826506024431239,
879 31.333618855585939,
880 35.005191956674878,
881 35.604197844189684,
882 38.867883904794553,
883 43.140442578909642,
884 45.582627209681618,
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```
885 48.321956872575583,  
886 49.097970512228358,  
887 51.829315558982103,  
888 54.299719366179147,  
889 56.406259870151757,  
890 59.773624318352631,  
891 66.265698878236435,  
892 71.012557435947429,  
893 77.932718023213965,  
894 83.524071653636156,  
895 88.852628188010385,  
896 93.895100994097902,  
897 97.636455890521574,  
898 102.581087475984080,  
899 109.686659872937980,  
900 116.804486719206120,  
901 128.271023838849030,  
902 139.735272895473140,  
903 155.223962470952760,  
904 172.303422699709700,  
905 192.017916451555270,  
906 210.797077449661630,  
907 230.621952843063810,  
908 258.488469307555530,  
909 292.228429511940250,  
910 334.202572994827730,  
911 378.319273137923120,  
912 430.237268685910750,  
913 478.178690219849160,  
914 531.447018382937130,  
915 596.605519277164600,  
916 731.361491445544740,  
917 852.035132492492270,  
918 1029.679957155479300,  
919 1254.605733164360600,  
920 1517.031051963887900,  
921 1923.388407979558900,  
922 2308.221899745212800,  
923 3203.318449353662800,  
924 4442.352348358261200,  
925 }  
926  
927 static const XFLOAT qual_aCentreOfBandBark_48k[] = {  
928 0.059106034919642,  
929 0.237974431152445,  
930 0.479588799397430,  
931 0.725409843773842,  
932 0.975492653189452,  
933 1.229892958277999,  
934 1.488667138409401,  
935 1.751872228773512,  
936 2.019565927538138,  
937 2.291806603082099,  
938 2.568653301304090,  
939 2.850165753008103,  
940 3.136404381366212,  
941 3.427430309459498,  
942 3.723305367897902,  
943 4.024092102519821,  
944 4.329853782172258,  
945 4.640654406572343,  
946 4.956558714251056,  
947 5.277632190579974,  
948 5.603941075881915,  
949 5.935552373626306,  
950 6.272533858710153,  
951 6.614954085825469,  
952 6.962882397914054,
```

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953 7.316388934710504,
954 7.675544641374356,
955 8.040421277212252,
956 8.411091424491069,
957 8.787628497342915,
958 9.170106750762933,
959 9.558601289700839,
960 9.953188078247189,
961 10.353943948915271,
962 10.760946612019652,
963 11.174274665152332,
964 11.594007602757486,
965 12.020225825805825,
966 12.453010651569549,
967 12.892444323498950,
968 13.338610021201655,
969 13.791591870525579,
970 14.251474953746628,
971 14.718345319862225,
972 15.192289994991686,
973 15.673396992884598,
974 16.161755325538230,
975 16.657455013925130,
976 17.160587098831961,
977 17.671243651810776,
978 18.189517786243812,
979 18.715503668522992,
980 19.249296529345223,
981 19.790992675124794,
982 20.340689499523890,
983 20.898485495102562,
984 21.464480265089264,
985 22.038774535273230,
986 22.621470166019897,
987 23.212670164410618,
988 23.812478696507902,
989 24.421001099747521,
990 25.038343895458659,
991 }
992
993 static const XFLOAT qual_aWidthOfBandBark_48k[] = {
994 0.118212069839284,
995 0.239524722626322,
996 0.243704013863648,
997 0.247938074889175,
998 0.252227543942046,
999 0.256573066235047,
1000 0.260975294027759,
1001 0.265434886700463,
1002 0.269952510828789,
1003 0.274528840259135,
1004 0.279164556184846,
1005 0.283860347223178,
1006 0.288616909493041,
1007 0.293434946693532,
1008 0.298315170183275,
1009 0.303258299060563,
1010 0.308265060244312,
1011 0.313336188555859,
1012 0.318472426801565,
1013 0.323674525856271,
1014 0.328943244747611,
1015 0.334279350741173,
1016 0.339683619426520,
1017 0.345156834804111,
1018 0.350699789373059,
1019 0.356313284219842,
1020 0.361998129107860,
```

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1021 0.367755142567931,
1022 0.373585151989705,
1023 0.379488993713990,
1024 0.385467513126043,
1025 0.391521564749771,
1026 0.397652012342927,
1027 0.403859728993236,
1028 0.410145597215527,
1029 0.416510509049832,
1030 0.422955366160478,
1031 0.429481079936199,
1032 0.436088571591249,
1033 0.442778772267552,
1034 0.449552623137858,
1035 0.456411075509989,
1036 0.463355090932112,
1037 0.470385641299082,
1038 0.477503708959842,
1039 0.484710286825980,
1040 0.492006378481289,
1041 0.499392998292507,
1042 0.506871171521151,
1043 0.514441934436480,
1044 0.522106334429598,
1045 0.529865430128755,
1046 0.537720291515715,
1047 0.545672000043425,
1048 0.553721648754767,
1049 0.561870342402575,
1050 0.570119197570829,
1051 0.578469342797106,
1052 0.586921918696230,
1053 0.595478078085204,
1054 0.604138986109366,
1055 0.612905820369871,
1056 0.621779771052410,
1057 }
1058
1059 static const int qual_aNumberOfHzBandsInBarkBand_48k[] = {
1060 1,
1061 1,
1062 1,
1063 1,
1064 1,
1065 1,
1066 1,
1067 2,
1068 1,
1069 1,
1070 1,
1071 1,
1072 1,
1073 2,
1074 1,
1075 1,
1076 2,
1077 1,
1078 1,
1079 2,
1080 2,
1081 1,
1082 2,
1083 2,
1084 3,
1085 2,
1086 2,
1087 3,
1088 2,
```



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1089 3,
1090 3,
1091 3,
1092 4,
1093 4,
1094 4,
1095 4,
1096 4,
1097 5,
1098 5,
1099 5,
1100 6,
1101 7,
1102 7,
1103 8,
1104 9,
1105 10,
1106 11,
1107 13,
1108 14,
1109 16,
1110 19,
1111 20,
1112 23,
1113 25,
1114 31,
1115 37,
1116 44,
1117 53,
1118 65,
1119 82,
1120 98,
1121 137,
1122 190,
1123 }
1124
1125 static const XFLOAT qual_aPowerDensityCorrectionFactor_48k[] = {
1126 100.00000000000000,
1127 100.00000000000010,
1128 99.99999999999972,
1129 100.00000000000000,
1130 100.00000000000030,
1131 99.99999999999986,
1132 99.99999999999972,
1133 50.00000000000007,
1134 99.99999999999972,
1135 100.00000000000090,
1136 99.99999999999986,
1137 100.00000000000000,
1138 99.99999999999901,
1139 50.00000000000036,
1140 100.00000000000060,
1141 99.99999999999957,
1142 50.00000000000028,
1143 99.99999999999986,
1144 109.915926814242180,
1145 54.999999999999808,
1146 59.079924159282804,
1147 129.055062728994700,
1148 67.095709953040625,
1149 69.99999999999986,
1150 46.666666666666764,
1151 72.729979282787326,
1152 75.00000000000156,
1153 51.126645006496013,
1154 79.999999999999844,
1155 58.206078855064298,
1156 61.408164560184503,
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1157 66.350298459313208,
1158 52.510781450293905,
1159 55.002159047590062,
1160 57.232786132260436,
1161 58.603836979561144,
1162 60.633518145897405,
1163 51.078692402111095,
1164 53.569157427353275,
1165 57.939102718023022,
1166 51.805308100946682,
1167 48.585262215179050,
1168 53.122918368870437,
1169 51.026726687822617,
1170 49.050713229908347,
1171 47.579339475801461,
1172 47.761477864917538,
1173 45.012865697589092,
1174 47.096015117871552,
1175 45.962338970326940,
1176 43.370603418710409,
1177 45.122654076871363,
1178 42.971025025806895,
1179 43.733636267185183,
1180 42.606797528538273,
1181 40.984502679715781,
1182 41.047235925030812,
1183 40.921453454487924,
1184 39.764981537624735,
1185 39.390125443906719,
1186 38.986533285924871,
1187 38.149232254838559,
1188 37.603027505849454,
1189 }
1190
1191 static const XFLOAT qual_aT1_48k = 0.1450986831
1192
1193 static const XFLOAT qual_aT20_48k[] = {
1194 0.145098683087348,
1195 0.147805247032314,
1196 0.193338134801842,
1197 0.211467665761431,
1198 0.221163503657670,
1199 0.227193090619346,
1200 0.231303111317615,
1201 0.234283360314810,
1202 0.236542789854830,
1203 0.238314292447551,
1204 0.239740214862524,
1205 0.240912454423327,
1206 0.241892985823276,
1207 0.242725121386982,
1208 0.243440043064954,
1209 0.244060770721161,
1210 0.244604668434463,
1211 0.245085080795452,
1212 0.245532217051363,
1213 0.245947998591998,
1214 0.246328246536026,
1215 0.246698284857524,
1216 0.247041586817658,
1217 0.247366886737641,
1218 0.247657012631770,
1219 0.247916710472696,
1220 0.248164581327939,
1221 0.248386525896917,
1222 0.248596884433471,
1223 0.248793510110283,
1224 0.248985269856539,
```

```
1225 0.249169288633657,
1226 0.249342087159880,
1227 0.249505125170130,
1228 0.249655425002138,
1229 0.249793158153387,
1230 0.249921323858203,
1231 0.250040115259688,
1232 0.250152180071761,
1233 0.250259169283855,
1234 0.250361311299006,
1235 0.250460275935711,
1236 0.250556163800678,
1237 0.250648797549971,
1238 0.250736907272781,
1239 0.250819811067525,
1240 0.250898821119961,
1241 0.250974790895663,
1242 0.251047913298019,
1243 0.251117928543347,
1244 0.251184291774711,
1245 0.251246396997785,
1246 0.251303493284183,
1247 0.251356057337813,
1248 0.251406185563114,
1249 0.251455470837454,
1250 0.251501980303525,
1251 0.251545180702490,
1252 0.251587422776554,
1253 0.251625998035075,
1254 0.251661741133353,
1255 0.251694494785568,
1256 0.251726904176581,
1257 }
1258
1259 static const XFLOAT qual_aAbsoluteThresholdPower_48k[] = {
1260 102329299228.075360000000000,
1261 10715193052.376049000000000,
1262 48977881.936844662000000,
1263 3019951.720402013000000,
1264 245470.891568502850000,
1265 58884.365535558958000,
1266 8709.635899560806100,
1267 3162.277660168379500,
1268 1659.586907437561400,
1269 724.435960074990590,
1270 346.736850452531660,
1271 186.208713666286740,
1272 128.824955169313480,
1273 77.624711662869160,
1274 48.977881936844611,
1275 33.113112148259113,
1276 23.988329190194911,
1277 18.197008586099834,
1278 13.182567385564068,
1279 10.715193052376065,
1280 8.912509381337454,
1281 7.585775750291840,
1282 6.309573444801933,
1283 5.623413251903491,
1284 5.011872336272722,
1285 4.570881896148750,
1286 4.265795188015927,
1287 4.073802778041127,
1288 3.981071705534972,
1289 3.981071705534972,
1290 3.981071705534972,
1291 3.981071705534972,
1292 4.073802778041127,
```

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1293 4.365158322401660,
1294 4.570881896148750,
1295 5.011872336272722,
1296 5.370317963702527,
1297 5.754399373371570,
1298 6.309573444801933,
1299 6.760829753919819,
1300 7.244359600749901,
1301 7.585775750291840,
1302 7.762471166286917,
1303 7.943282347242816,
1304 7.943282347242816,
1305 8.128305161640991,
1306 8.317637711026709,
1307 8.317637711026709,
1308 8.317637711026709,
1309 8.128305161640991,
1310 7.585775750291840,
1311 6.918309709189366,
1312 6.025595860743578,
1313 5.754399373371570,
1314 6.165950018614822,
1315 7.943282347242816,
1316 14.125375446227540,
1317 25.118864315095795,
1318 47.863009232263849,
1319 97.723722095581010,
1320 354.813389233575320,
1321 3090.295432513588800,
1322 562341325.190349100000000,
1323 }
1324
1325 static const int windowLen_8k = 256
1326 static const XFLOAT window_8k[] = {
1327 0.000000000000000,
1328 0.000150590651898,
1329 0.000602271897414,
1330 0.001354771660655,
1331 0.002407636663902,
1332 0.003760232700645,
1333 0.005411745017610,
1334 0.007361178805529,
1335 0.009607359798385,
1336 0.012148934980736,
1337 0.014984373402728,
1338 0.018111967102280,
1339 0.021529832133896,
1340 0.025235909703482,
1341 0.029227967408490,
1342 0.033503600582631,
1343 0.038060233744357,
1344 0.042895122148235,
1345 0.048005353438279,
1346 0.053387849402243,
1347 0.059039367825823,
1348 0.064956504445645,
1349 0.071135694999864,
1350 0.077573217375147,
1351 0.084265193848728,
1352 0.091207593424209,
1353 0.098396234259678,
1354 0.105826786186697,
1355 0.113494773318632,
1356 0.121395576746758,
1357 0.129524437322521,
1358 0.137876458524267,
1359 0.146446609406727,
1360 0.155229727631467,
```

1361 0.164220522576491,
 1362 0.173413578523112,
 1363 0.182803357918178,
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 3903 0.137876458524262,
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 4037 0.030270388198903,
 4038 0.029746964703364,
 4039 0.029227967408487,
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 4047 0.025235909703480,
 4048 0.024756963025257,
 4049 0.024282489515494,
 4050 0.023812493640115,
 4051 0.023346979822901,
 4052 0.022885952445445,
 4053 0.022429415847113,
 4054 0.021977374325000,
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 4066 0.016904998277292,
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 4073 0.014248054506872,
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4117 0.002717714632872,
4118 0.002560334602596,
4119 0.002407636663901,
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4121 0.002116292766169,
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4123 0.001843693908610,
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4125 0.001589850354417,
4126 0.001469964830258,
4127 0.001354771660654,
4128 0.001244271929848,
4129 0.001138466677904,
4130 0.001037356900702,
4131 0.000940943549925,
4132 0.000849227533053,
4133 0.000762209713352,
4134 0.000679890909867,
4135 0.000602271897413,
4136 0.000529353406571,
4137 0.000461136123677,
4138 0.000397620690818,
4139 0.000338807705825,
4140 0.000284697722269,
4141 0.000235291249453,
4142 0.000190588752411,
4143 0.000150590651898,
4144 0.000115297324392,
4145 0.000084709102088,
4146 0.000058826272894,
4147 0.000037649080428,
4148 0.000021177724018,

```

4149 0.000009412358699,
4150 0.000002353095212,
4151 }
4152
4153 enum LC
4154 {
4155     NB = 2,
4156     SWB = 3
4157 }
4158
4159 class PolqaStatics
4160 {
4161 public:
4162     PolqaStatics()
4163     {
4164         startFrameIdx = 0 stopFrameIdx = 0 nrFrames = 0 nrSpeechFrames = 0 frameLength = 1
nrTimesSamples = 0 sampleRate = 0 frameWindow = 0
4165
4166         aT1 = 0 aCentreOfBandHz = 0 aCentreOfBandBark = 0 aWidthOfBandHz = 0 aWidthOfBandBark =
0 aPowerDensityCorrectionFactor = 0 aAbsoluteThresholdPower = 0
4167         aT20 = 0 aDifferenceBarkScalingLen = 0 aNumberOfBarkBands = 0 aNumberOfHzBands = 0
aFrequencyResolutionHz = 0
4168
4169         aCalibrationFactorSp = 0 aCalibrationFactorSl = 0
4170
4171         listeningCondition = NB
4172     }
4173
4174     ~PolqaStatics(){}
4175
4176     void setFrameLength(int newFrameLength)
4177     {
4178         ASSERT(newFrameLength >= 0)
4179         frameLength = newFrameLength
4180         setFrameWindow()
4181         calcNrFrames()
4182         calcFreqRes()
4183         calcNumberOfHzBands()
4184     }
4185
4186     void setNrTimeSamples(int newNrSamples)
4187     {
4188         nrTimesSamples = newNrSamples
4189         calcNrFrames()
4190     }
4191
4192     void setSampleRate(XFLOAT newSampleRate)
4193     {
4194         ASSERT((int)newSampleRate == 8000 || (int)newSampleRate == 16000 || (int)newSampleRate ==
48000)
4195         sampleRate = newSampleRate
4196         ZeroPaddingLength = 0.32 * newSampleRate
4197         setBarkCoeffs()
4198         calcFreqRes()
4199     }
4200
4201     void setStartFrameIndex(int newStartFrameIndex)
4202     {
4203         ASSERT(newStartFrameIndex >= 0)
4204         startFrameIdx = newStartFrameIndex
4205         nrSpeechFrames = stopFrameIdx - startFrameIdx + 1
4206     }
4207
4208     void setStopFrameIndex(int newStopFrameIndex)
4209     {
4210         ASSERT(newStopFrameIndex <= nrFrames)
4211         stopFrameIdx = newStopFrameIndex
4212         nrSpeechFrames = stopFrameIdx - startFrameIdx + 1

```

```

4213     }
4214
4215     void setNrFrames(int newNrFrames)
4216     {
4217         ASSERT(newNrFrames >= 0)
4218         nrFrames = newNrFrames
4219     }
4220
4221     void setACalibrationFactorSp(XFLOAT newACalibrationFactorSp)
4222     {
4223         ASSERT(newACalibrationFactorSp > 0)
4224         aCalibrationFactorSp = newACalibrationFactorSp
4225     }
4226
4227     void setACalibrationFactorSl(XFLOAT newACalibrationFactorSl)
4228     {
4229         ASSERT(newACalibrationFactorSl > 0)
4230         aCalibrationFactorSl = newACalibrationFactorSl
4231     }
4232
4233     void setListeningCondition(int newListeningCondition)
4234     {
4235         ASSERT(newListeningCondition == 2 || newListeningCondition == 3 || newListeningCondition ==
5)
4236             listeningCondition = (LC)newListeningCondition
4237     }
4238
4239     XFLOAT const *frameWindow
4240     int frameLength
4241     int startFrameIdx
4242     int stopFrameIdx
4243     int nrFrames
4244     int nrSpeechFrames
4245
4246     int nrTimesSamples
4247
4248     XFLOAT sampleRate
4249     LC listeningCondition
4250
4251     int aNumberOfBarkBands
4252     XFLOAT aT1
4253     XFLOAT const *aCentreOfBandHz
4254     XFLOAT const *aCentreOfBandBark
4255     XFLOAT const *aWidthOfBandHz
4256     XFLOAT const *aWidthOfBandBark
4257     XFLOAT const *aPowerDensityCorrectionFactor
4258     XFLOAT const *aAbsoluteThresholdPower
4259     XFLOAT const *aT20
4260     int const *aNumberOfHzBandsInBarkBand
4261     XFLOAT aDifferenceBarkScaling[6]
4262     int aDifferenceBarkScalingLen
4263
4264     int aNumberOfHzBands
4265     XFLOAT aFrequencyResolutionHz
4266
4267     XFLOAT aCalibrationFactorSp
4268     XFLOAT aCalibrationFactorSl
4269
4270     int ZeroPaddingLength
4271
4272 private:
4273
4274     void calcNrFrames()
4275     {
4276         const XFLOAT OverlapFac = 1-0.75
4277         nrFrames = (int)floor(nrTimesSamples / ((XFLOAT) frameLength * OverlapFac)-1)
4278     }
4279

```

```

4280 void calcFreqRes()
4281 {
4282     if(frameLength)
4283         aFrequencyResolutionHz = sampleRate / frameLength
4284 }
4285
4286 void calcNumberOfHzBands()
4287 {
4288     aNumberOfHzBands = frameLength / 2
4289 }
4290
4291 void setFrameWindow()
4292 {
4293     switch((int)sampleRate)
4294     {
4295         case 8000:
4296             frameWindow = window_8k
4297             break
4298         case 16000:
4299             frameWindow = window_16k
4300             break
4301         case 48000:
4302             frameWindow = window_48k
4303             break
4304         default:
4305             ASSERT(false)
4306             break
4307     }
4308 }
4309
4310 void setBarkCoeffs()
4311 }
4312 }
4313 }
4314
4315 {
4316 {
4317
4318 void PolqaStatics::setBarkCoeffs()
4319 {
4320
4321     switch((int)sampleRate)
4322     {
4323         case 8000:
4324         {
4325             aNumberOfBarkBands = qual_aNumberOfBarkBands_8k
4326             aT1 = qual_aT1_8k
4327             aCentreOfBandHz = qual_aCentreOfBandHz_8k
4328             aCentreOfBandBark = qual_aCentreOfBandBark_8k
4329             aWidthOfBandHz = qual_aWidthOfBandHz_8k
4330             aWidthOfBandBark = qual_aWidthOfBandBark_8k
4331             aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_8k
4332             aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_8k
4333             aT20 = qual_aT20_8k
4334             aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_8k
4335
4336             aDifferenceBarkScalingLen = 4
4337             const XFLOAT scaling[] = {0,0,0.33,0.66}
4338             matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen)
4339             break
4340         }
4341         case 16000:
4342         {
4343             aNumberOfBarkBands = qual_aNumberOfBarkBands_16k
4344             aT1 = qual_aT1_16k
4345             aCentreOfBandHz = qual_aCentreOfBandHz_16k
4346             aCentreOfBandBark = qual_aCentreOfBandBark_16k
4347             aWidthOfBandHz = qual_aWidthOfBandHz_16k

```



```

4348     aWidthOfBandBark = qual_aWidthOfBandBark_16k
4349     aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_16k
4350     aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_16k
4351     aT20 = qual_aT20_16k
4352     aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_16k
4353
4354     aDifferenceBarkScalingLen = 4
4355     const XFLOAT scaling[] = {0,0,0.33,0.66}
4356     matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen)
4357     break
4358 }
4359
4360 case 48000:
4361 {
4362     aNumberOfBarkBands = qual_aNumberOfBarkBands_48k
4363     aT1 = qual_aT1_48k
4364     aCentreOfBandHz = qual_aCentreOfBandHz_48k
4365     aCentreOfBandBark = qual_aCentreOfBandBark_48k
4366     aWidthOfBandHz = qual_aWidthOfBandHz_48k
4367     aWidthOfBandBark = qual_aWidthOfBandBark_48k
4368     aPowerDensityCorrectionFactor = qual_aPowerDensityCorrectionFactor_48k
4369     aAbsoluteThresholdPower = qual_aAbsoluteThresholdPower_48k
4370     aT20 = qual_aT20_48k
4371     aNumberOfHzBandsInBarkBand = qual_aNumberOfHzBandsInBarkBand_48k
4372
4373     aDifferenceBarkScalingLen = 6
4374     const XFLOAT scaling[] = {0,0,0.17,0.42,0.67,0.95}
4375     matbCopy(scaling, aDifferenceBarkScaling, aDifferenceBarkScalingLen)
4376     break
4377 }
4378 default:
4379     ASSERT(false)
4380 }
4381
4382 }
4383 }
4384

```