```
    typedef double XFLOAT
    typedef double OTA_FLOAT


{

static const int qual_aNumberOfBarkBands_8k = 42

static const XFLOAT qual_aCentreOfBandHz_8k[] = {
7.867213391919682,
31.634143268655833,
63.655891799098754,
96.124605518591650,
129.044974350629590,
162.421731986685330,
196.259656269227240,
230.563569577955180,
265.338339219281240,
300.588877819080660,
336.320143718741180,
372.537141374536420,
409.244921760350960,
446.448582773784950,
484.568596610231450,
526.600592888287570,
570.303849242400700,
619.423353339182310,
672.121604306886980,
728.525756853291340,
785.675989853772080,
846.835700313003260,
909.691610194635130,
977.063272971177870,
1049.861745293105300,
1129.636141508770800,
1217.257669480493400,
1312.109392538742400,
1412.501516206835000,
1517.999395469417500,
1628.894311753134400,
1746.194538120266300,
1871.568772689906600,
2008.776338188902900,
2158.979388843049500,
2326.743242983026000,
2513.787152431817500,
2722.488782060286700,
2952.586614693790600,
3205.835247616510500,
3492.680347943505200,
3820.219598636514500,
}

static const XFLOAT qual_aWidthOfBandHz_8k[] = {
15.734426783839364,
31.799432969632942,
32.244064091252888,
32.693363347732898,
33.147374316342976,
33.606140955768495,
34.069707609315316,
34.538119008140654,
35.011420274511437,
35.489656925087445,
35.972874874233582,
36.461120437356840,
```

```
36.954440334272249,
37.452881692595838,
40.269643618288683,
42.311851299831915,
45.992602608514972,
51.348464384927752,
55.040530971124099,
56.775280701042107,
58.699369764471726,
62.445866689437935,
64.820925522595871,
69.195364254347510,
76.745707044252754,
84.016159884609124,
90.825685663805416,
97.931212000520645,
103.348886555479570,
107.801940408289740,
113.552247862722650,
121.490447376823570,
130.420569222977520,
143.431701144088950,
158.486701426626040,
176.872776192240510,
198.314560971309220,
219.549588310402210,
240.600248510215810,
268.703054594721380,
306.059403679688330,
349.937364906109000,
}

static const XFLOAT qual_aCentreOfBandBark_8k[] = {
0.078672133919197,
0.316341432686558,
0.636558917990988,
0.961246055185916,
1.290449743506296,
1.624217319866853,
1.962596562692272,
2.305635695779552,
2.653383392192812,
3.005888778190807,
3.363201437187412,
3.725371413745364,
4.092449217603510,
4.464485827737850,
4.841532696456650,
5.223641753529887,
5.610865410353339,
6.003256564147557,
6.400868602192050,
6.803755406094938,
7.211971356098372,
7.625571335420021,
8.044610734630901,
8.469145456069862,
8.899231918295030,
9.334927060572479,
9.776288347402467,
10.223373773083535,
10.676241866314763,
11.134951694836506,
11.599562870109931,
12.070135552035641,
12.546730453711742,
13.029408846231640,
13.518232563521924,
```

```
14.013264007220629,
14.514566151596222,
15.022202548507657,
15.536237332405801,
16.056735225376602,
16.583761542226299,
17.117382195609046,
}

static const XFLOAT qual_aWidthOfBandBark_8k[] = {
0.157344267838394,
0.317994329696329,
0.322440640912529,
0.326933633477329,
0.331473743163430,
0.336061409557685,
0.340697076093153,
0.345381190081407,
0.350114202745114,
0.354896569250875,
0.359728748742336,
0.364611204373568,
0.369544403342723,
0.374528816925959,
0.379564920511640,
0.384653193634836,
0.389794120012067,
0.394988187576368,
0.400235888512618,
0.405537719293158,
0.410894180713711,
0.416305777929586,
0.421773020492172,
0.427296422385751,
0.432876502064586,
0.438513782490313,
0.444208791169663,
0.449962060192473,
0.455774126269983,
0.461645530773504,
0.467576819773344,
0.473568544078077,
0.479621259274124,
0.485735525765673,
0.491911908814897,
0.498150978582512,
0.504453310168675,
0.510819483654194,
0.517250084142097,
0.523745701799506,
0.530306931899883,
0.536934374865616,
}

static const int qual_aNumberOfHzBandsInBarkBand_8k[] = {
1,
1,
1,
1,
1,
1,
1,
1,
2,
1,
1,
1,
1,
```

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1,
2,
1,
1,
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3,
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4,
3,
4,
5,
4,
5,
6,
6,
7,
8,
9,
9,
11,
}

static const XFLOAT qual_aPowerDensityCorrectionFactor_8k[] = {
100.000000000000000,
99.999999999999986,
100.000000000000000,
100.000000000000010,
99.999999999999986,
99.999999999999972,
100.000000000000070,
99.999999999999929,
50.000000000000043,
99.999999999999972,
100.000000000000030,
100.000000000000030,
99.999999999999957,
99.999999999999929,
53.047109258683179,
109.999999999999800,
117.992037968892770,
64.999999999999829,
68.760114411115339,
69.999999999999957,
71.428816127929494,
75.000000000000043,
76.843375907443658,
80.968808336850344,
88.646192018066856,
63.864324786237937,
68.155401595909368,
72.547755069712835,
75.584871685804970,
58.379174725066441,
80.950867722489420,
64.135619276263355,
54.384815810859074,
73.821912098150136,
64.437025648941329,
59.176429033466867,
```

```
65.521280487781439,
61.399824997118699,
58.144081530037795,
57.004563192383280,
64.126260403615447,
59.248372255360252,
}

static const XFLOAT qual_aT1_8k = 0.0770938698

static const XFLOAT qual_aT20_8k[] = {
0.077093869803673,
0.094148285639443,
0.123060081399139,
0.134563351000337,
0.140713988142163,
0.144538671555516,
0.147145804624606,
0.149036440839478,
0.150469979113058,
0.151594125484436,
0.152499151486982,
0.153243331192947,
0.153865961872396,
0.154394505989731,
0.154853350584443,
0.155283509987372,
0.155664529012082,
0.156029468822096,
0.156362429750768,
0.156666052939686,
0.156929705866242,
0.157172829423245,
0.157388947729925,
0.157589984149038,
0.157778443865027,
0.157957277586417,
0.158126877377476,
0.158285103596123,
0.158429561637651,
0.158560891131512,
0.158680694803320,
0.158790937830731,
0.158893559432919,
0.158991247911919,
0.159084008063799,
0.159173505995100,
0.159259252660801,
0.159341063403773,
0.159417894862328,
0.159489740611646,
0.159558564108577,
0.159624540563461,
}

static const XFLOAT qual_aAbsoluteThresholdPower_8k[] = {
102329299228.075360000000000,
1995262314.968882800000000,
11220184.543019630000000,
245470.891568502850000,
29512.092266663902000,
6165.950018614822500,
1659.586907437561400,
724.435960074990590,
281.838293126445480,
154.881661891248110,
77.624711662869160,
48.977881936844611,
```

```
30.199517204020161,
19.952623149688797,
15.488166189124811,
11.481536214968829,
8.912509381337454,
7.244359600749901,
6.165950018614822,
5.248074602497725,
4.677351412871983,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.168693834703354,
4.570881896148750,
4.897788193684463,
5.370317963702527,
5.888436553555890,
6.309573444801933,
6.918309709189366,
7.413102413009173,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
}

static const int qual_aNumberOfBarkBands_16k = 49

static const XFLOAT qual_aCentreOfBandHz_16k[] = {
7.867213391919682,
31.634143268655833,
63.655891799098754,
96.124605518591650,
129.044974350629590,
162.421731986685330,
196.259656269227240,
230.563569577955180,
265.338339219281240,
300.588877819080660,
336.320143718741180,
372.537141374536420,
409.244921760350960,
446.448582773784950,
484.568596610231450,
526.600592888287570,
570.303849242400700,
619.423353339182310,
672.121604306886980,
728.525756853291340,
785.675989853772080,
846.835700313003260,
909.691610194635130,
977.063272971177870,
1049.861745293105300,
1129.636141508770800,
1217.257669480493400,
1312.109392538742400,
1412.501516206835000,
1517.999395469417500,
1628.894311753134400,
1746.194538120266300,
1871.568772689906600,
```

```
2008.776338188902900,
2158.979388843049500,
2326.743242983026000,
2513.787152431817500,
2722.488782060286700,
2952.586614693790600,
3205.835247616510500,
3492.680347943505200,
3820.219598636514500,
4193.939129343916600,
4619.845883795305800,
5100.437353963356100,
5636.200046593819900,
6234.312434981934500,
6946.734992943288500,
7796.472853895668800,
}

static const XFLOAT qual_aWidthOfBandHz_16k[] = {
15.734426783839364,
31.799432969632942,
32.244064091252888,
32.693363347732898,
33.147374316342976,
33.606140955768495,
34.069707609315316,
34.538119008140654,
35.011420274511437,
35.489656925087445,
35.972874874233582,
36.461120437356840,
36.954440334272249,
37.452881692595838,
40.269643618288683,
42.311851299831915,
45.992602608514972,
51.348464384927752,
55.040530971124099,
56.775280701042107,
58.699369764471726,
62.445866689437935,
64.820925522595871,
69.195364254347510,
76.745707044252754,
84.016159884609124,
90.825685663805416,
97.931212000520645,
103.348886555479570,
107.801940408289740,
113.552247862722650,
121.490447376823570,
130.420569222977520,
143.431701144088950,
158.486701426626040,
176.872776192240510,
198.314560971309220,
219.549588310402210,
240.600248510215810,
268.703054594721380,
306.059403679688330,
349.937364906109000,
398.686610359186490,
454.713611741021850,
506.841513852932620,
564.863198713552260,
637.262576607390660,
794.715709200185300,
931.068552669087690,
```

```
}

static const XFLOAT qual_aCentreOfBandBark_16k[] = {
0.078672133919197,
0.316341432686558,
0.636558917990988,
0.961246055185916,
1.290449743506296,
1.624217319866853,
1.962596562692272,
2.305635695779552,
2.653383392192812,
3.005888778190807,
3.363201437187412,
3.725371413745364,
4.092449217603510,
4.464485827737850,
4.841532696456650,
5.223641753529887,
5.610865410353339,
6.003256564147557,
6.400868602192050,
6.803755406094938,
7.211971356098372,
7.625571335420021,
8.044610734630901,
8.469145456069862,
8.899231918295030,
9.334927060572479,
9.776288347402467,
10.223373773083535,
10.676241866314763,
11.134951694836506,
11.599562870109931,
12.070135552035641,
12.546730453711742,
13.029408846231640,
13.518232563521924,
14.013264007220629,
14.514566151596222,
15.022202548507657,
15.536237332405801,
16.056735225376602,
16.583761542226299,
17.117382195609046,
17.657663701197311,
18.204673182895327,
18.758478378096022,
19.319147642981740,
19.886749957869128,
20.461354932598510,
21.043032811968168,
}

static const XFLOAT qual_aWidthOfBandBark_16k[] = {
0.157344267838394,
0.317994329696329,
0.322440640912529,
0.326933633477329,
0.331473743163430,
0.336061409557685,
0.340697076093153,
0.345381190081407,
0.350114202745114,
0.354896569250875,
0.359728748742336,
0.364611204373568,
0.369544403342723,
```

```
0.374528816925959,
0.379564920511640,
0.384653193634836,
0.389794120012067,
0.394988187576368,
0.400235888512618,
0.405537719293158,
0.410894180713711,
0.416305777929586,
0.421773020492172,
0.427296422385751,
0.432876502064586,
0.438513782490313,
0.444208791169663,
0.449962060192473,
0.455774126269983,
0.461645530773504,
0.467576819773344,
0.473568544078077,
0.479621259274124,
0.485735525765673,
0.491911908814897,
0.498150978582512,
0.504453310168675,
0.510819483654194,
0.517250084142097,
0.523745701799506,
0.530306931899883,
0.536934374865616,
0.543628636310913,
0.550390327085115,
0.557220063316276,
0.564118466455167,
0.571086163319610,
0.578123786139155,
0.585231972600159,
}

static const int qual_aNumberOfHzBandsInBarkBand_16k[] = {
1,
1,
1,
1,
1,
1,
1,
1,
2,
1,
1,
1,
1,
1,
2,
1,
1,
2,
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2,
3,
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3,
3,
```

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4,
3,
4,
5,
4,
5,
6,
6,
7,
8,
9,
9,
12,
12,
15,
16,
18,
21,
25,
20,
}

static const XFLOAT qual_aPowerDensityCorrectionFactor_16k[] = {
100.000000000000000,
99.999999999999986,
100.000000000000000,
100.000000000000010,
99.999999999999986,
99.999999999999972,
100.000000000000070,
99.999999999999929,
50.000000000000043,
99.999999999999972,
100.000000000000030,
100.000000000000030,
99.999999999999957,
99.999999999999929,
53.047109258683179,
109.999999999999800,
117.992037968892770,
64.999999999999829,
68.760114411115339,
69.999999999999957,
71.428816127929494,
75.000000000000043,
76.843375907443658,
80.968808336850344,
88.646192018066856,
63.864324786237937,
68.155401595909368,
72.547755069712835,
75.584871685804970,
58.379174725066441,
80.950867722489420,
64.135619276263355,
54.384815810859074,
73.821912098150136,
64.437025648941329,
59.176429033466867,
65.521280487781439,
61.399824997118699,
58.144081530037795,
57.004563192383280,
64.126260403615447,
54.311007900746894,
61.115036952537203,
55.077713562445773,
56.849343197156585,
```

```
55.628898331612412,
53.137055194806393,
54.985851006579821,
79.546965670073760,
}

static const XFLOAT qual_aT1_16k = 0.0770938698

static const XFLOAT qual_aT20_16k[] = {
0.077093869803673,
0.094148285639443,
0.123060081399139,
0.134563351000337,
0.140713988142163,
0.144538671555516,
0.147145804624606,
0.149036440839478,
0.150469979113058,
0.151594125484436,
0.152499151486982,
0.153243331192947,
0.153865961872396,
0.154394505989731,
0.154853350584443,
0.155283509987372,
0.155664529012082,
0.156029468822096,
0.156362429750768,
0.156666052939686,
0.156929705866242,
0.157172829423245,
0.157388947729925,
0.157589984149038,
0.157778443865027,
0.157957277586417,
0.158126877377476,
0.158285103596123,
0.158429561637651,
0.158560891131512,
0.158680694803320,
0.158790937830731,
0.158893559432919,
0.158991247911919,
0.159084008063799,
0.159173505995100,
0.159259252660801,
0.159341063403773,
0.159417894862328,
0.159489740611646,
0.159558564108577,
0.159624540563461,
0.159687257264811,
0.159746383260581,
0.159801262701207,
0.159851426442048,
0.159897256404505,
0.159941559333382,
0.159983824994766,
}

static const XFLOAT qual_aAbsoluteThresholdPower_16k[] = {
102329299228.075360000000000,
1995262314.968882800000000,
11220184.543019630000000,
245470.891568502850000,
29512.092266663902000,
6165.950018614822500,
1659.586907437561400,
```

```
724.435960074990590,
281.838293126445480,
154.881661891248110,
77.624711662869160,
48.977881936844611,
30.199517204020161,
19.952623149688797,
15.488166189124811,
11.481536214968829,
8.912509381337454,
7.244359600749901,
6.165950018614822,
5.248074602497725,
4.677351412871983,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.168693834703354,
4.570881896148750,
4.897788193684463,
5.370317963702527,
5.888436553555890,
6.309573444801933,
6.918309709189366,
7.413102413009173,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
8.128305161640991,
7.585775750291840,
6.760829753919819,
5.888436553555890,
5.754399373371570,
6.606934480075959,
8.511380382023766,
}

static const int qual_aNumberOfBarkBands_48k = 63

static const XFLOAT qual_aCentreOfBandHz_48k[] = {
5.910603491964197,
23.797443115244512,
47.958879939743021,
72.540984377384163,
97.549265318945217,
122.989295827799850,
148.866713840940120,
175.187222877351190,
201.956592753813740,
229.180660308209920,
256.865330130409010,
285.016575300810250,
313.640438136621240,
342.743030945949840,
372.330536789790190,
402.409210251982070,
432.985378217225730,
464.065440657234320,
497.221458567616080,
532.539540963797090,
569.472929105829850,
```

```
610.621808571419820,
654.429401632319810,
702.093572015565660,
750.803535707967510,
800.458340206575710,
854.331696206153420,
909.063191581837710,
967.774627918571010,
1029.896844548295600,
1098.619215137328000,
1173.720257940167800,
1254.169496431909700,
1340.822789979333500,
1431.973653931604300,
1527.049915220804200,
1627.551769290355700,
1733.227435980363500,
1846.263670199879000,
1968.793810035118900,
2101.915043737582400,
2249.206520871338900,
2412.974855582727300,
2595.473393024933600,
2796.582747622492700,
3016.424742000808200,
3260.628330270893900,
3535.777932688708500,
3848.250218409411000,
4203.877374532146900,
4607.335464729203500,
5061.849338360401800,
5566.583563042058800,
6129.101797698542200,
6782.607399760106100,
7576.721253229217800,
8517.627097876013100,
9628.002979959626800,
11034.310560620694000,
12732.344379300084000,
14849.382859505577000,
17518.196174942277000,
21306.839738544175000,
}

static const XFLOAT qual_aWidthOfBandHz_48k[] = {
11.821206983928395,
23.952472262632238,
24.370401386364776,
24.793807488917508,
25.222754394204600,
25.657306623504667,
26.097529402775848,
26.543488670046258,
26.995251082878895,
27.452884025913505,
27.916455618484633,
28.386034722317845,
28.861690949304034,
29.343494669353220,
29.831517018327531,
30.325829906056242,
30.826506024431239,
31.333618855585939,
35.005191956674878,
35.604197844189684,
38.867883904794553,
43.140442578909642,
45.582627209681618,
```

```
48.321956872575583,
49.097970512228358,
51.829315558982103,
54.299719366179147,
56.406259870151757,
59.773624318352631,
66.265698878236435,
71.012557435947429,
77.932718023213965,
83.524071653636156,
88.852628188010385,
93.895100994097902,
97.636455890521574,
102.581087475984080,
109.686659872937980,
116.804486719206120,
128.271023838849030,
139.735272895473140,
155.223962470952760,
172.303422699709700,
192.017916451555270,
210.797077449661630,
230.621952843063810,
258.488469307555530,
292.228429511940250,
334.202572994827730,
378.319273137923120,
430.237268685910750,
478.178690219849160,
531.447018382937130,
596.605519277164600,
731.361491445544740,
852.035132492492270,
1029.679957155479300,
1254.605733164360600,
1517.031051963887900,
1923.388407979558900,
2308.221899745212800,
3203.318449353662800,
4442.352348358261200,
}

static const XFLOAT qual_aCentreOfBandBark_48k[] = {
0.059106034919642,
0.237974431152445,
0.479588799397430,
0.725409843773842,
0.975492653189452,
1.229892958277999,
1.488667138409401,
1.751872228773512,
2.019565927538138,
2.291806603082099,
2.568653301304090,
2.850165753008103,
3.136404381366212,
3.427430309459498,
3.723305367897902,
4.024092102519821,
4.329853782172258,
4.640654406572343,
4.956558714251056,
5.277632190579974,
5.603941075881915,
5.935552373626306,
6.272533858710153,
6.614954085825469,
6.962882397914054,
```

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 7.316388934710504,
 7.675544641374356,
 8.040421277212252,
 8.411091424491069,
 8.787628497342915,
 9.170106750762933,
 9.558601289700839,
 9.953188078247189,
 10.353943948915271,
 10.760946612019652,
 11.174274665152332,
 11.594007602757486,
 12.020225825805825,
 12.453010651569549,
 12.892444323498950,
 13.338610021201655,
 13.791591870525579,
 14.251474953746628,
 14.718345319862225,
 15.192289994991686,
 15.673396992884598,
 16.161755325538230,
 16.657455013925130,
 17.160587098831961,
 17.671243651810776,
 18.189517786243812,
 18.715503668522992,
 19.249296529345223,
 19.790992675124794,
 20.340689499523890,
 20.898485495102562,
 21.464480265089264,
 22.038774535273230,
 22.621470166019897,
 23.212670164410618,
 23.812478696507902,
 24.421001099747521,
 25.038343895458659,
};

static const XFLOAT qual_aWidthOfBandBark_48k[] = {
 0.118212069839284,
 0.239524722626322,
 0.243704013863648,
 0.247938074889175,
 0.252227543942046,
 0.256573066235047,
 0.260975294027759,
 0.265434886700463,
 0.269952510828789,
 0.274528840259135,
 0.279164556184846,
 0.283860347223178,
 0.288616909493041,
 0.293434946693532,
 0.298315170183275,
 0.303258299060563,
 0.308265060244312,
 0.313336188555859,
 0.318472426801565,
 0.323674525856271,
 0.328943244747611,
 0.334279350741173,
 0.339683619426520,
 0.345156834804111,
 0.350699789373059,
 0.356313284219842,
 0.361998129107860,
```

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0.367755142567931,
0.373585151989705,
0.379488993713990,
0.385467513126043,
0.391521564749771,
0.397652012342927,
0.403859728993236,
0.410145597215527,
0.416510509049832,
0.422955366160478,
0.429481079936199,
0.436088571591249,
0.442778772267552,
0.449552623137858,
0.456411075509989,
0.463355090932112,
0.470385641299082,
0.477503708959842,
0.484710286825980,
0.492006378481289,
0.499392998292507,
0.506871171521151,
0.514441934436480,
0.522106334429598,
0.529865430128755,
0.537720291515715,
0.545672000043425,
0.553721648754767,
0.561870342402575,
0.570119197570829,
0.578469342797106,
0.586921918696230,
0.595478078085204,
0.604138986109366,
0.612905820369871,
0.621779771052410,
}

static const int qual_aNumberOfHzBandsInBarkBand_48k[] = {
1,
1,
1,
1,
1,
1,
1,
2,
1,
1,
1,
1,
1,
2,
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3,
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9,
10,
11,
13,
14,
16,
19,
20,
23,
25,
31,
37,
44,
53,
65,
82,
98,
137,
190,
}

static const XFLOAT qual_aPowerDensityCorrectionFactor_48k[] = {
100.000000000000000,
100.000000000000010,
99.999999999999972,
100.000000000000000,
100.000000000000030,
99.999999999999986,
99.999999999999972,
50.000000000000007,
99.999999999999972,
100.000000000000090,
99.999999999999986,
100.000000000000000,
99.999999999999901,
50.000000000000036,
100.000000000000060,
99.999999999999957,
50.000000000000028,
99.999999999999986,
109.915926814242180,
54.999999999999808,
59.079924159282804,
129.055062728994700,
67.095709953040625,
69.999999999999986,
46.666666666666764,
72.729979282787326,
75.000000000000156,
51.126645006496013,
79.999999999999844,
58.206078855064298,
61.408164560184503,
```

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66.350298459313208,
52.510781450293905,
55.002159047590062,
57.232786132260436,
58.603836979561144,
60.633518145897405,
51.078692402111095,
53.569157427353275,
57.939102718023022,
51.805308100946682,
48.585262215179050,
53.122918368870437,
51.026726687822617,
49.050713229908347,
47.579339475801461,
47.761477864917538,
45.012865697589092,
47.096015117871552,
45.962338970326940,
43.370603418710409,
45.122654076871363,
42.971025025806895,
43.733636267185183,
42.606797528538273,
40.984502679715781,
41.047235925030812,
40.921453454487924,
39.764981537624735,
39.390125443906719,
38.986533285924871,
38.149232254838559,
37.603027505849454,
}

static const XFLOAT qual_aT1_48k = 0.1450986831

static const XFLOAT qual_aT20_48k[] = {
0.145098683087348,
0.147805247032314,
0.193338134801842,
0.211467665761431,
0.221163503657670,
0.227193090619346,
0.231303111317615,
0.234283360314810,
0.236542789854830,
0.238314292447551,
0.239740214862524,
0.240912454423327,
0.241892985823276,
0.242725121386982,
0.243440043064954,
0.244060770721161,
0.244604668434463,
0.245085080795452,
0.245532217051363,
0.245947998591998,
0.246328246536026,
0.246698284857524,
0.247041586817658,
0.247366886737641,
0.247657012631770,
0.247916710472696,
0.248164581327939,
0.248386525896917,
0.248596884433471,
0.248793510110283,
0.248985269856539,
```

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0.249169288633657,
0.249342087159880,
0.249505125170130,
0.249655425002138,
0.249793158153387,
0.249921323858203,
0.250040115259688,
0.250152180071761,
0.250259169283855,
0.250361311299006,
0.250460275935711,
0.250556163800678,
0.250648797549971,
0.250736907272781,
0.250819811067525,
0.250898821119961,
0.250974790895663,
0.251047913298019,
0.251117928543347,
0.251184291774711,
0.251246396997785,
0.251303493284183,
0.251356057337813,
0.251406185563114,
0.251455470837454,
0.251501980303525,
0.251545180702490,
0.251587422776554,
0.251625998035075,
0.251661741133353,
0.251694494785568,
0.251726904176581,
}

static const XFLOAT qual_aAbsoluteThresholdPower_48k[] = {
102329299228.075360000000000,
10715193052.376049000000000,
48977881.936844662000000,
3019951.720402013000000,
245470.891568502850000,
58884.365535558958000,
8709.635899560806100,
3162.277660168379500,
1659.586907437561400,
724.435960074990590,
346.736850452531660,
186.208713666286740,
128.824955169313480,
77.624711662869160,
48.977881936844611,
33.113112148259113,
23.988329190194911,
18.197008586099834,
13.182567385564068,
10.715193052376065,
8.912509381337454,
7.585775750291840,
6.309573444801933,
5.623413251903491,
5.011872336272722,
4.570881896148750,
4.265795188015927,
4.073802778041127,
3.981071705534972,
3.981071705534972,
3.981071705534972,
3.981071705534972,
4.073802778041127,
```

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4.365158322401660,
4.570881896148750,
5.011872336272722,
5.370317963702527,
5.754399373371570,
6.309573444801933,
6.760829753919819,
7.244359600749901,
7.585775750291840,
7.762471166286917,
7.943282347242816,
7.943282347242816,
8.128305161640991,
8.317637711026709,
8.317637711026709,
8.317637711026709,
8.128305161640991,
7.585775750291840,
6.918309709189366,
6.025595860743578,
5.754399373371570,
6.165950018614822,
7.943282347242816,
14.125375446227540,
25.118864315095795,
47.863009232263849,
97.723722095581010,
354.813389233575320,
3090.295432513588800,
562341325.190349100000000,
}

static const int windowLen_8k = 256
static const XFLOAT window_8k[] = {
0.000000000000000,
0.000150590651898,
0.000602271897414,
0.001354771660655,
0.002407636663902,
0.003760232700645,
0.005411745017610,
0.007361178805529,
0.009607359798385,
0.012148934980736,
0.014984373402728,
0.018111967102280,
0.021529832133896,
0.025235909703482,
0.029227967408490,
0.033503600582631,
0.038060233744357,
0.042895122148235,
0.048005353438279,
0.053387849402243,
0.059039367825823,
0.064956504445645,
0.071135694999864,
0.077573217375147,
0.084265193848728,
0.091207593424209,
0.098396234259678,
0.105826786186697,
0.113494773318632,
0.121395576746758,
0.129524437322521,
0.137876458524267,
0.146446609406727,
0.155229727631467,
```

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0.164220522576491,
0.173413578523112,
0.182803357918178,
0.192384204709687,
0.202150347753784,
0.212095904291078,
0.222214883490200,
0.232501190056452,
0.242948627903390,
0.253550903885109,
0.264301631587002,
0.275194335172698,
0.286222453284860,
0.297379342997506,
0.308658283817456,
0.320052481732507,
0.331555073303891,
0.343159129800556,
0.354857661372770,
0.366643621262552,
0.378509910048370,
0.390449379921567,
0.402454838991937,
0.414519055619851,
0.426634762772321,
0.438794662400394,
0.450991429835221,
0.463217718200168,
0.475466162836293,
0.487729385738546,
0.500000000000002,
0.512270614261458,
0.524533837163711,
0.536782281799836,
0.549008570164782,
0.561205337599610,
0.573365237227683,
0.585480944380153,
0.597545161008066,
0.609550620078437,
0.621490089951634,
0.633356378737451,
0.645142338627233,
0.656840870199448,
0.668444926696112,
0.679947518267496,
0.691341716182547,
0.702620657002497,
0.713777546715143,
0.724805664827305,
0.735698368413001,
0.746449096114894,
0.757051372096613,
0.767498809943551,
0.777785116509803,
0.787904095708925,
0.797849652246219,
0.807615795290315,
0.817196642081825,
0.826586421476890,
0.835779477423511,
0.844770272368535,
0.853553390593276,
0.862123541475735,
0.870475562677481,
0.878604423253244,
0.886505226681370,
0.894173213813305,
```

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0.901603765740324,
0.908792406575794,
0.915734806151274,
0.922426782624855,
0.928864305000138,
0.935043495554357,
0.940960632174179,
0.946612150597759,
0.951994646561723,
0.957104877851767,
0.961939766255645,
0.966496399417371,
0.970772032591511,
0.974764090296519,
0.978470167866105,
0.981888032897721,
0.985015626597273,
0.987851065019265,
0.990392640201616,
0.992638821194471,
0.994588254982391,
0.996239767299355,
0.997592363336099,
0.998645228339345,
0.999397728102586,
0.999849409348102,
1.000000000000000,
0.999849409348102,
0.999397728102586,
0.998645228339345,
0.997592363336098,
0.996239767299355,
0.994588254982390,
0.992638821194470,
0.990392640201615,
0.987851065019263,
0.985015626597271,
0.981888032897719,
0.978470167866103,
0.974764090296517,
0.970772032591509,
0.966496399417368,
0.961939766255642,
0.957104877851764,
0.951994646561720,
0.946612150597756,
0.940960632174176,
0.935043495554354,
0.928864305000134,
0.922426782624851,
0.915734806151270,
0.908792406575789,
0.901603765740320,
0.894173213813301,
0.886505226681366,
0.878604423253240,
0.870475562677477,
0.862123541475730,
0.853553390593271,
0.844770272368530,
0.835779477423506,
0.826586421476885,
0.817196642081819,
0.807615795290310,
0.797849652246213,
0.787904095708919,
0.777785116509797,
0.767498809943545,
```

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0.757051372096607,
0.746449096114888,
0.735698368412995,
0.724805664827299,
0.713777546715137,
0.702620657002491,
0.691341716182540,
0.679947518267489,
0.668444926696105,
0.656840870199441,
0.645142338627227,
0.633356378737445,
0.621490089951627,
0.609550620078430,
0.597545161008059,
0.585480944380146,
0.573365237227676,
0.561205337599603,
0.549008570164775,
0.536782281799828,
0.524533837163704,
0.512270614261451,
0.499999999999995,
0.487729385738539,
0.475466162836286,
0.463217718200161,
0.450991429835214,
0.438794662400386,
0.426634762772314,
0.414519055619844,
0.402454838991931,
0.390449379921560,
0.378509910048363,
0.366643621262545,
0.354857661372763,
0.343159129800549,
0.331555073303885,
0.320052481732501,
0.308658283817450,
0.297379342997500,
0.286222453284854,
0.275194335172692,
0.264301631586996,
0.253550903885103,
0.242948627903384,
0.232501190056446,
0.222214883490194,
0.212095904291073,
0.202150347753779,
0.192384204709682,
0.182803357918173,
0.173413578523107,
0.164220522576486,
0.155229727631462,
0.146446609406722,
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static const int windowLen_16k = 512
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static const int windowLen_48k = 2048
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```
0.000009412358699,
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}

enum LC
{
    NB = 2,
    SWB = 3
}

class PolqaStatics
{
public:
    PolqaStatics()
    {
        startFrameIdx = 0  stopFrameIdx = 0  nrFrames = 0  nrSpeechFrames = 0  frameLength = 1
nrTimesSamples = 0  sampleRate = 0 frameWindow = 0

        aT1 = 0  aCentreOfBandHz = 0  aCentreOfBandBark = 0  aWidthOfBandHz = 0  aWidthOfBandBark =
0  aPowerDensityCorrectionFactor = 0  aAbsoluteThresholdPower = 0
        aT20 = 0  aDifferenceBarkScalingLen = 0  aNumberOfBarkBands = 0  aNumberOfHzBands = 0
aFrequencyResolutionHz = 0

        aCalibrationFactorSp = 0  aCalibrationFactorSl = 0

        listeningCondition = NB
    }

    ~PolqaStatics(){}

    void setFrameLength(int newFrameLength)
    {
        ASSERT(newFrameLength >= 0)
        frameLength = newFrameLength
        setFrameWindow()
        calcNrFrames()
        calcFreqRes()
        calcNumberOfHzBands()
    }

    void setNrTimeSamples(int newNrSamples)
    {
        nrTimesSamples = newNrSamples
        calcNrFrames()
    }

    void setSampleRate(XFLOAT newSampleRate)
    {
        ASSERT((int)newSampleRate == 8000 || (int)newSampleRate == 16000 || (int)newSampleRate ==
48000)
        sampleRate = newSampleRate
        ZeroPaddingLength = 0.32 * newSampleRate
        setBarkCoeffs()
        calcFreqRes()
    }

    void setStartFrameIndex(int newStartFrameIndex)
    {
        ASSERT(newStartFrameIndex >= 0)
        startFrameIdx = newStartFrameIndex
        nrSpeechFrames = stopFrameIdx - startFrameIdx + 1
    }

    void setStopFrameIndex(int newStopFrameIndex)
    {
        ASSERT(newStopFrameIndex <= nrFrames)
        stopFrameIdx = newStopFrameIndex
        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
```