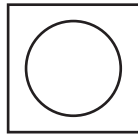


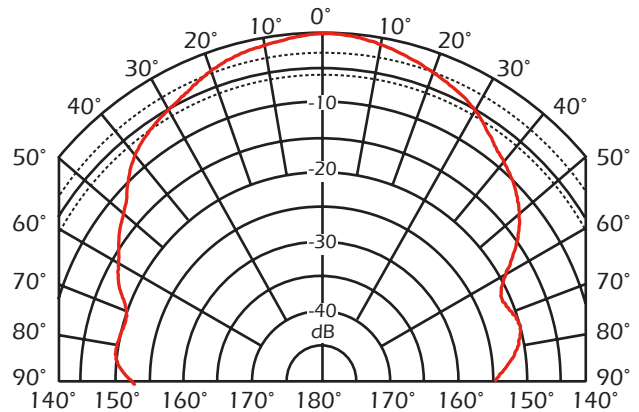
77/200 kHz-A (77kHz)

Power Rating: 300 W rms @ 1% duty cycle
 27mm (1.07") PZT
 Active Area: 5.8 cm² (0.90 in²)
 Radiating Surface: Urethane

Array



Transmit Radiation Pattern

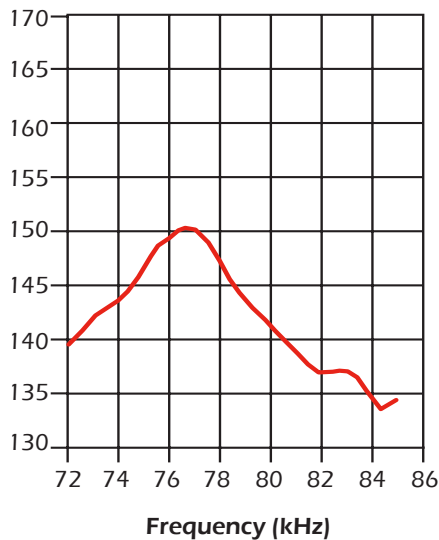


Beamwidth:

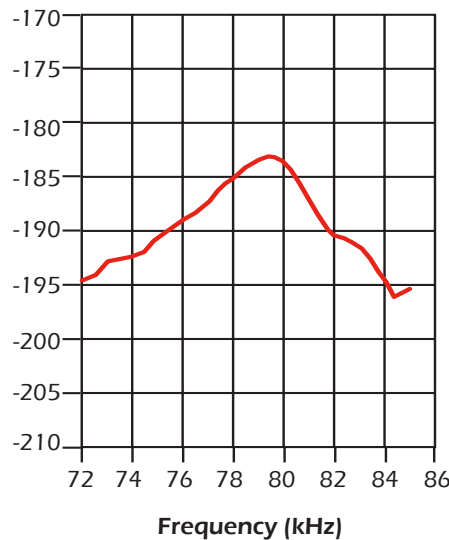
-3 dB: 43°
 -6 dB: 67°
 -10 dB: 89°

Directivity Index: 12.33
 Frequency Tolerance: +/-2kHz
 Peak TVR⁽¹⁾, nominal: 150.2 dB
 Peak TVR⁽¹⁾, minimum: 148.2 dB
 Q (transmit): 26
 Peak Source Level⁽⁴⁾: 202.3 dB
 Peak RVR⁽²⁾, nominal: -183 dB
 Peak Figure of Merit⁽³⁾: -37.1 dB

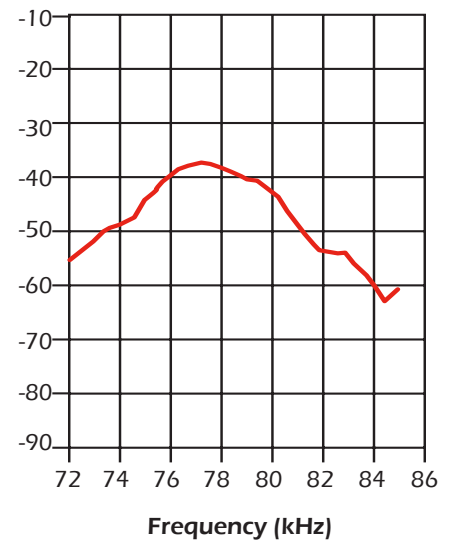
TVR
dB⁽¹⁾



RVR
dB⁽²⁾



FOM
dB⁽³⁾



Notes:

- (1) dB re 1 μ Pa per volt at 1 meter
- (2) dB re 1 volt per μ Pa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

Technical Data Catalog

77/200 kHz-A (77kHz)

27mm (1.07") PZT

Cable Type: Customer Supplied

Cable Length: 10.3m (34')

Note:

Impedance data includes cable

Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
Parallel: Rp.	550 Ω: -20%, +40%	540 Ω: -20%, +40%
Parallel: Cp. (nominal)	860 pF	2,390 pF
Series [R - jX]: (nominal)	520-j120 Ω	390-j240 Ω
1 kHz capacitance: (nominal)	610 pF	2,190 pF

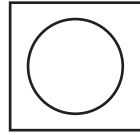
Balanced Impedance Table

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
72.00	1362.01	-77.27	300.13	-1328.53	0.16	0.72	6180.93	1583.06
72.50	1260.67	-75.43	317.23	-1220.10	0.20	0.77	5009.94	1685.30
73.00	1157.26	-73.13	335.76	-1107.48	0.25	0.83	3988.68	1802.90
73.50	1050.76	-70.19	356.07	-988.59	0.32	0.90	3100.80	1938.84
74.00	943.37	-66.36	378.21	-864.23	0.43	0.97	2353.02	2088.61
74.50	835.70	-61.38	400.33	-733.57	0.57	1.05	1744.55	2243.92
75.00	732.44	-54.27	427.72	-594.58	0.80	1.11	1254.25	2351.92
75.50	637.21	-44.54	454.14	-446.97	1.12	1.10	894.06	2320.56
76.00	564.59	-30.66	485.64	-287.94	1.52	0.90	656.37	1891.71
76.50	532.93	-12.80	519.70	-118.04	1.83	0.42	546.50	864.63
77.00	561.17	6.42	557.66	62.70	1.77	-0.20	564.71	-411.53
77.50	652.97	23.33	599.59	258.58	1.41	-0.61	711.11	-1245.46
78.00	799.02	35.95	646.85	469.06	1.01	-0.73	986.99	-1499.14
78.50	988.35	45.15	697.04	700.69	0.71	-0.72	1401.39	-1454.31
79.00	1219.99	51.60	757.76	956.12	0.51	-0.64	1964.17	-1294.18
79.50	1486.11	56.28	825.00	1236.08	0.37	-0.56	2677.00	-1120.46
80.00	1791.32	59.76	902.16	1547.56	0.28	-0.48	3556.82	-959.47
80.50	2136.23	62.36	990.95	1892.48	0.22	-0.41	4605.14	-819.90
81.00	2530.78	64.42	1092.78	2282.69	0.17	-0.36	5861.07	-700.28
81.50	2984.55	65.98	1214.67	2726.19	0.14	-0.31	7333.28	-597.67
82.00	3518.51	67.29	1358.18	3245.81	0.11	-0.26	9115.06	-508.88
82.50	4139.74	68.29	1531.39	3846.07	0.09	-0.22	11190.75	-432.95
83.00	4880.21	68.96	1751.84	4554.94	0.07	-0.19	13595.13	-366.73
83.50	5774.60	69.49	2023.34	5408.52	0.06	-0.16	16480.70	-309.15
84.00	6878.01	69.78	2377.58	6454.00	0.05	-0.14	19897.15	-258.49
84.50	8294.64	69.85	2857.51	7786.89	0.04	-0.11	24077.30	-213.17
85.00	10164.10	69.72	3522.66	9534.14	0.03	-0.09	29326.95	-172.80

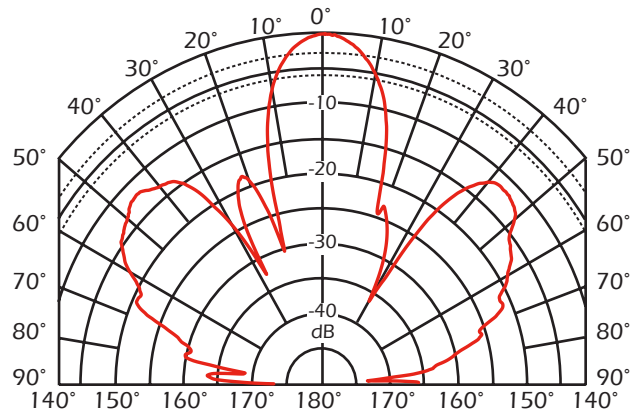
77/200 kHz-A (200kHz)

Power Rating: 300 W rms @ 1% duty cycle
 27mm (1.07") PZT
 Active Area: 5.8 cm² (0.90 in²)
 Radiating Surface: Urethane

Array



Transmit Radiation Pattern

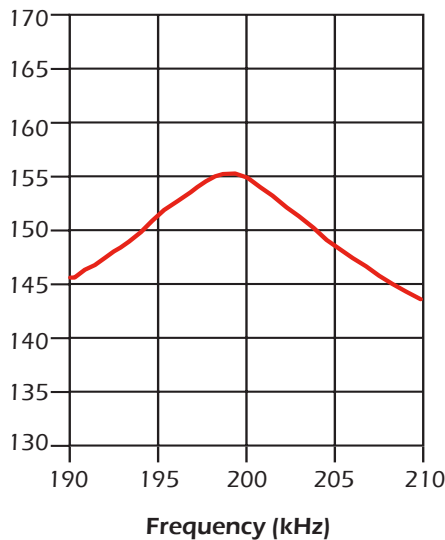


Beamwidth:

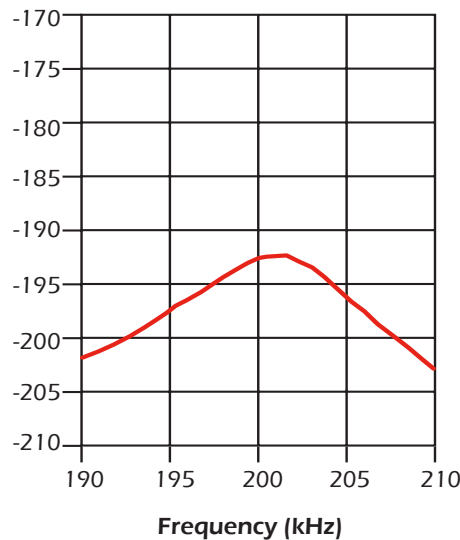
-3 dB: 14°
 -6 dB: 20°
 -10 dB: 24°

Directivity Index: 22.07
 Frequency Tolerance: +/-4kHz
 Peak TVR⁽¹⁾, nominal: 155.5 dB
 Peak TVR⁽¹⁾, minimum: 153.5 dB
 Q (transmit): 31
 Peak Source Level⁽⁴⁾: 209.1 dB
 Peak RVR⁽²⁾, nominal: -192.3 dB
 Peak Figure of Merit⁽³⁾: -37.3 dB

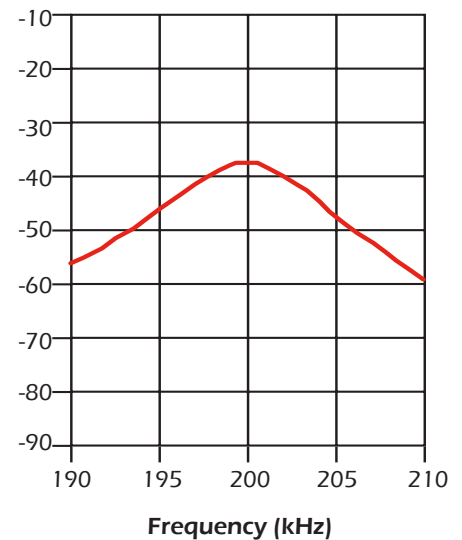
dB⁽¹⁾ TVR



dB⁽²⁾ RVR



dB⁽³⁾ FOM



Notes:

- (1) dB re 1 μ Pa per volt at 1 meter
- (2) dB re 1 volt per μ Pa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

Technical Data Catalog

77/200 kHz-A (200kHz)

27mm (1.07") PZT

Cable Type: Customer Supplied

Cable Length: 10.3m (34')

Note:

Impedance data includes cable

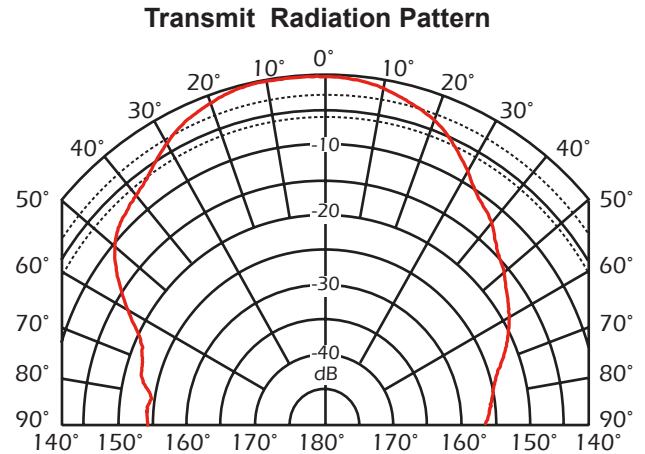
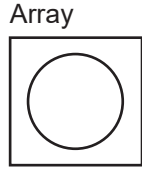
Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
Parallel: Rp.	770 Ω: -20%, +40%	730 Ω: -20%, +40%
Parallel: Cp. (nominal)	270 pF	1,780pF
Series [R - jX]: (nominal)	720-j180 Ω	200-j330 Ω
1 kHz capacitance: (nominal)	600 pF	5,280 pF

Balanced Impedance Table

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
190.00	1406.58	-83.87	150.29	-1398.53	0.08	0.71	13164.41	592.12
191.00	1320.22	-81.81	188.18	-1306.74	0.11	0.75	9262.16	624.72
191.50	1275.73	-80.73	205.40	-1259.09	0.13	0.77	7923.40	642.97
192.00	1230.72	-79.43	225.80	-1209.83	0.15	0.80	6708.04	662.10
193.00	1141.15	-76.24	271.34	-1108.42	0.21	0.85	4799.30	701.91
193.50	1096.54	-74.44	294.22	-1056.33	0.24	0.88	4086.74	722.59
194.00	1049.93	-72.40	317.42	-1000.80	0.29	0.91	3472.89	744.81
194.50	1003.47	-69.91	344.73	-942.40	0.34	0.94	2921.01	765.82
195.00	959.44	-67.16	372.43	-884.20	0.40	0.96	2471.68	783.98
196.00	871.54	-60.16	433.65	-756.00	0.57	1.00	1751.60	808.18
196.50	832.24	-55.85	467.14	-688.76	0.67	0.99	1482.67	805.44
197.00	795.05	-50.85	501.96	-616.55	0.79	0.98	1259.25	788.02
197.50	763.98	-45.06	539.61	-540.82	0.92	0.93	1081.64	746.69
198.00	740.13	-38.42	579.91	-459.89	1.06	0.84	944.62	674.83
199.00	727.13	-22.89	669.88	-282.81	1.27	0.53	789.28	427.79
199.50	744.12	-14.39	720.76	-184.98	1.30	0.33	768.23	266.51
200.00	781.06	-6.02	776.76	-81.90	1.27	0.13	785.39	106.84
200.50	839.39	1.85	838.95	27.05	1.19	-0.04	839.83	-30.47
201.00	916.87	9.08	905.37	144.73	1.08	-0.17	928.51	-136.32
202.00	1130.27	21.09	1054.59	406.62	0.83	-0.32	1211.38	-250.78
202.50	1267.44	26.11	1138.12	557.75	0.71	-0.35	1411.45	-272.88
203.00	1435.00	30.36	1238.16	725.38	0.60	-0.35	1663.13	-276.18
203.50	1623.28	33.94	1346.68	906.36	0.51	-0.34	1956.69	-269.01
204.00	1848.94	37.10	1474.66	1115.33	0.43	-0.33	2318.22	-254.54
205.00	2401.35	41.77	1790.97	1599.66	0.31	-0.28	3219.75	-215.37
205.50	2751.68	43.43	1998.30	1891.70	0.26	-0.25	3789.08	-193.49
206.00	3146.78	44.62	2239.73	2210.40	0.23	-0.22	4421.18	-172.46
206.50	3635.03	45.70	2538.75	2601.57	0.19	-0.20	5204.70	-151.75
207.00	4200.99	46.43	2895.67	3043.59	0.16	-0.17	6094.73	-132.60
208.00	5781.03	46.50	3979.44	4193.38	0.12	-0.13	8398.25	-96.01
208.50	6843.75	45.44	4802.34	4875.90	0.10	-0.10	9752.94	-79.47
209.00	8297.99	44.34	5934.67	5799.68	0.09	-0.08	11602.43	-64.14
210.00	12761.60	38.24	10023.73	7898.30	0.06	-0.05	16247.28	-36.76

77/200 kHz-A (77kHz)

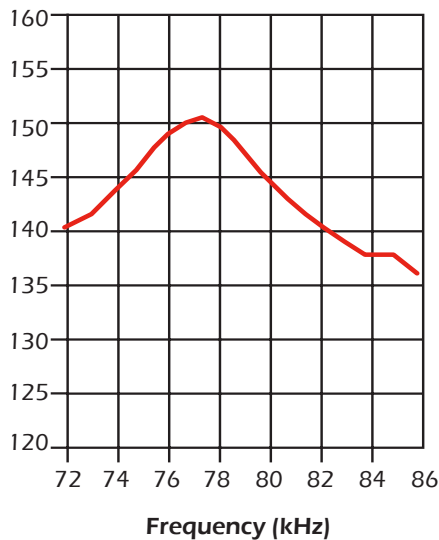
Power Rating: 300 W rms @ 1% duty cycle
 27mm (1.07") PZT
 Active Area: 5.8 cm² (0.90 in²)
 Radiating Surface: Urethane/Plastic



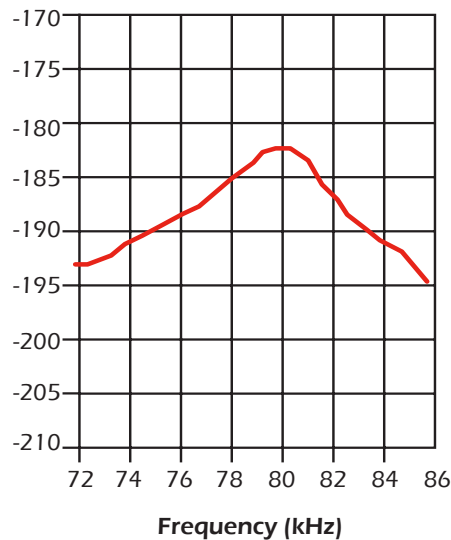
Beamwidth:
 -3 dB: 46°
 -6 dB: 61°
 -10 dB: 84°

Directivity Index: 11.8
 Frequency Tolerance: +/-2kHz
 Peak TVR⁽¹⁾, nominal: 150.5 dB
 Peak TVR⁽¹⁾, minimum: 148.5 dB
 Q (transmit): 22
 Peak Source Level⁽⁴⁾: 203 dB
 Peak RVR⁽²⁾, nominal: -182.1 dB
 Peak Figure of Merit⁽³⁾: -35.3 dB

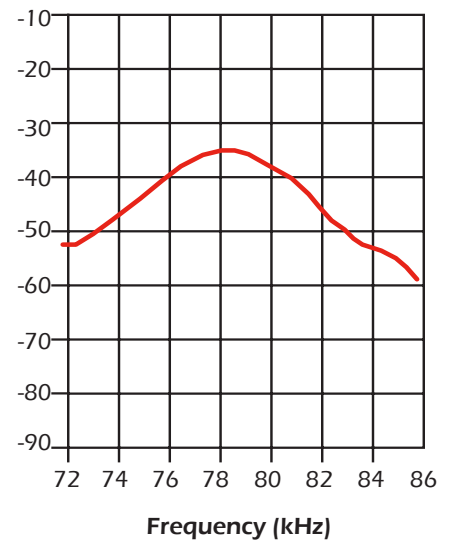
TVR
dB⁽¹⁾



RVR
dB⁽²⁾



FOM
dB⁽³⁾



Notes:

- (1) dB re 1 μPa per volt at 1 meter
- (2) dB re 1 volt per μPa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

Technical Data Catalog

77/200 kHz-A (77kHz)

27mm (1.07") PZT

Cable Type: 22-1288-01
Cable Length: 10.3m (34')

Note:
Impedance data includes cable

Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
Parallel: Rp.	620 Ω: -20%, +40%	620 Ω: -20%, +40%
Parallel: Cp. (nominal)	930 pF	1,980 pF
Series [R - jX]: (nominal)	570-j160 Ω	460-j270 Ω
1 kHz capacitance: (nominal)	1,070 pF	2,130 pF

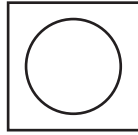
Balanced Impedance Table

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
72.00	1137.02	-81.16	174.71	-1123.52	0.14	0.87	7399.57	1921.02
72.50	1082.90	-79.96	188.84	-1066.31	0.16	0.91	6209.81	1996.13
73.00	1027.40	-78.40	206.56	-1006.42	0.20	0.95	5110.24	2078.73
73.50	969.46	-76.49	226.45	-942.64	0.24	1.00	4150.40	2171.81
74.00	909.26	-74.18	247.93	-874.81	0.30	1.06	3334.67	2275.73
74.50	844.67	-71.08	273.94	-799.02	0.38	1.12	2604.52	2392.45
75.00	782.11	-66.98	305.83	-719.83	0.50	1.18	2000.11	2497.23
75.50	716.65	-61.55	341.39	-630.11	0.66	1.23	1504.39	2586.29
76.00	654.88	-54.17	383.40	-530.92	0.89	1.24	1118.62	2592.45
76.50	606.12	-44.24	434.21	-422.90	1.18	1.15	846.09	2394.85
77.00	579.26	-31.14	495.79	-299.56	1.48	0.89	676.79	1845.30
77.50	595.62	-15.68	573.46	-160.96	1.62	0.45	618.64	931.76
78.00	669.43	-0.44	669.41	-5.13	1.49	0.01	669.45	23.35
78.50	815.47	12.48	796.20	176.22	1.20	-0.27	835.20	-537.28
79.00	1039.20	21.66	965.82	383.56	0.89	-0.36	1118.15	-715.54
79.50	1336.89	27.59	1184.81	619.27	0.66	-0.35	1508.49	-693.65
80.00	1750.40	30.77	1504.07	895.36	0.49	-0.29	2037.07	-581.37
80.50	2281.83	31.40	1947.61	1188.93	0.37	-0.23	2673.40	-451.45
81.00	3014.04	29.54	2622.18	1486.14	0.29	-0.16	3464.46	-321.44
81.50	3990.75	24.58	3629.16	1659.90	0.23	-0.10	4388.37	-203.53
82.00	5239.92	15.87	5040.11	1433.19	0.18	-0.05	5447.65	-101.31
82.50	6706.45	2.49	6700.10	291.82	0.15	-0.01	6712.81	-12.52
83.00	7761.57	-15.50	7479.34	-2073.99	0.12	0.03	8054.45	66.02
83.50	7984.22	-33.90	6627.19	-4452.88	0.10	0.07	9619.13	133.14
84.00	7408.21	-49.28	4833.06	-5614.55	0.09	0.10	11355.46	193.83
84.50	6641.52	-59.98	3323.25	-5750.29	0.08	0.13	13273.09	245.54
85.00	5931.03	-67.44	2275.11	-5477.32	0.06	0.16	15461.73	291.55
85.50	5324.70	-72.56	1595.60	-5080.01	0.06	0.18	17769.12	333.52
86.00	4851.86	-76.29	1150.32	-4713.52	0.05	0.20	20464.29	370.55

77/200 kHz-A (200kHz)

Power Rating: 300 W rms @ 1% duty cycle
 27mm (1.07") PZT
 Active Area: 5.8 cm² (0.90 in²)
 Radiating Surface: Urethane/Plastic

Array

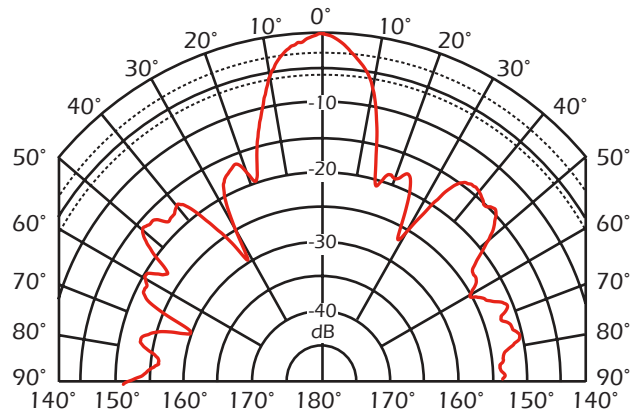


Beamwidth:

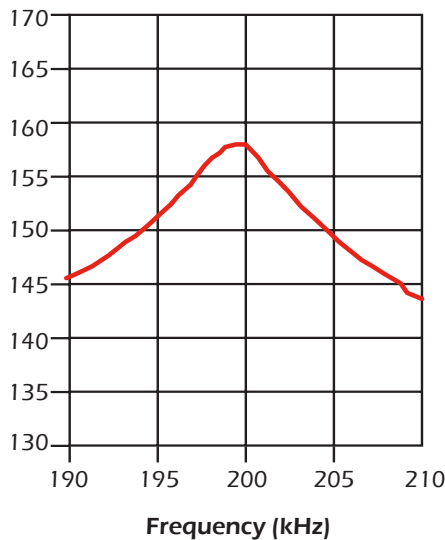
-3 dB: 13°
 -6 dB: 19°
 -10 dB: 24°

Directivity Index: 21
 Frequency Tolerance: +/-4kHz
 Peak TVR⁽¹⁾, nominal: 158.1 dB
 Peak TVR⁽¹⁾, minimum: 156.1 dB
 Q (transmit): 45
 Peak Source Level⁽⁴⁾: 210 dB
 Peak RVR⁽²⁾, nominal: -190.3 dB
 Peak Figure of Merit⁽³⁾: -33.4 dB

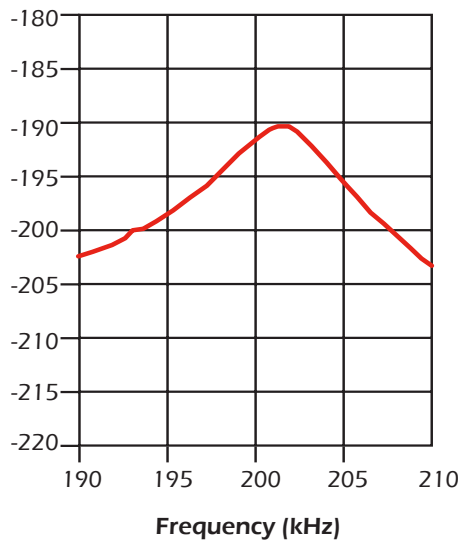
Transmit Radiation Pattern



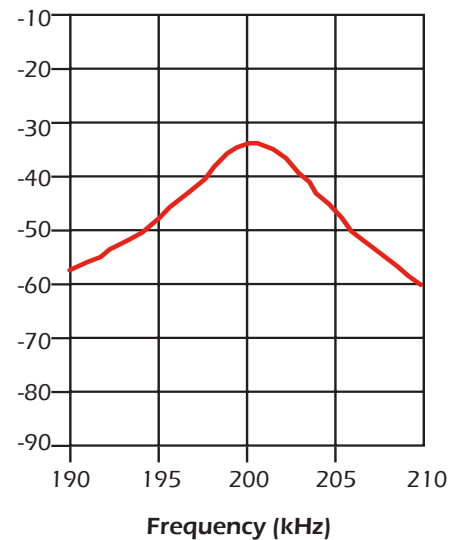
TVR
dB⁽¹⁾



RVR
dB⁽²⁾



FOM
dB⁽³⁾



Notes:

- (1) dB re 1 µPa per volt at 1 meter
- (2) dB re 1 volt per µPa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation

Technical Data Catalog

77/200 kHz-A (200kHz)

27mm (1.07") PZT

Cable Type: 22-1288-01
Cable Length: 10.3m (34')

Note:
Impedance data includes cable

Impedance Data		
	<i>Balanced</i>	<i>Unbalanced</i>
Parallel: Rp.	530 Ω: -20%, +40%	520 Ω: -20%, +40%
Parallel: Cp. (nominal)	1,040 pF	2,090 pF
Series [R - jX]: (nominal)	360-j240 Ω	180-j250 Ω
1 kHz capacitance: (nominal)	1,070 pF	2,130 pF

Balanced Impedance Table

Test Frequency (kHz)	Impedance Magnitude (Ω)	Phase Angle (°)	Series Resistance (Ω)	Series Reactance (Ω)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (Ω)	Parallel Capacitance (pF)
190.00	699.37	-86.63	41.11	-698.16	0.08	1.43	11898.76	1195.66
191.00	674.07	-85.89	48.34	-672.33	0.11	1.48	9398.80	1233.00
191.50	660.38	-85.49	51.90	-658.33	0.12	1.51	8401.93	1254.62
192.00	646.86	-84.96	56.82	-644.36	0.14	1.54	7364.54	1276.53
193.00	616.73	-83.68	67.92	-612.98	0.18	1.61	5600.06	1328.97
193.50	600.75	-82.84	74.83	-596.07	0.21	1.65	4823.06	1358.47
194.00	583.61	-81.89	82.33	-577.77	0.24	1.70	4137.09	1391.66
194.50	565.38	-80.78	90.63	-558.07	0.28	1.75	3527.08	1428.58
195.00	546.63	-79.31	101.43	-537.14	0.34	1.80	2946.05	1467.17
196.00	506.46	-75.55	126.35	-490.44	0.49	1.91	2029.98	1552.63
196.50	485.45	-72.90	142.78	-463.98	0.61	1.97	1650.58	1594.64
197.00	463.09	-69.54	161.89	-433.87	0.75	2.02	1324.63	1634.50
197.50	442.49	-65.21	185.52	-401.72	0.95	2.05	1055.38	1653.38
198.00	425.13	-59.55	215.42	-366.51	1.19	2.03	839.00	1630.02
199.00	414.61	-43.94	298.56	-287.69	1.74	1.67	575.77	1338.46
199.50	433.94	-34.31	358.43	-244.60	1.90	1.30	525.35	1036.29
200.00	478.85	-24.80	434.69	-200.84	1.90	0.88	527.49	697.02
200.50	555.36	-17.21	530.50	-164.29	1.72	0.53	581.38	422.84
201.00	670.59	-11.82	656.38	-137.31	1.46	0.31	685.11	241.78
202.00	999.20	-10.05	983.88	-174.32	0.99	0.17	1014.76	137.56
202.50	1215.58	-13.23	1183.32	-278.20	0.80	0.19	1248.72	147.97
203.00	1442.65	-18.61	1367.24	-460.31	0.66	0.22	1522.21	173.40
203.50	1656.25	-26.61	1480.77	-741.95	0.54	0.27	1852.53	211.53
204.00	1815.26	-35.84	1471.62	-1062.78	0.45	0.32	2239.14	251.63
205.00	1883.04	-53.11	1130.34	-1506.05	0.32	0.42	3136.98	329.75
205.50	1834.64	-60.08	915.09	-1590.13	0.27	0.47	3678.22	365.88
206.00	1765.63	-65.44	733.79	-1605.93	0.24	0.52	4248.42	398.00
206.50	1686.02	-69.64	586.73	-1580.64	0.21	0.56	4844.96	428.56
207.00	1614.31	-72.99	472.30	-1543.68	0.18	0.59	5517.71	455.44
208.00	1490.29	-77.70	317.56	-1456.06	0.14	0.66	6993.93	501.64
208.50	1437.22	-79.53	261.28	-1413.27	0.13	0.68	7905.59	522.27
209.00	1388.26	-80.98	217.64	-1371.09	0.11	0.71	8855.36	541.75
210.00	1302.95	-83.22	153.78	-1293.84	0.09	0.76	11039.99	577.60