

## 25 to 45 kHz-A (Broadband)

Ceramics wired in parallel

**Power Rating:**

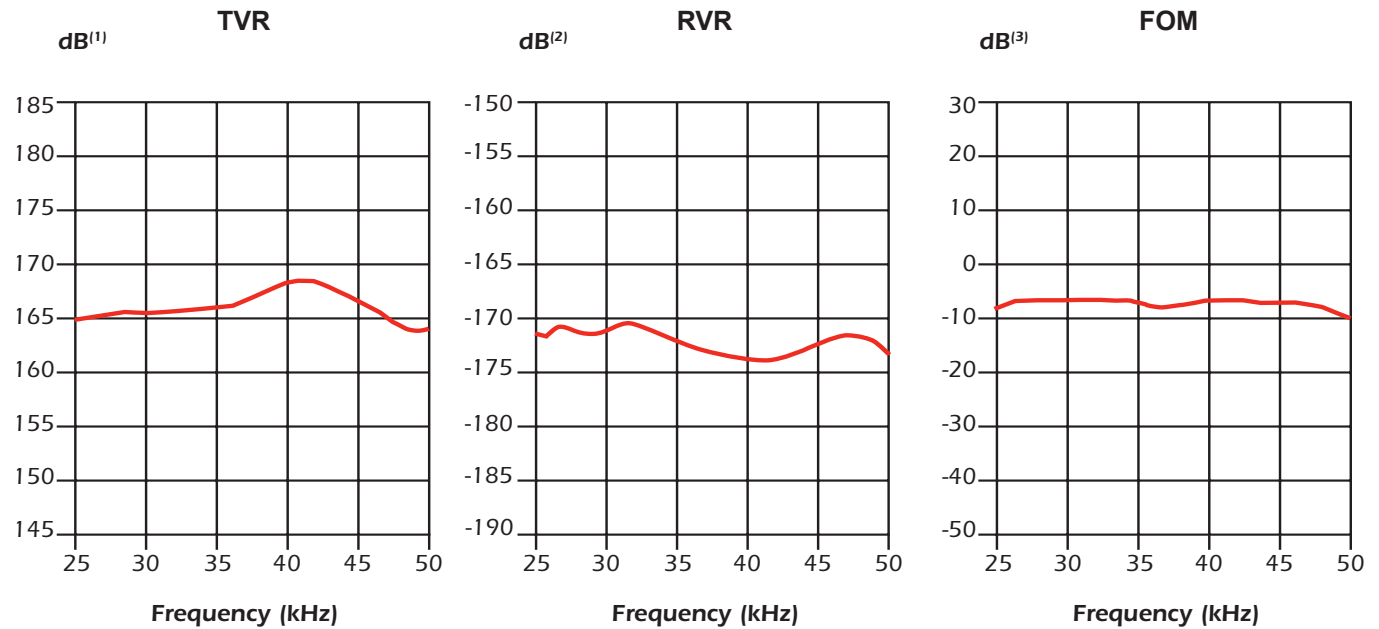
- 3 kW @ 1% duty cycle
  - CW<sup>(4)</sup>: 60W in R609
- 15 x 44.4 mm (1.7") PZT4  
Active Area: 232.8 cm<sup>2</sup>  
Radiating Surface: Epoxy

Q ≈ 2

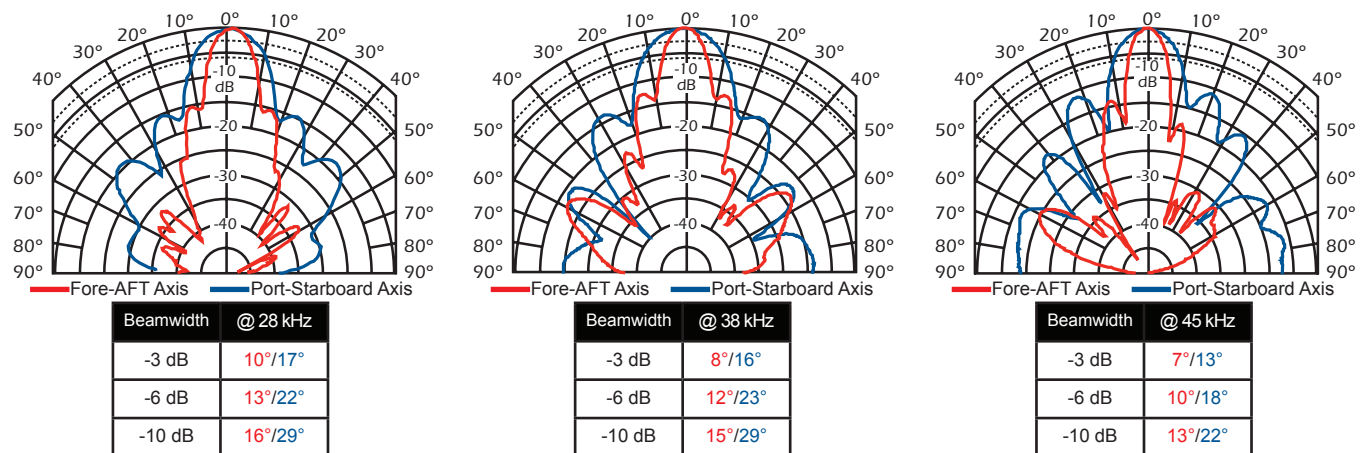
Cable Type: C44  
Cable Length: 10 m (33 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



*Sensing Technology*

# Technical Data Catalog

## 25 to 45 kHz-A (Broadband)

Note: Impedance data includes cable

1 kHz Capacitance: 38,275 pF: ± 20%

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
25.00	197.22	-4.87	196.51	-16.73	5.0521	0.4300	197.94	2737.72
25.50	202.12	1.96	202.00	6.91	4.9447	-0.1692	202.24	-1056.28
26.00	176.40	8.02	174.68	24.60	5.6135	-0.7906	178.14	-4839.29
26.50	186.13	6.46	184.95	20.95	5.3385	-0.6047	187.32	-3631.79
27.00	218.58	9.16	215.79	34.81	4.5165	-0.7285	221.41	-4294.20
27.50	191.32	10.55	188.09	35.03	5.1384	-0.9569	194.61	-5537.84
28.00	186.11	7.12	184.67	23.08	5.3317	-0.6664	187.56	-3787.93
28.50	215.63	7.33	213.87	27.50	4.5997	-0.5915	217.40	-3303.38
29.00	203.33	13.97	197.31	49.08	4.7728	-1.1871	209.52	-6515.01
29.50	198.65	10.03	195.61	34.60	4.9570	-0.8767	201.73	-4729.88
30.00	212.67	7.84	210.68	29.01	4.6582	-0.6413	214.68	-3402.38
30.50	240.79	13.00	234.61	54.17	4.0466	-0.9343	247.12	-4875.43
31.00	220.33	6.27	219.01	24.05	4.5115	-0.4954	221.65	-2543.30
31.50	259.13	-2.09	258.96	-9.46	3.8565	0.1409	259.30	711.66
32.00	264.80	3.56	264.29	16.46	3.7691	-0.2347	265.31	-1167.52
32.50	231.01	-1.04	230.97	-4.19	4.3281	0.0785	231.05	384.48
33.00	246.18	-11.15	241.53	-47.61	3.9854	0.7856	250.92	3788.90
33.50	249.38	-6.23	247.91	-27.05	3.9864	0.4349	250.86	2066.16
34.00	217.24	-7.92	215.17	-29.95	4.5592	0.6345	219.34	2970.26
34.50	209.45	-16.39	200.95	-59.09	4.5804	1.3468	218.32	6213.06
35.00	221.39	-13.08	215.64	-50.11	4.3997	1.0225	227.29	4649.37
35.50	197.45	-10.33	194.25	-35.40	4.9824	0.9081	200.70	4071.25
36.00	192.32	-16.14	184.75	-53.46	4.9946	1.4453	200.22	6389.62
36.50	203.19	-14.72	196.52	-51.62	4.7602	1.2503	210.08	5451.70
37.00	183.67	-14.07	178.16	-44.66	5.2811	1.3240	189.36	5695.05
37.50	179.23	-19.06	169.41	-58.53	5.2736	1.8219	189.63	7732.24
38.00	178.93	-15.83	172.14	-48.81	5.3769	1.5246	185.98	6385.31
38.50	159.26	-11.67	155.96	-32.22	6.1493	1.2704	162.62	5251.72
39.00	160.04	-15.55	154.18	-42.90	6.0197	1.6750	166.12	6835.64
39.50	170.26	-11.73	166.70	-34.60	5.7509	1.1936	173.89	4809.48
40.00	155.21	-6.55	154.20	-17.71	6.4007	0.7349	156.23	2924.27
40.50	148.58	-9.87	146.38	-25.46	6.6310	1.1533	150.81	4532.37
41.00	159.37	-5.11	158.74	-14.21	6.2497	0.5594	160.01	2171.44
41.50	146.81	3.17	146.58	8.13	6.8013	-0.3771	147.03	-1446.18
42.00	147.22	2.74	147.05	7.03	6.7848	-0.3245	147.39	-1229.76
42.50	177.17	4.78	176.55	14.75	5.6248	-0.4700	177.78	-1760.25
43.00	174.34	13.22	169.72	39.88	5.5839	-1.3121	179.09	-4856.37
43.50	177.82	10.52	174.83	32.47	5.5291	-1.0269	180.86	-3757.27
44.00	221.38	8.59	218.89	33.05	4.4666	-0.6743	223.88	-2439.15
44.50	232.27	14.01	225.36	56.22	4.1774	-1.0421	239.38	-3727.23
45.00	225.05	9.41	222.02	36.78	4.3837	-0.7261	228.12	-2568.20



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## 25 to 45 kHz-B (Broadband)

Transformed to 60 ohms minimum  
Ceramics wired in parallel

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 12W in M563

7 x 44.4 mm (1.7") PZT4

Active Area: 140.6 cm<sup>2</sup> (21.8 in<sup>2</sup>)

Radiating Surface: Urethane

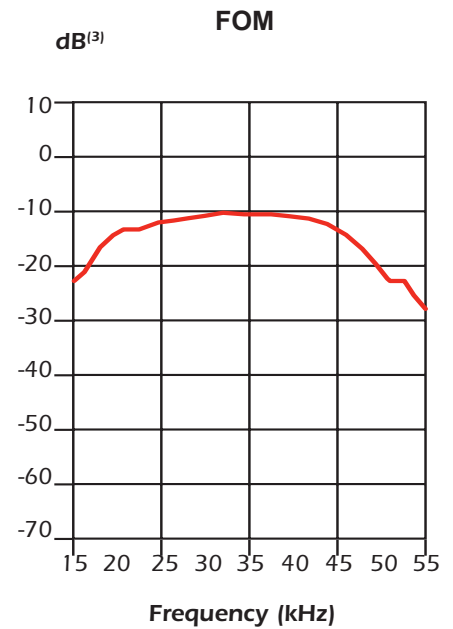
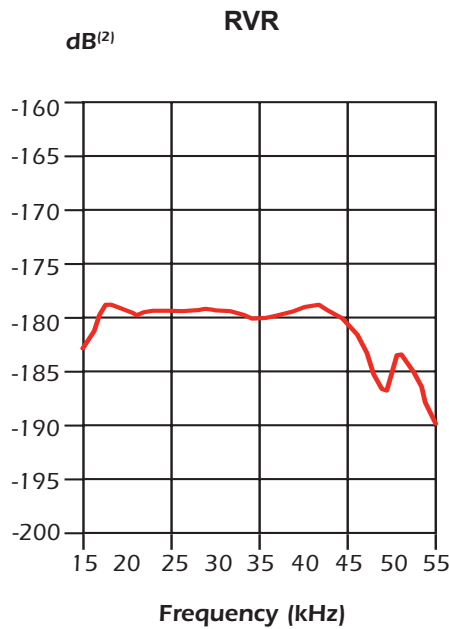
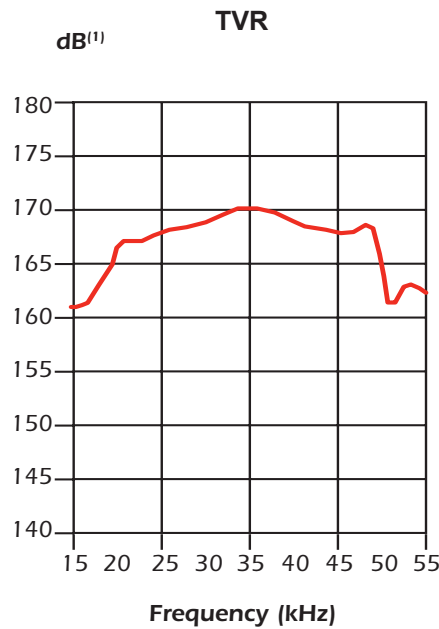
Q ≈ 2

Cable Type: C44-02

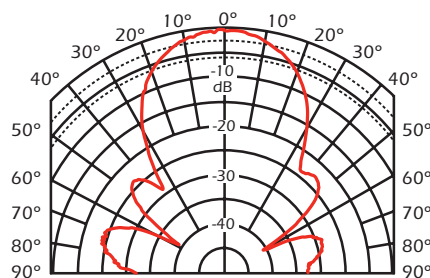
Cable Length: 10 m (33 ft)

**Notes:**

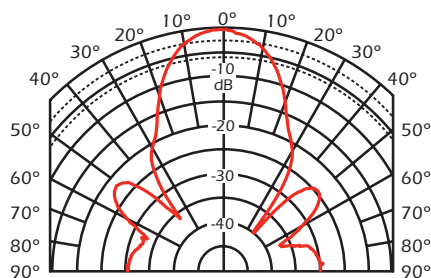
- (1) dB re 1 μPa per volt at 1 meter
- (2) dB re 1 volt per μPa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



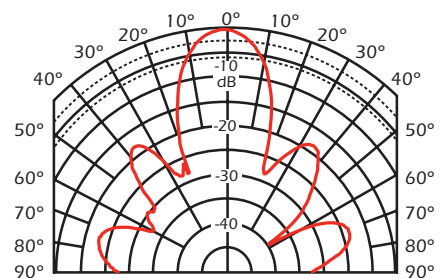
## Transmit Radiation Pattern



Beamwidth	@ 25 kHz
-3 dB	24°
-6 dB	35°
-10 dB	45°



Beamwidth	@ 35 kHz
-3 dB	19°
-6 dB	26°
-10 dB	33°



Beamwidth	@ 45 kHz
-3 dB	14°
-6 dB	19°
-10 dB	24°



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# Technical Data Catalog

## 25 to 45 kHz-B (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
10.00	16.39	86.99	0.86	16.37	3.20	-60.94	312.48	-969813.28
11.00	18.53	87.25	0.89	18.51	2.59	-53.91	386.78	-779954.91
12.00	20.87	87.41	0.94	20.85	2.16	-47.87	462.37	-634881.04
13.00	23.41	87.44	1.05	23.38	1.91	-42.68	524.24	-522529.37
15.00	29.62	87.35	1.37	29.59	1.56	-33.73	640.92	-357854.09
16.00	33.57	87.17	1.66	33.53	1.47	-29.75	679.60	-295970.30
17.00	38.49	86.75	2.18	38.43	1.47	-25.94	678.16	-242853.40
18.00	44.90	85.75	3.33	44.78	1.65	-22.21	605.69	-196371.50
20.00	65.99	78.17	13.53	64.59	3.11	-14.83	321.78	-118020.46
21.00	80.91	66.91	31.73	74.43	4.85	-11.37	206.30	-86167.46
22.00	87.64	49.07	57.41	66.21	7.48	-8.62	133.77	-62367.39
23.00	78.17	34.22	64.64	43.96	10.58	-7.19	94.54	-49778.52
25.00	58.31	30.41	50.29	29.52	14.79	-8.68	67.61	-55265.18
26.00	57.15	34.35	47.18	32.24	14.45	-9.87	69.22	-60437.85
27.00	60.15	37.44	47.76	36.57	13.20	-10.11	75.76	-59574.99
28.00	66.42	37.19	52.91	40.15	11.99	-9.10	83.38	-51729.17
30.00	78.67	25.49	71.01	33.86	11.47	-5.47	87.16	-29023.24
31.00	76.68	19.39	72.33	25.45	12.30	-4.33	81.29	-22226.55
32.00	74.65	14.99	72.11	19.31	12.94	-3.46	77.28	-17230.49
33.00	73.18	12.20	71.53	15.46	13.36	-2.89	74.87	-13926.30
35.00	68.36	5.70	68.02	6.79	14.56	-1.45	68.70	-6611.38
36.00	64.43	4.77	64.21	5.35	15.47	-1.29	64.66	-5701.87
37.00	62.25	4.59	62.05	4.99	16.01	-1.29	62.45	-5534.68
38.00	60.96	5.63	60.67	5.98	16.32	-1.61	61.26	-6739.93
40.00	59.61	10.49	58.61	10.85	16.50	-3.05	60.62	-12153.91
41.00	62.93	13.09	61.29	14.26	15.48	-3.60	64.61	-13973.12
42.00	67.80	15.49	65.34	18.11	14.21	-3.94	70.36	-14926.10
43.00	74.30	15.75	71.51	20.16	12.95	-3.65	77.20	-13517.55
45.00	92.23	9.02	91.09	14.47	10.71	-1.70	93.38	-6015.46
46.00	100.89	4.55	100.57	7.99	9.88	-0.79	101.21	-2717.60
47.00	109.72	-3.23	109.54	-6.17	9.10	0.51	109.89	1737.04
48.00	110.73	-13.39	107.72	-25.64	8.79	2.09	113.82	6932.55
50.00	102.64	-28.86	89.89	-49.54	8.53	4.70	117.19	14968.74
51.00	91.60	-35.58	74.49	-53.30	8.88	6.35	112.63	19825.15
52.00	78.85	-39.43	60.90	-50.09	9.80	8.06	102.09	24655.30
53.00	63.79	-38.56	49.88	-39.76	12.26	9.77	81.57	29343.21
55.00	75.46	9.45	74.43	12.39	13.07	-2.18	76.49	-6298.48
56.00	158.69	-9.27	156.62	-25.57	6.22	1.02	160.79	2885.96
57.00	152.65	-44.83	108.26	-107.62	4.65	4.62	215.24	12895.09
58.00	122.05	-59.78	61.42	-105.47	4.12	7.08	242.52	19428.28
60.00	86.51	-73.53	24.52	-82.96	3.28	11.08	305.20	29403.65



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## 25 to 45 kHz-B (Broadband)

Transformed to 100 ohms minimum

Ceramics wired in parallel

Power Rating:

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 12W in M563

7 x 44.4 mm (1.7") PZT4

Active Area: 140.6 cm<sup>2</sup>

Radiating Surface: Urethane

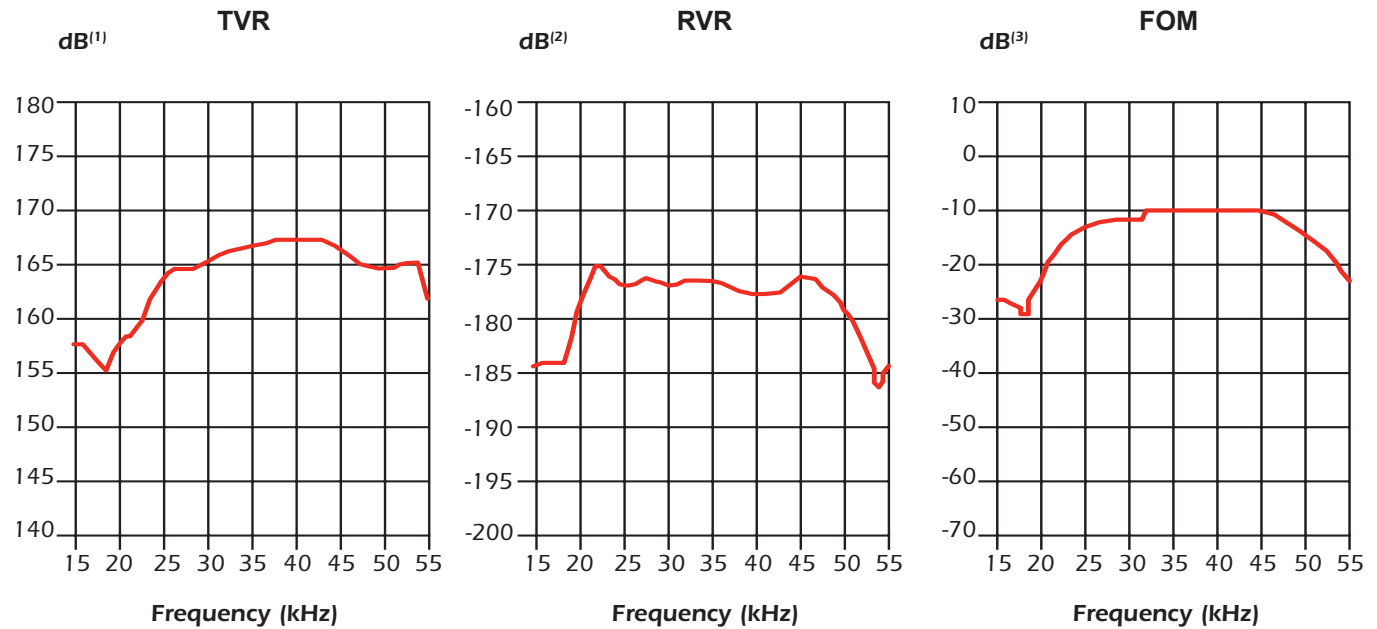
Q ≈ 2

Cable Type: C44-02

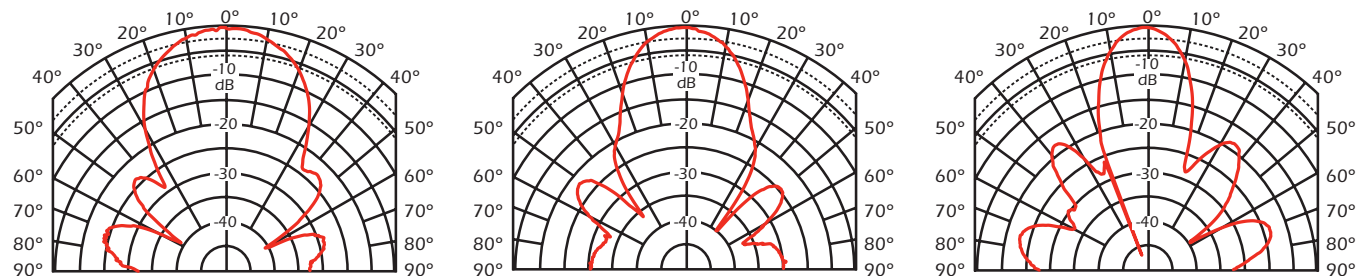
Cable Length: 10 m (33 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



## Transmit Radiation Pattern



Beamwidth	@ 25 kHz
-3 dB	24°
-6 dB	35°
-10 dB	45°

Beamwidth	@ 35 kHz
-3 dB	19°
-6 dB	26°
-10 dB	33°

Beamwidth	@ 45 kHz
-3 dB	14°
-6 dB	19°
-10 dB	24°



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**28 to 60 kHz-A (Broadband)**  
 Transformed to 100 ohms minimum (B2)  
 Ceramics wired in parallel

Power Rating:

- 3 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 60W in R509  
 40W in CM599, R599

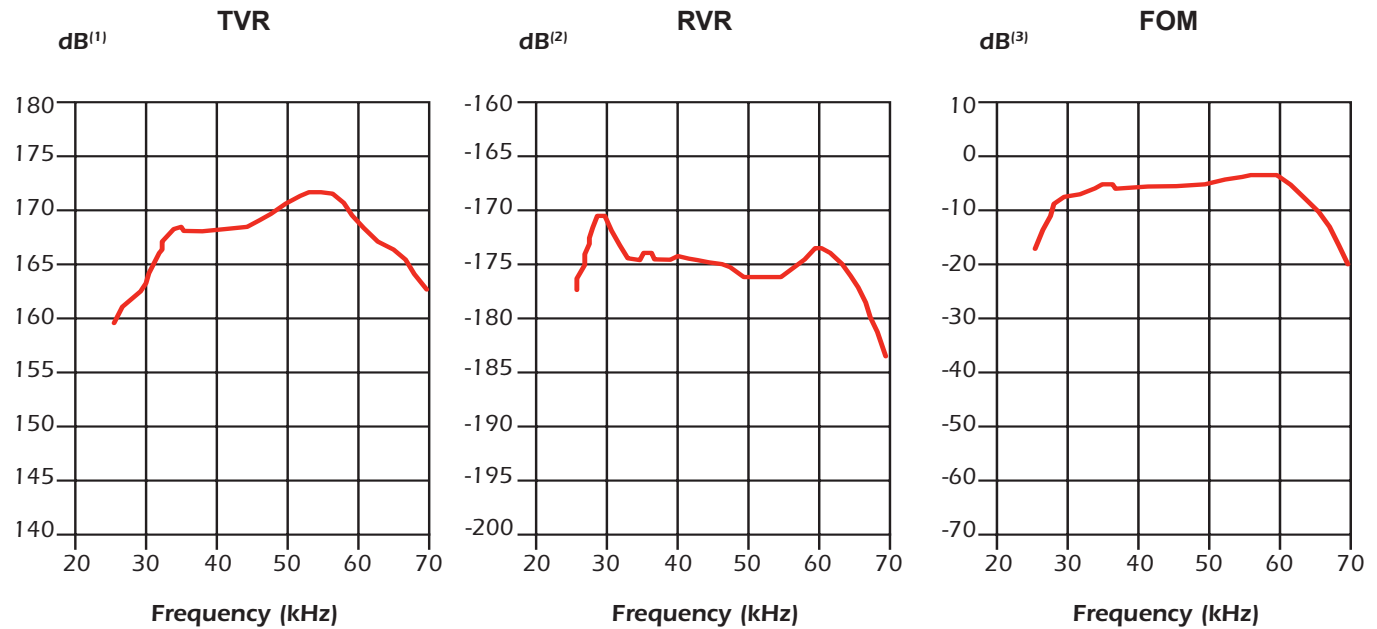
24 x 35.1 mm (1.4 in) PZT  
 Active Area: 229.9 cm<sup>2</sup> (35.63 in<sup>2</sup>)  
 Radiating Surface: Epoxy

Q ≈ 2

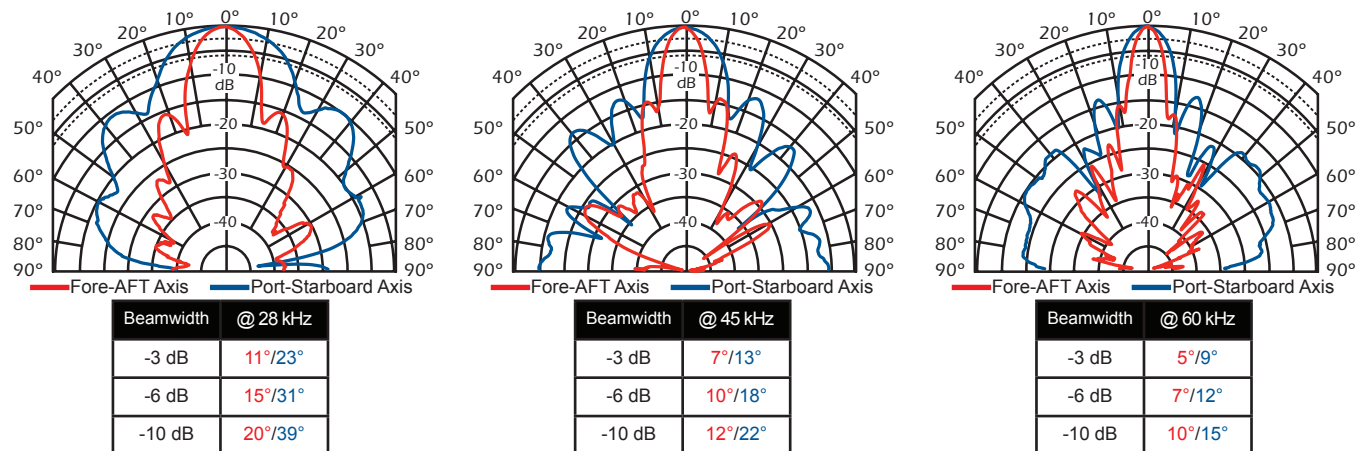
Cable Type: C44  
 Cable Length: 15 m (50 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



*Sensing Technology*

# Technical Data Catalog

## 28 to 60 kHz-A (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
28.00	308.55	41.79	230.06	205.61	2.42	-2.16	413.81	-12276.03
29.00	318.78	20.93	297.74	113.90	2.93	-1.12	341.31	-6150.87
30.00	241.28	0.87	241.25	3.68	4.14	-0.06	241.31	-335.76
31.00	193.73	-7.41	192.12	-24.97	5.12	0.67	195.36	3416.12
32.00	145.29	-8.06	143.85	-20.37	6.82	0.96	146.74	4798.72
33.00	128.57	-0.01	128.57	-0.01	7.78	0.00	128.57	3.43
34.00	120.78	8.12	119.58	17.05	8.20	-1.17	122.01	-5471.06
35.00	135.55	12.11	132.54	28.44	7.21	-1.55	138.64	-7037.17
36.00	133.81	6.89	132.85	16.04	7.42	-0.90	134.78	-3960.88
37.00	133.31	7.74	132.09	17.95	7.43	-1.01	134.53	-4345.42
38.00	134.75	7.40	133.63	17.35	7.36	-0.96	135.88	-4001.46
39.00	142.01	9.12	140.22	22.52	6.95	-1.12	143.84	-4557.01
40.00	150.97	3.48	150.69	9.16	6.61	-0.40	151.25	-1599.99
41.00	149.39	2.52	149.25	6.58	6.69	-0.29	149.54	-1143.87
42.00	150.47	-1.08	150.45	-2.85	6.64	0.13	150.50	476.71
43.00	148.40	-2.06	148.31	-5.34	6.73	0.24	148.50	897.42
44.00	150.01	-6.28	149.11	-16.40	6.63	0.73	150.92	2636.57
45.00	144.71	-8.59	143.08	-21.61	6.83	1.03	146.35	3650.59
46.00	144.44	-11.83	141.37	-29.62	6.78	1.42	147.57	4912.27
47.00	142.31	-14.82	137.58	-36.40	6.79	1.80	147.21	6085.48
48.00	132.05	-18.07	125.54	-40.97	7.20	2.35	138.91	7789.92
49.00	119.22	-17.44	113.74	-35.74	8.00	2.51	124.97	8165.83
50.00	112.06	-15.52	107.98	-29.99	8.60	2.39	116.31	7601.44
51.00	109.67	-11.32	107.53	-21.53	8.94	1.79	111.84	5586.70
52.00	108.55	-9.99	106.90	-18.82	9.07	1.60	110.22	4889.39
53.00	109.23	-7.10	108.39	-13.50	9.08	1.13	110.07	3397.43
54.00	108.61	-3.96	108.35	-7.50	9.19	0.64	108.87	1872.96
55.00	113.56	2.37	113.46	4.69	8.80	-0.36	113.66	-1053.14
56.00	125.63	6.09	124.92	13.33	7.92	-0.84	126.34	-2399.70
57.00	136.85	9.33	135.04	22.18	7.21	-1.18	138.68	-3306.52
58.00	162.06	10.90	159.14	30.65	6.06	-1.17	165.04	-3202.70
59.00	190.57	7.57	188.91	25.09	5.20	-0.69	192.24	-1863.70
60.00	220.91	1.96	220.79	7.54	4.52	-0.15	221.04	-409.63

### 33 to 60 kHz-A (Broadband) Array

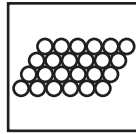
**Ceramics wired in parallel**

Power Rating: 3 kW rms @ 2% duty cycle

24 x 35.1 mm (1.4") PZT4

Active Area: 60.8 cm<sup>2</sup>

Epoxy Window



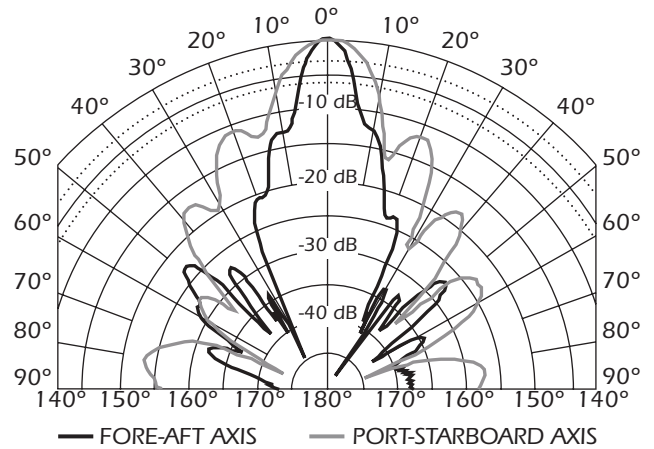
Cable Type: C44

Cable Length: 10 m (33')

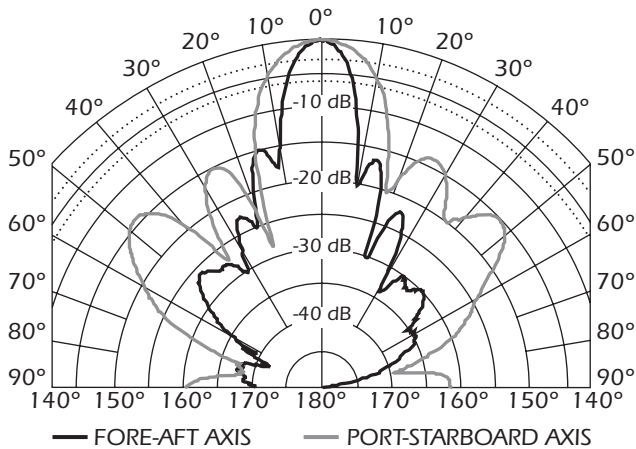
1 kHz Capacitance: 41,520 pF

Beamwidth	@ 38 kHz	@ 50 kHz	@ 60 kHz
-3 dB	7° / 13°	9° / 16°	6° / 10°
-6 dB	10° / 18°	12° / 22°	8° / 13°
-10 dB	12° / 22°	15° / 27°	10° / 17°

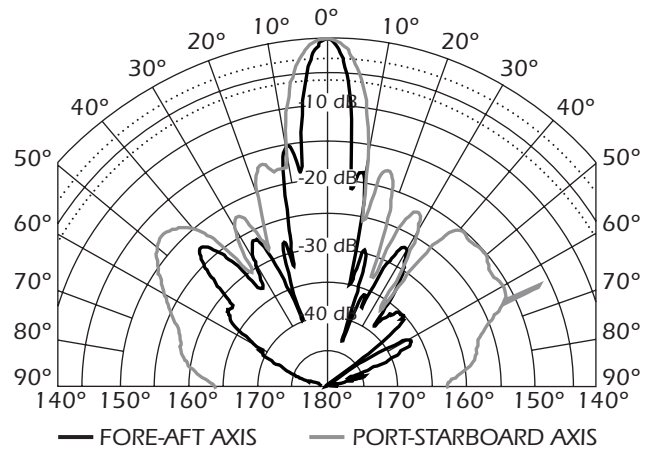
Transmit Radiation Pattern @ 50 kHz



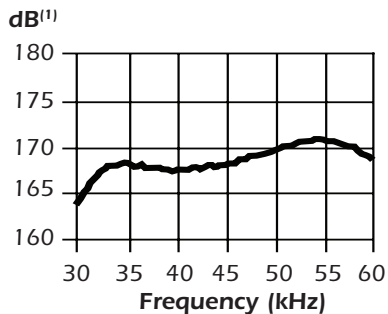
Transmit Radiation Pattern @ 38 kHz



Transmit Radiation Pattern @ 60 kHz



TVR



RVR

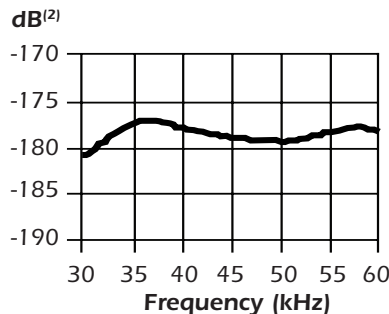
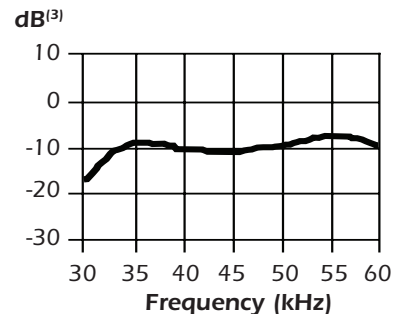


Figure of Merit



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

## 33 to 60 kHz-A (Broadband)

Note: Impedance data includes cable

Impedance Data	
1 kHz capacitance: 48,675 pF: ±20%	Impedance @ 38 kHz = 115 ohms: -20%, +40%
Impedance Range: 120 to 190 ohms: -20%, +40%	Impedance @ 50 kHz = 130 ohms: -20%, +40%

**Balance Impedance Table**

Test Frequency (kHz)	Impedance Magnitude (ohms)	Phase Angle (degree)	Series Resistance (ohms)	Series Reactance (ohms)	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance (ohms)	Parallel Capacitance (pF)
33.00	78.67	-56.74	43.15	-65.78	6.9717	10.6282	143.44	51258.38
33.50	78.32	-53.41	46.68	-62.89	7.6102	10.2524	131.40	48708.27
34.00	82.48	-52.46	50.26	-65.40	7.3878	9.6132	135.36	44999.67
34.50	86.54	-48.75	57.06	-65.07	7.6181	8.6877	131.27	40078.21
35.00	87.96	-47.23	59.73	-64.57	7.7197	8.3452	129.54	37947.94
35.50	95.06	-48.40	63.12	-71.08	6.9845	7.8663	143.17	35266.48
36.00	99.09	-47.40	67.07	-72.94	6.8310	7.4290	146.39	32843.25
36.50	98.40	-48.54	65.15	-73.74	6.7287	7.6157	148.62	33207.38
37.00	102.46	-50.44	65.26	-78.99	6.2163	7.5243	160.87	32365.53
37.50	102.66	-49.19	67.09	-77.71	6.3657	7.3731	157.09	31292.53
38.00	104.75	-50.60	66.48	-80.95	6.0586	7.3771	165.05	30897.28
38.50	107.80	-52.25	66.00	-85.24	5.6790	7.3346	176.09	30320.54
39.00	106.12	-51.93	65.44	-83.54	5.8107	7.4183	172.10	30273.32
39.50	105.81	-54.17	61.94	-85.78	5.5326	7.6624	180.75	30873.46
40.00	106.38	-54.62	61.59	-86.74	5.4424	7.6648	183.74	30497.13
40.50	104.42	-54.56	60.56	-85.07	5.5535	7.8017	180.07	30658.92
41.00	104.04	-55.87	58.38	-86.12	5.3930	7.9558	185.43	30883.08
41.50	104.43	-55.59	59.02	-86.15	5.4117	7.8999	184.79	30296.43
42.00	102.37	-56.18	56.98	-85.04	5.4376	8.1153	183.90	30752.04
42.50	102.14	-56.79	55.94	-85.46	5.3617	8.1913	186.51	30675.05
43.00	100.80	-55.93	56.46	-83.50	5.5573	8.2184	179.94	30418.40
43.50	99.15	-56.31	55.00	-82.50	5.5940	8.3917	178.76	30702.91
44.00	99.68	-57.40	53.70	-83.97	5.4052	8.4516	185.01	30570.88
44.50	98.68	-55.46	55.95	-81.29	5.7450	8.3474	174.06	29854.71
45.00	97.78	-56.49	53.98	-81.53	5.6454	8.5272	177.13	30158.72
45.50	98.66	-57.24	53.39	-82.96	5.4853	8.5238	182.31	29815.35
46.00	96.60	-56.24	53.69	-80.31	5.7532	8.6055	173.82	29774.07
46.50	94.57	-57.95	50.18	-80.16	5.6112	8.9625	178.22	30675.90
47.00	93.82	-56.61	51.63	-78.34	5.8651	8.8996	170.50	30136.64
47.50	91.74	-56.49	50.64	-76.50	6.0172	9.0887	166.19	30453.02
48.00	91.07	-56.15	50.73	-75.64	6.1160	9.1193	163.51	30237.10
48.50	90.16	-54.52	52.33	-73.42	6.4380	9.0320	155.33	29639.05
49.00	89.85	-55.08	51.44	-73.67	6.3712	9.1254	156.96	29639.92
49.50	89.25	-54.47	51.87	-72.63	6.5117	9.1183	153.57	29317.53
50.00	87.73	-53.72	51.91	-70.73	6.7445	9.1885	148.27	29248.01
50.50	86.12	-52.98	51.85	-68.76	6.9909	9.2720	143.04	29221.35
51.00	86.06	-51.46	53.61	-67.32	7.2391	9.0894	138.14	28365.23
51.50	85.17	-49.65	55.15	-64.91	7.6023	8.9475	131.54	27651.20
52.00	85.23	-48.72	56.23	-64.05	7.7404	8.8172	129.19	26986.63
52.50	86.19	-46.56	59.26	-62.58	7.9777	8.4252	125.35	25541.33
53.00	86.85	-45.40	60.98	-61.83	8.0855	8.1984	123.68	24619.11
53.50	89.52	-44.41	63.96	-62.64	7.9800	7.8162	125.31	23252.07
54.00	91.07	-43.12	66.47	-62.25	8.0145	7.5057	124.77	22121.70
54.50	92.49	-42.23	68.49	-62.16	8.0060	7.2663	124.91	21219.49
55.00	94.83	-40.81	71.78	-61.98	7.9810	6.8916	125.30	19942.46
55.50	97.31	-40.10	74.43	-62.69	7.8599	6.6195	127.23	18982.39
56.00	101.20	-39.28	78.33	-64.08	7.6483	6.2564	130.75	17780.92
56.50	105.50	-38.98	82.01	-66.37	7.3685	5.9632	135.71	16797.66
57.00	109.99	-38.58	85.98	-68.59	7.1076	5.6697	140.69	15830.89
57.50	115.22	-39.58	88.80	-73.41	6.6892	5.5301	149.49	15306.70
58.00	120.98	-40.70	91.71	-78.89	6.2665	5.3905	159.58	14791.89
58.50	125.95	-41.84	93.83	-84.02	5.9148	5.2967	169.07	14410.13
59.00	128.98	-43.84	93.04	-89.33	5.5925	5.3697	178.81	14484.95
59.50	133.49	-46.73	91.49	-97.20	5.1345	5.4550	194.76	14591.47
60.00	136.62	-48.96	89.70	-103.05	4.8059	5.5210	208.08	14644.90



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### 33 to 60 kHz-BIq (Broadband)

**Power Rating:**

- 150 W @ 1% duty cycle

35 mm (1.38 in) PZT

Active Area: 9.6 cm<sup>2</sup> (1.5 in<sup>2</sup>)

Radiating Surface: HPC/Urethane

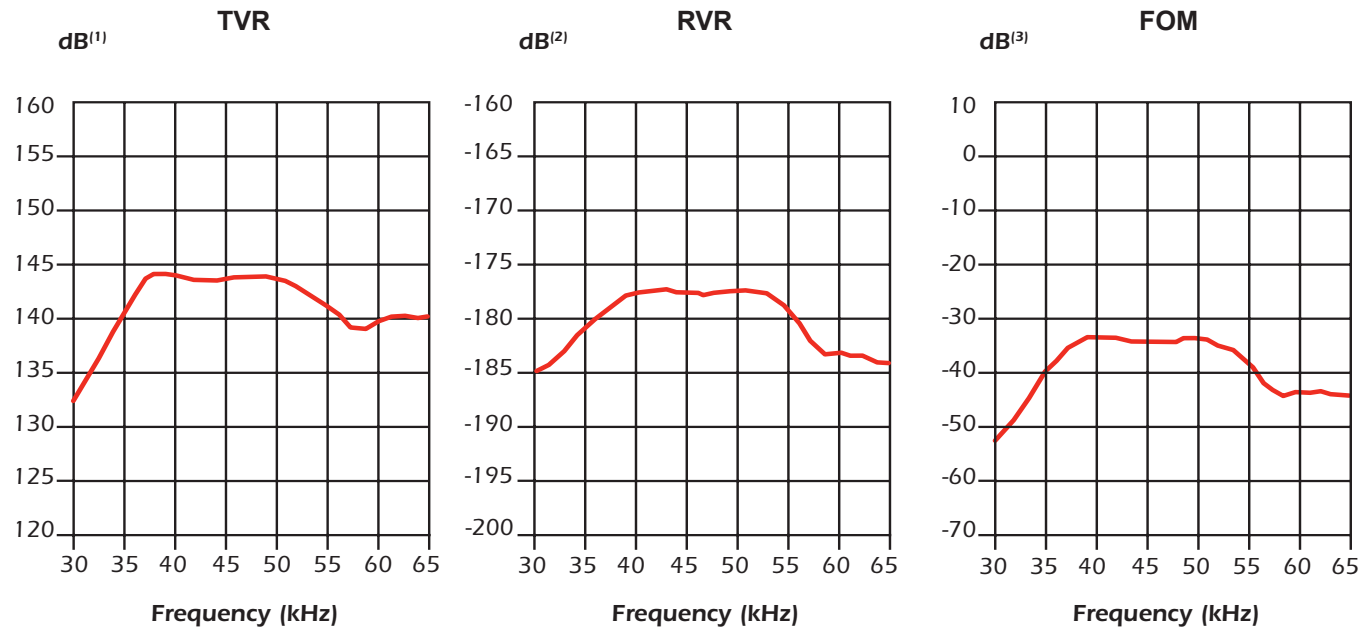
Q ≈ 2

Cable Type: C189-02

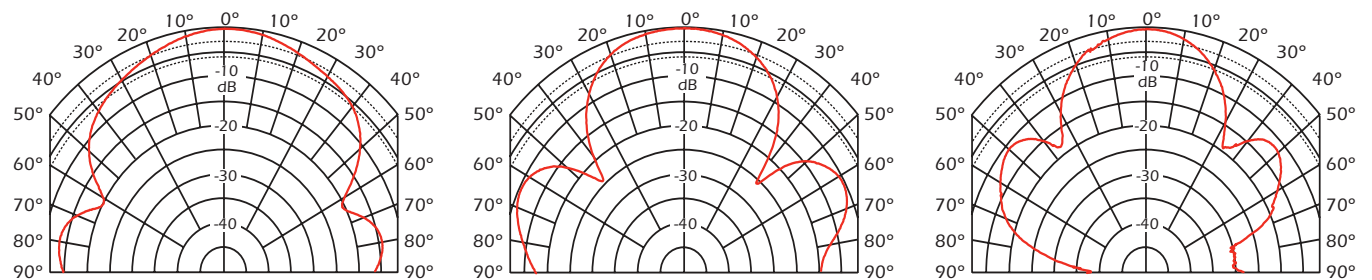
Cable Length: 4.9 m (16 ft)

**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



### Transmit Radiation Pattern



Beamwidth	@ 35 kHz
-3 dB	46°
-6 dB	76°
-10 dB	96°

Beamwidth	@ 50 kHz
-3 dB	40°
-6 dB	53°
-10 dB	63°

Beamwidth	@ 60 kHz
-3 dB	30°
-6 dB	42°
-10 dB	53°



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# Technical Data Catalog

## 33 to 60 kHz-BIq (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
30.00	2172.90	-82.18	295.66	-2152.69	0.06	0.46	15969.59	2418.81
31.00	2009.08	-80.94	316.34	-1984.02	0.08	0.49	12759.86	2523.54
32.00	1850.27	-78.74	361.44	-1814.62	0.11	0.53	9471.79	2636.25
33.00	1707.99	-75.47	428.39	-1653.39	0.15	0.57	6809.69	2733.45
34.00	1597.95	-70.97	521.09	-1510.60	0.20	0.59	4900.22	2769.26
35.00	1519.04	-65.82	622.19	-1385.77	0.27	0.60	3708.67	2730.90
36.00	1472.70	-59.93	737.82	-1274.55	0.34	0.59	2939.53	2598.03
37.00	1451.51	-53.58	861.83	-1167.96	0.41	0.55	2444.67	2384.55
38.00	1495.65	-46.31	1033.14	-1081.48	0.46	0.48	2165.21	2024.85
39.00	1631.90	-40.54	1240.09	-1060.79	0.47	0.40	2147.50	1625.54
40.00	1801.68	-38.39	1412.07	-1118.98	0.44	0.34	2298.79	1371.60
41.00	1946.96	-38.45	1524.78	-1210.66	0.40	0.32	2486.04	1239.78
42.00	2059.82	-39.70	1584.79	-1315.79	0.37	0.31	2677.24	1175.17
43.00	2123.81	-41.00	1602.85	-1393.35	0.36	0.31	2814.09	1143.36
44.00	2146.33	-42.01	1594.81	-1436.42	0.35	0.31	2888.58	1127.86
45.00	2147.63	-41.97	1596.75	-1436.21	0.35	0.31	2888.56	1101.30
46.00	2150.65	-41.47	1611.43	-1424.29	0.35	0.31	2870.31	1065.42
47.00	2175.15	-40.20	1661.34	-1404.00	0.35	0.30	2847.86	1004.87
48.00	2242.04	-38.21	1761.73	-1386.74	0.35	0.28	2853.29	914.72
49.00	2349.64	-36.69	1884.16	-1403.84	0.34	0.25	2930.12	825.92
50.00	2507.31	-36.14	2024.84	-1478.72	0.32	0.24	3104.73	748.72
51.00	2681.53	-36.91	2144.13	-1610.38	0.30	0.22	3353.63	698.90
52.00	2875.50	-37.92	2268.47	-1767.08	0.27	0.21	3644.98	654.10
53.00	3108.60	-40.62	2359.55	-2023.83	0.24	0.21	4095.43	628.91
54.00	3328.24	-44.84	2359.94	-2346.88	0.21	0.21	4693.83	624.44
55.00	3460.65	-50.91	2182.08	-2686.01	0.18	0.22	5488.39	649.01
56.00	3440.98	-57.77	1835.39	-2910.61	0.16	0.25	6451.11	698.64
57.00	3282.41	-63.38	1470.94	-2934.37	0.14	0.27	7324.70	760.46
58.00	3087.70	-66.80	1216.15	-2838.11	0.13	0.30	7839.43	816.87
59.00	2908.90	-68.80	1052.10	-2711.97	0.12	0.32	8042.67	864.56
60.00	2762.15	-69.55	965.09	-2588.06	0.13	0.34	7905.45	899.81
61.00	2659.38	-69.68	923.62	-2493.84	0.13	0.35	7657.18	920.02
62.00	2602.20	-69.57	908.38	-2438.50	0.13	0.36	7454.40	924.42
63.00	2578.90	-69.87	887.64	-2421.33	0.13	0.36	7492.58	919.74
64.00	2574.86	-70.75	848.96	-2430.88	0.13	0.37	7809.46	911.79
65.00	2545.33	-72.27	775.18	-2424.42	0.12	0.37	8357.72	916.28



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### 35 to 65 kHz-A (Broadband)

Transformed to 100 ohms minimum

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 12W in CM365

10 x 35 mm (1.38 in) PZT

Active Area: 96.2 cm<sup>2</sup> (14.95 in<sup>2</sup>)

Radiating Surface: Urethane

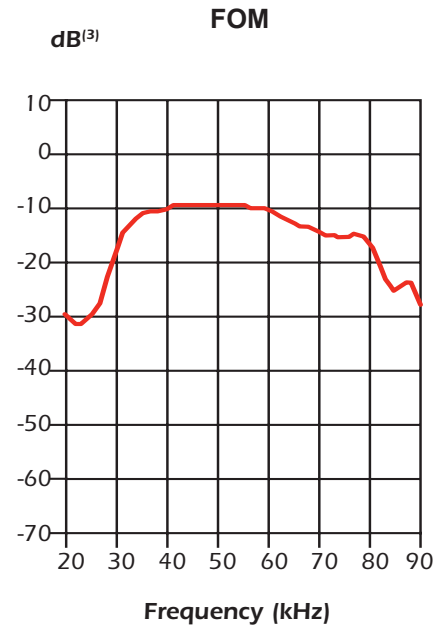
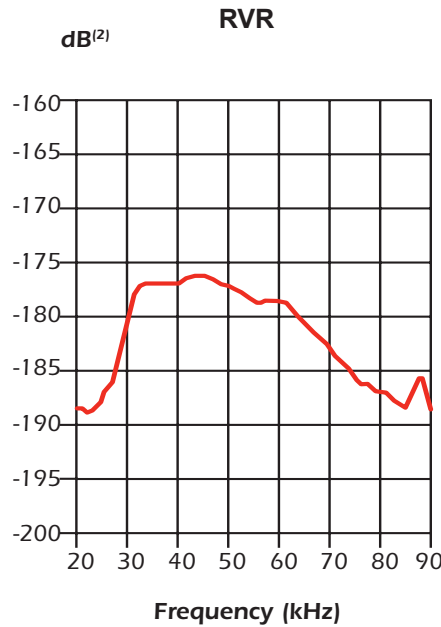
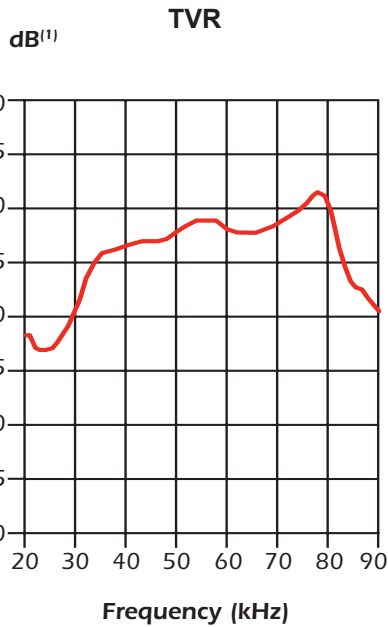
Q ≈ 2.6

Cable Type: C332/C338

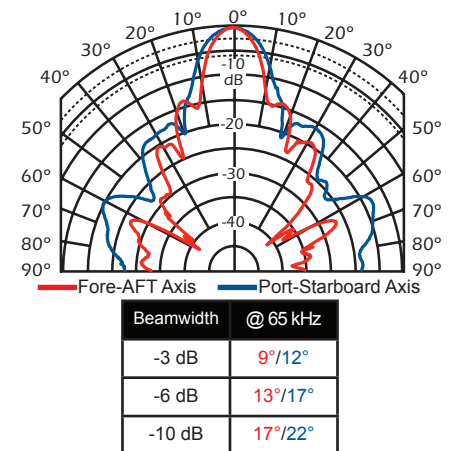
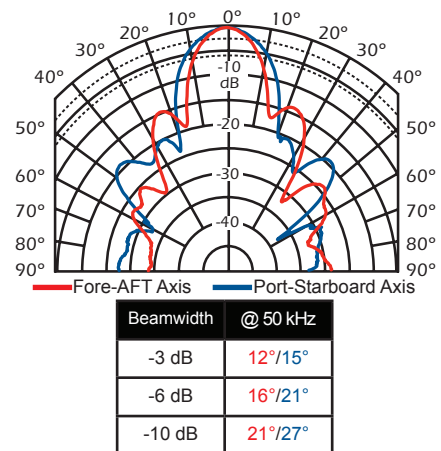
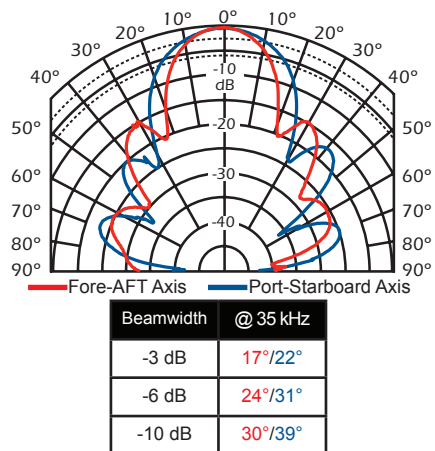
Cable Length: 15 m (50 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



*Sensing Technology*

# Technical Data Catalog

## 35 to 65 kHz-A (Broadband)

Note: Impedance data includes cable

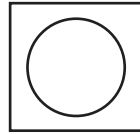
### Balanced Impedance Table (Nominal Value) in 20°C Water

Test Frequency (kHz)	Impedance Magnitude ( $\Omega$ )	Phase Angle ( $^{\circ}$ )	Series Resistance ( $\Omega$ )	Series Reactance ( $\Omega$ )	Parallel Conductance (mS)	Parallel Susceptance (mS)	Parallel Resistance ( $\Omega$ )	Parallel Capacitance (pF)
20.00	45.14	86.94	2.41	45.07	1.18	-22.12	846.17	-176044.03
22.00	53.53	86.73	3.05	53.45	1.07	-18.65	938.54	-134914.71
24.00	64.46	86.13	4.35	64.32	1.05	-15.48	956.08	-102639.47
26.00	79.65	84.17	8.09	79.24	1.28	-12.49	784.33	-76456.21
28.00	101.12	79.05	19.20	99.28	1.88	-9.71	532.58	-55187.82
30.00	128.97	67.44	49.49	119.10	2.98	-7.16	336.10	-37986.54
32.00	139.69	50.23	89.35	107.38	4.58	-5.50	218.39	-27367.51
34.00	127.25	39.07	98.79	80.21	6.10	-4.95	163.92	-23186.96
36.00	122.58	36.32	98.77	72.60	6.57	-4.83	152.14	-21360.34
38.00	123.77	32.36	104.55	66.26	6.82	-4.32	146.54	-18113.75
40.00	129.98	31.32	111.04	67.56	6.57	-4.00	152.14	-15911.67
42.00	139.36	26.19	125.05	61.51	6.44	-3.17	155.31	-12001.53
44.00	147.10	20.97	137.36	52.65	6.35	-2.43	157.54	-8800.31
46.00	157.17	12.71	153.32	34.58	6.21	-1.40	161.12	-4843.35
48.00	151.69	2.27	151.57	6.01	6.59	-0.26	151.81	-866.01
50.00	138.87	-3.62	138.60	-8.76	7.19	0.45	139.15	1445.49
52.00	132.57	-7.62	131.40	-17.57	7.48	1.00	133.75	3059.41
54.00	120.22	-9.37	118.61	-19.58	8.21	1.35	121.84	3993.18
56.00	118.08	-5.74	117.49	-11.80	8.43	0.85	118.67	2406.33
58.00	131.08	-6.93	130.12	-15.81	7.57	0.92	132.04	2524.41
60.00	140.87	-11.87	137.85	-28.99	6.95	1.46	143.95	3874.52
62.00	145.03	-21.28	135.14	-52.63	6.43	2.50	155.64	6423.56
64.00	137.89	-29.92	119.52	-68.77	6.29	3.62	159.09	8994.72
66.00	127.75	-37.40	101.48	-77.60	6.22	4.76	160.81	11466.45
68.00	115.45	-42.91	84.55	-78.61	6.34	5.90	157.64	13803.70
70.00	101.73	-48.79	67.02	-76.54	6.48	7.40	154.43	16814.77
72.00	84.18	-51.57	52.32	-65.95	7.38	9.31	135.44	20570.24
74.00	68.90	-49.94	44.34	-52.73	9.34	11.11	107.05	23890.92
76.00	56.32	-42.44	41.57	-38.01	13.10	11.98	76.32	25090.37
78.00	49.96	-27.69	44.23	-23.22	17.72	9.30	56.42	18982.95
80.00	53.96	-7.13	53.54	-6.70	18.39	2.30	54.38	4575.17
82.00	77.45	3.60	77.30	4.87	12.89	-0.81	77.60	-1574.74
84.00	106.75	-0.87	106.74	-1.61	9.37	0.14	106.77	267.95
86.00	137.12	-6.35	136.27	-15.17	7.25	0.81	137.96	1493.31
88.00	214.27	-22.95	197.32	-83.54	4.30	1.82	232.68	3290.55
90.00	189.72	-68.63	69.13	-176.67	1.92	4.91	520.64	8680.41

### 38 to 58 kHz-A (Broadband)

Power Rating: 150 W rms @ 2% duty cycle  
 35.05 mm (1.38") PZT4-L  
 Active Area: 11 cm<sup>2</sup>  
 Epoxy/Urethane Window

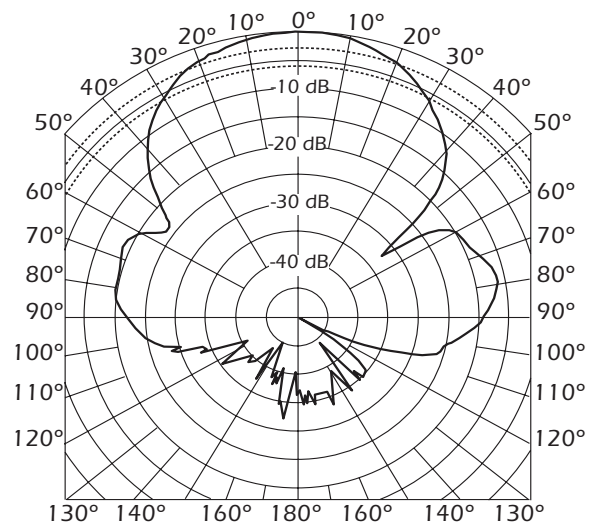
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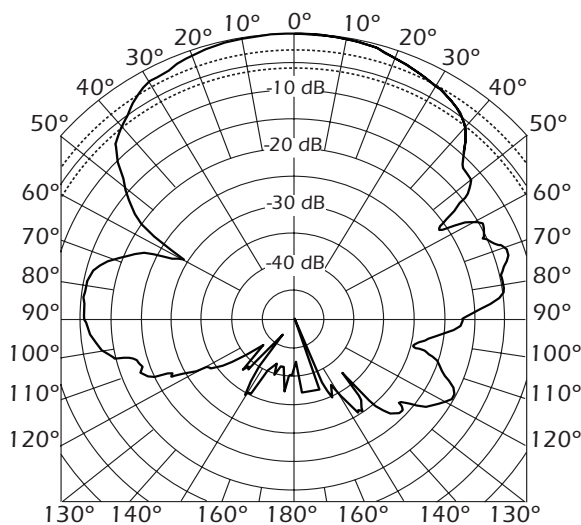
Cable Type: Custom  
 Cable Length: 20-30 m (8-12')

Beamwidth	@ 40 kHz	@ 44 kHz	@ 50 kHz
-3 dB	46°	37°	33°
-6 dB	69°	59°	46°
-10 dB	82°	74°	57°

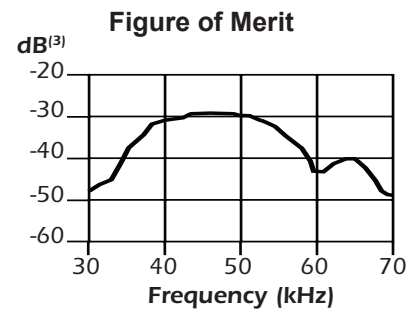
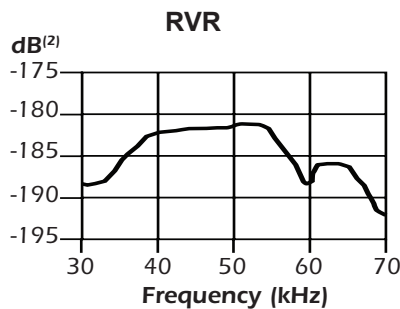
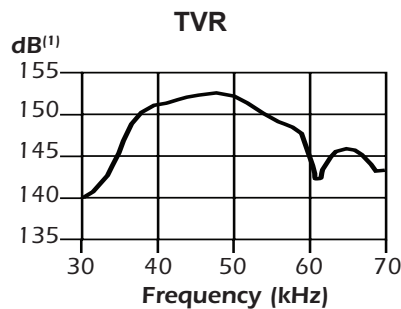
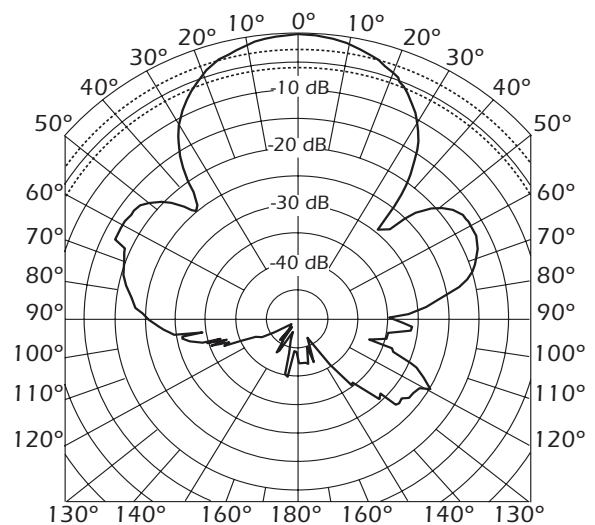
Transmit Radiation Pattern @ 44 kHz



Transmit Radiation Pattern @ 40 kHz



Transmit Radiation Pattern @ 50 kHz

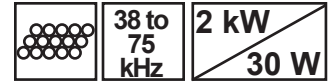


Notes:

- (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
- (5) Q, Nominal, less than 3.5



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**38 to 75 kHz-A (Broadband)**  
 Transformed to 100 ohms minimum (B1)

Power Rating:

- 2 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 30W in CM199, PM111, R109  
 25W in R111

5 x 35 mm (1.38 in) PZT

Active Area: 144.6 cm<sup>2</sup> (22.4 in<sup>2</sup>)

Radiating Surface: Urethane

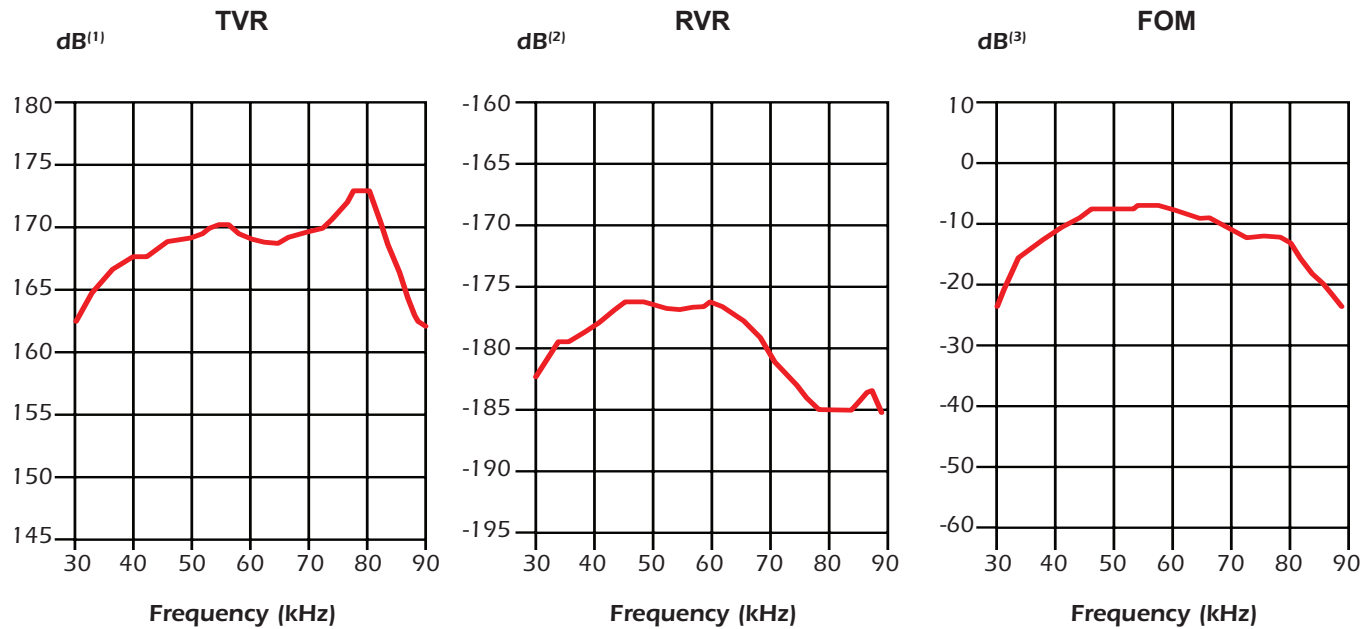
Q ≈ 2.5

Cable Type: C44

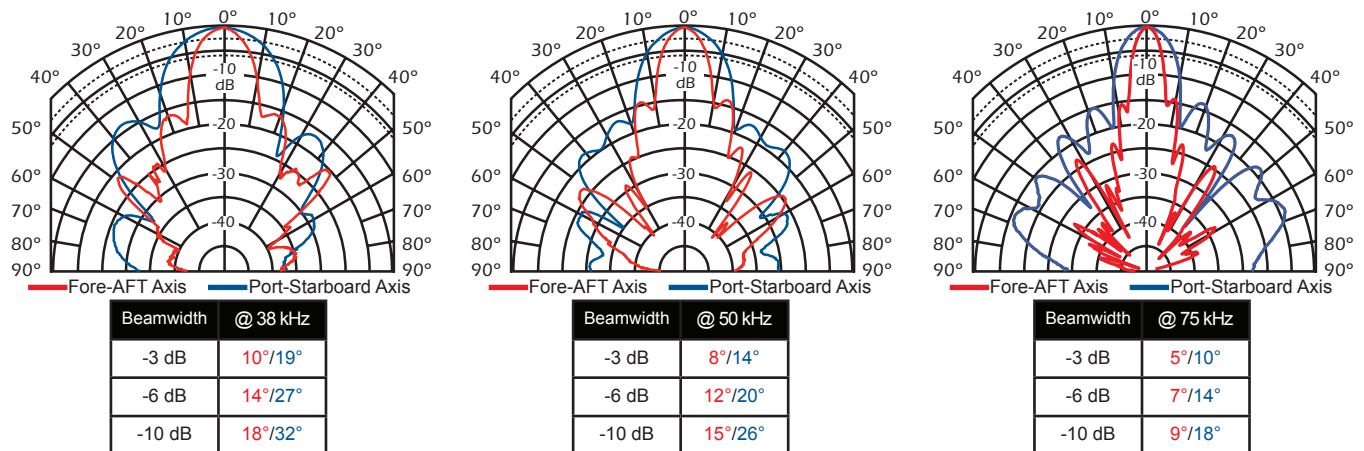
Cable Length: 10 m (33 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



*Sensing Technology*

# Technical Data Catalog

## 38 to 75 kHz-A (Broadband)

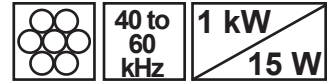
Note: Impedance data includes cable

### Balanced Impedance Table (Nominal Value) in 20°C Water

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)
30.00	73.63	79.09	13.94	72.30	2.57	-13.34	388.89	-70751.87
32.00	83.84	71.66	26.38	79.59	3.75	-11.32	266.51	-56308.40
33.00	86.52	66.26	34.83	79.20	4.65	-10.58	214.93	-51027.89
34.00	87.92	64.05	38.48	79.06	4.98	-10.23	200.91	-47870.63
35.00	87.72	60.49	43.21	76.34	5.62	-9.92	178.09	-45112.33
37.00	91.45	56.84	50.02	76.56	5.98	-9.15	167.20	-39379.39
38.00	93.70	56.32	51.96	77.97	5.92	-8.88	168.96	-37195.20
39.00	95.09	55.19	54.27	78.07	6.00	-8.64	166.59	-35239.96
40.00	100.06	55.99	55.97	82.95	5.59	-8.28	178.90	-32961.94
42.00	111.74	52.29	68.34	88.40	5.47	-7.08	182.69	-26829.75
43.00	115.80	48.05	77.41	86.13	5.77	-6.42	173.24	-23771.53
44.00	120.86	45.22	85.13	85.78	5.83	-5.87	171.57	-21244.19
45.00	121.59	40.54	92.40	79.04	6.25	-5.35	160.01	-18906.98
47.00	125.64	34.58	103.45	71.30	6.55	-4.52	152.59	-15295.70
48.00	127.75	32.83	107.34	69.26	6.58	-4.24	152.03	-14071.62
49.00	126.59	29.64	110.03	62.60	6.87	-3.91	145.65	-12689.05
50.00	129.39	27.71	114.55	60.18	6.84	-3.59	146.16	-11440.62
52.00	125.13	22.81	115.35	48.51	7.37	-3.10	135.75	-9481.56
53.00	121.69	20.84	113.74	43.29	7.68	-2.92	130.21	-8777.16
54.00	120.95	21.36	112.64	44.05	7.70	-3.01	129.87	-8875.86
55.00	119.93	21.17	111.84	43.30	7.78	-3.01	128.61	-8711.94
57.00	131.50	21.90	122.01	49.04	7.06	-2.84	141.72	-7919.07
58.00	140.42	20.79	131.28	49.84	6.66	-2.53	150.20	-6935.86
59.00	147.88	17.71	140.87	44.98	6.44	-2.06	155.23	-5548.44
60.00	156.98	14.36	152.07	38.94	6.17	-1.58	162.04	-4191.94
62.00	168.17	4.78	167.59	14.03	5.93	-0.50	168.76	-1273.03
63.00	168.00	-1.26	167.96	-3.69	5.95	0.13	168.04	330.64
64.00	166.64	-6.26	165.65	-18.18	5.97	0.65	167.64	1627.73
65.00	163.04	-11.77	159.61	-33.26	6.00	1.25	166.55	3063.86
67.00	153.01	-21.93	141.93	-57.16	6.06	2.44	164.95	5799.39
68.00	145.19	-26.24	130.23	-64.21	6.18	3.05	161.88	7128.34
69.00	135.53	-30.73	116.50	-69.25	6.34	3.77	157.66	8696.56
70.00	125.37	-34.40	103.44	-70.83	6.58	4.51	151.95	10246.24
72.00	104.21	-39.11	80.87	-65.73	7.45	6.05	134.30	13379.47
73.00	94.65	-40.41	72.07	-61.36	8.04	6.85	124.32	14932.33
74.00	85.81	-40.46	65.29	-55.68	8.87	7.56	112.77	16263.93
75.00	77.42	-39.96	59.34	-49.72	9.90	8.30	101.00	17602.69
77.00	62.05	-35.05	50.80	-35.64	13.19	9.26	75.80	19130.99
78.00	56.05	-29.11	48.97	-27.27	15.59	8.68	64.15	17709.11
79.00	52.08	-20.92	48.64	-18.59	17.94	6.86	55.75	13812.91
80.00	51.11	-10.83	50.20	-9.60	19.22	3.68	52.03	7312.83



*Sensing Technology*



**40 to 60 kHz-A (Broadband)**  
 Transformed to 100 ohms minimum (B2)

Power Rating:

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 15W in B175

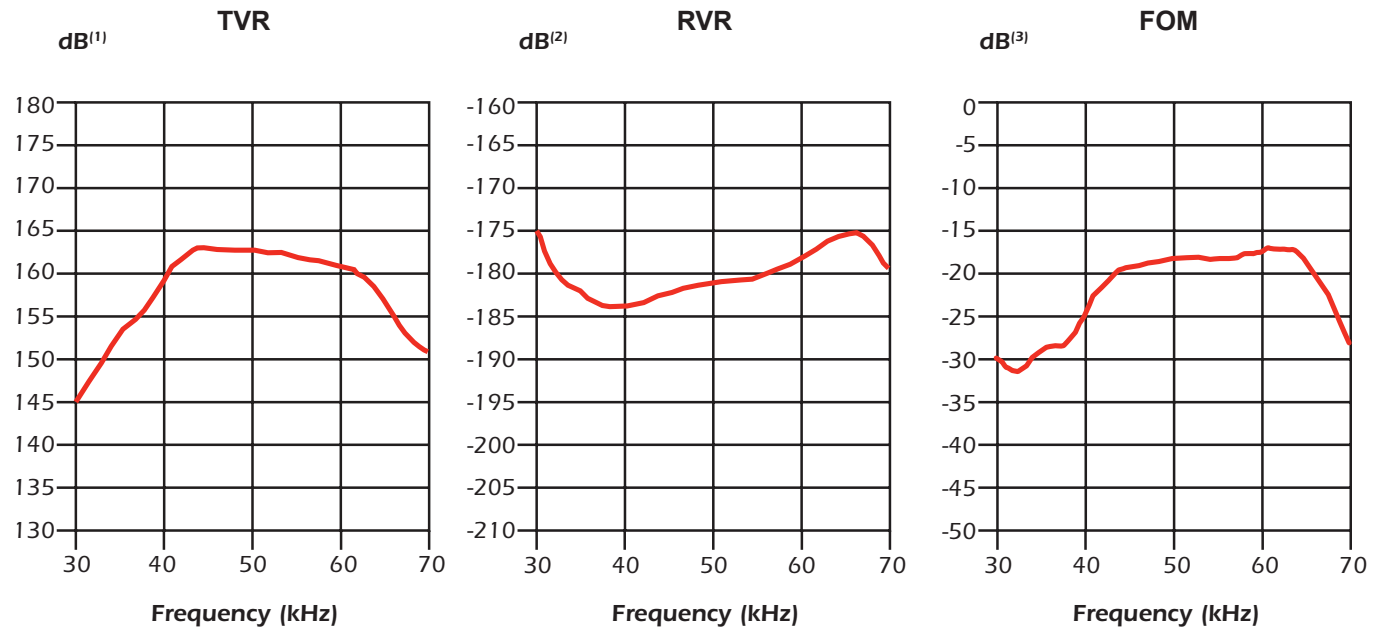
7 x 20.3 mm (0.80") PZT4  
 Active Area: 23 cm<sup>2</sup> (3.5 in<sup>2</sup>)  
 Radiating Surface: Urethane

Q ≈ 2.5

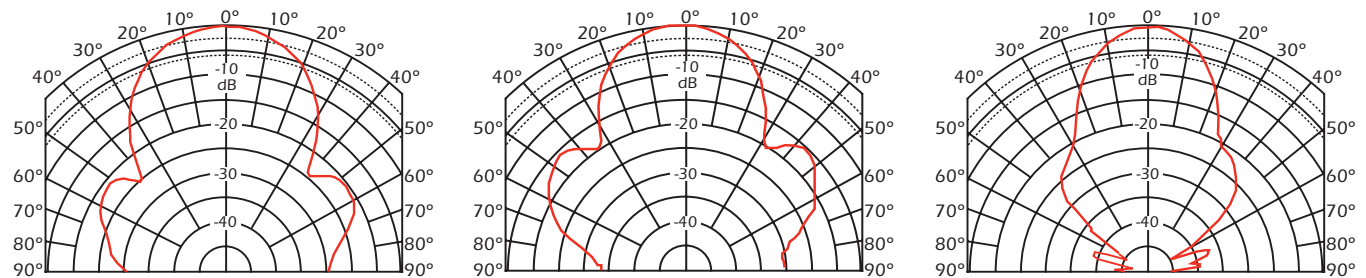
Cable Type: C335  
 Cable Length: 10 m (33')

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 40 kHz
-3 dB	31°
-6 dB	43°
-10 dB	51°

Beamwidth	@ 50 kHz
-3 dB	27°
-6 dB	38°
-10 dB	47°

Beamwidth	@ 60 kHz
-3 dB	21°
-6 dB	30°
-10 dB	39°



*Sensing Technology*

# Technical Data Catalog

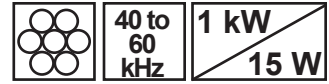
## 40 to 60 kHz-A (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
30.00	1566.74	-52.71	949.12	-1246.54	0.39	0.51	2586.28	2694.08
32.00	659.12	-67.32	254.12	-608.16	0.58	1.40	1709.58	6962.49
33.00	493.15	-68.47	180.98	-458.74	0.74	1.89	1343.79	9097.42
34.00	386.75	-67.72	146.65	-357.86	0.98	2.39	1019.94	11199.70
35.00	313.94	-66.40	125.69	-287.68	1.28	2.92	784.12	13272.91
36.00	264.23	-63.55	117.70	-236.57	1.69	3.39	593.18	14979.78
37.00	225.64	-61.22	108.64	-197.76	2.13	3.88	468.64	16708.54
38.00	191.83	-58.14	101.25	-162.93	2.75	4.43	363.44	18544.10
39.00	163.59	-53.89	96.42	-132.15	3.60	4.94	277.55	20152.19
40.00	141.47	-47.14	96.24	-103.70	4.81	5.18	207.98	20615.15
41.00	127.09	-38.97	98.81	-79.93	6.12	4.95	163.47	19209.71
42.00	117.05	-29.39	101.99	-57.45	7.44	4.19	134.35	15888.54
43.00	114.17	-19.82	107.41	-38.71	8.24	2.97	121.36	10991.74
44.00	116.41	-10.49	114.47	-21.19	8.45	1.56	118.39	5655.50
45.00	124.14	-3.65	123.89	-7.91	8.04	0.51	124.39	1815.47
46.00	132.21	1.87	132.14	4.32	7.56	-0.25	132.28	-856.05
47.00	142.79	4.84	142.28	12.05	6.98	-0.59	143.30	-2001.25
48.00	148.70	7.28	147.50	18.83	6.67	-0.85	149.90	-2823.74
49.00	155.74	9.70	153.52	26.23	6.33	-1.08	158.00	-3513.14
50.00	162.24	12.43	158.43	34.93	6.02	-1.33	166.13	-4224.56
51.00	169.58	14.95	163.84	43.76	5.70	-1.52	175.53	-4748.29
52.00	174.96	17.38	166.97	52.25	5.45	-1.71	183.32	-5224.76
53.00	182.36	19.88	171.49	62.03	5.16	-1.87	193.93	-5600.86
54.00	193.16	24.54	175.70	80.24	4.71	-2.15	212.35	-6338.45
55.00	212.47	27.32	188.77	97.52	4.18	-2.16	239.14	-6250.85
56.00	229.11	28.58	201.19	109.62	3.83	-2.09	260.91	-5934.84
57.00	248.37	30.03	215.02	124.31	3.49	-2.02	286.88	-5626.80
58.00	267.37	32.03	226.67	141.80	3.17	-1.98	315.38	-5442.88
59.00	295.20	33.89	245.06	164.59	2.81	-1.89	355.60	-5094.99
60.00	330.19	35.77	267.91	193.01	2.46	-1.77	406.96	-4695.73
61.00	375.74	37.29	298.91	227.66	2.12	-1.61	472.31	-4207.37
62.00	435.78	38.13	342.81	269.05	1.81	-1.42	553.97	-3636.77
63.00	527.40	37.50	418.43	321.05	1.50	-1.15	664.76	-2915.87
64.00	637.87	34.62	524.95	362.37	1.29	-0.89	775.10	-2214.76
65.00	800.21	28.90	700.55	386.72	1.09	-0.60	914.03	-1478.77
66.00	1001.17	18.83	947.61	323.09	0.95	-0.32	1057.76	-777.28
67.00	1212.72	3.05	1211.00	64.58	0.82	-0.04	1214.44	-104.30
68.00	1295.75	-15.77	1246.99	-352.10	0.74	0.21	1346.41	490.84
70.00	1088.53	-48.17	725.98	-811.08	0.61	0.68	1632.14	1556.34





**40 to 60 kHz-A (Broadband)**  
Transformed to 200 ohms minimum

Power Rating:

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 15W in B175

7 x 20.3 mm (0.80") PZT4

Active Area: 23 cm<sup>2</sup> (3.5 in<sup>2</sup>)

Radiating Surface: Urethane

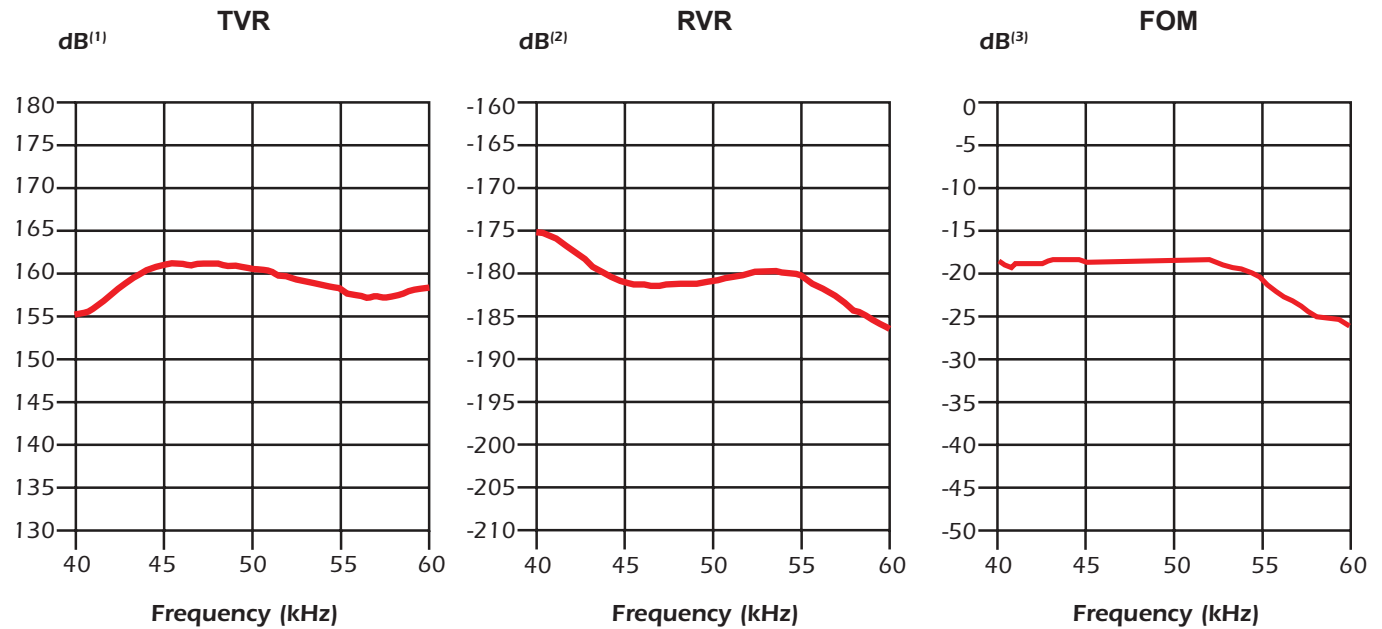
Q ≈ 2.5

Cable Type: C335

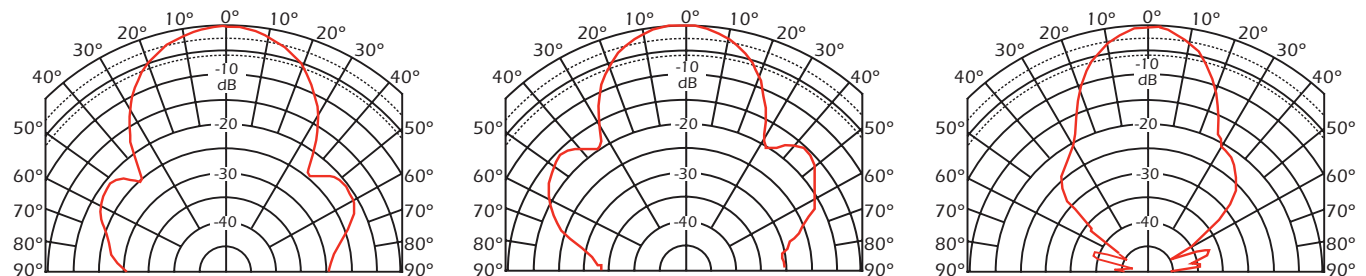
Cable Length: 10 m (33')

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 40 kHz
-3 dB	31°
-6 dB	43°
-10 dB	51°

Beamwidth	@ 50 kHz
-3 dB	27°
-6 dB	38°
-10 dB	47°

Beamwidth	@ 60 kHz
-3 dB	21°
-6 dB	30°
-10 dB	39°



*Sensing Technology*

# Technical Data Catalog

## 40 to 60 kHz-A (Broadband)

Transformed to 200 ohms

Note: Impedance data includes cable

**Unbalanced Impedance Table (Nominal Value) in 20°C Water**

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)
40.00	418.98	-34.21	346.49	-235.56	1.9738	1.3419	506.63	5339.18
41.00	339.61	-34.34	280.41	-191.59	2.4312	1.6611	411.31	6448.24
42.00	287.92	-31.89	244.46	-152.12	2.9488	1.8350	339.12	6953.62
43.00	242.44	-27.10	215.82	-110.45	3.6718	1.8791	272.35	6954.97
44.00	217.38	-21.04	202.89	-78.03	4.2937	1.6512	232.90	5972.68
45.00	205.36	-14.98	198.39	-53.07	4.7041	1.2583	212.58	4450.40
46.00	199.17	-8.79	196.83	-30.43	4.9619	0.7670	201.53	2653.90
47.00	201.44	-4.78	200.74	-16.79	4.9469	0.4138	202.15	1401.15
48.00	200.73	-1.22	200.69	-4.28	4.9806	0.1062	200.78	352.12
49.00	198.34	2.41	198.17	8.33	5.0373	-0.2118	198.52	-687.80
50.00	201.95	8.64	199.66	30.35	4.8954	-0.7442	204.27	-2368.94
51.00	207.39	12.71	202.31	45.63	4.7037	-1.0609	212.60	-3310.78
52.00	221.17	17.41	211.04	66.18	4.3142	-1.3530	231.79	-4141.13
53.00	240.15	21.20	223.90	86.83	3.8824	-1.5056	257.57	-4521.31
54.00	271.57	22.83	250.29	105.38	3.3937	-1.4289	294.67	-4211.38
55.00	306.70	25.43	276.99	131.69	2.9446	-1.4000	339.60	-4051.16
56.00	351.87	24.75	319.56	147.29	2.5810	-1.1897	387.45	-3381.07
57.00	406.37	21.82	377.26	151.04	2.2845	-0.9147	437.73	-2553.90
58.00	456.66	19.17	431.34	149.96	2.0684	-0.7191	483.47	-1973.26
59.00	515.06	10.82	505.90	96.68	1.9070	-0.3644	524.38	-983.09
60.00	559.21	4.13	557.76	40.28	1.7836	-0.1288	560.67	-341.62



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**40 to 60 kHz-B (Broadband)**  
 Transformed to 120 ohms minimum (B2)

Power Rating:

- 2 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 20W in PM411

14 x 20 mm (0.80") PZT

Active Area: 45.4 cm<sup>2</sup> (7.04 in<sup>2</sup>)

Radiating Surface: Epoxy/Urethane

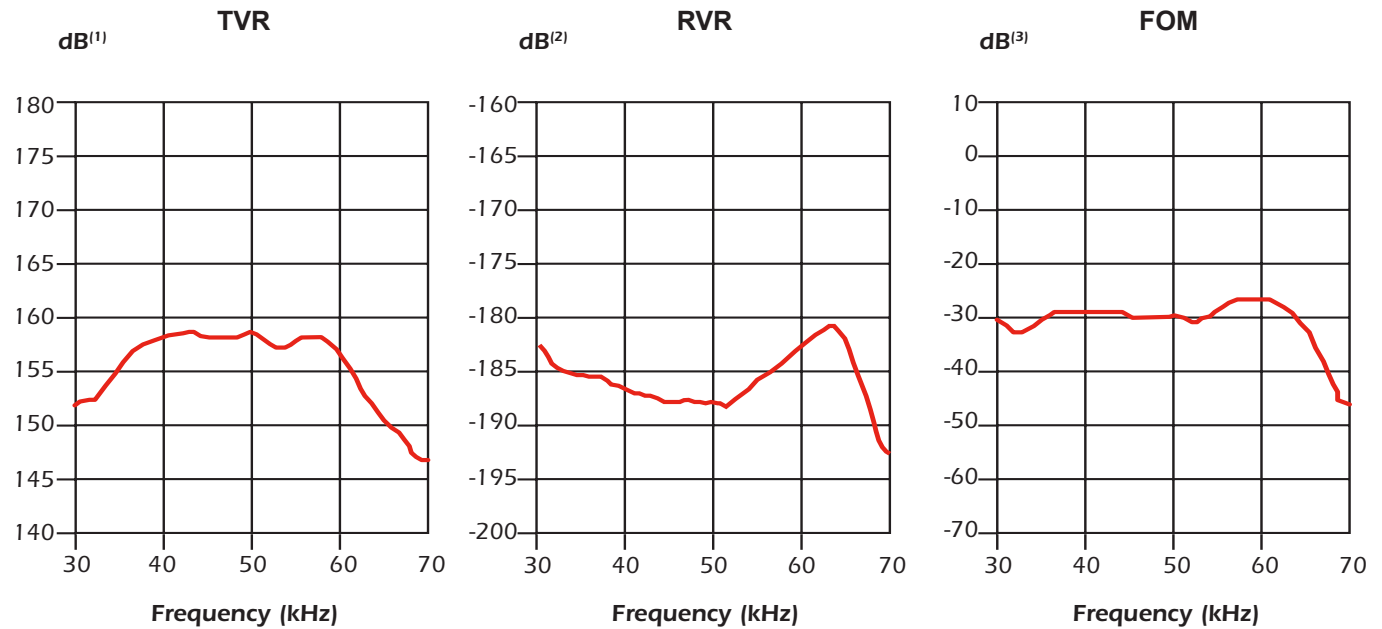
Q ≈ 2.0

Cable Type: C44-02

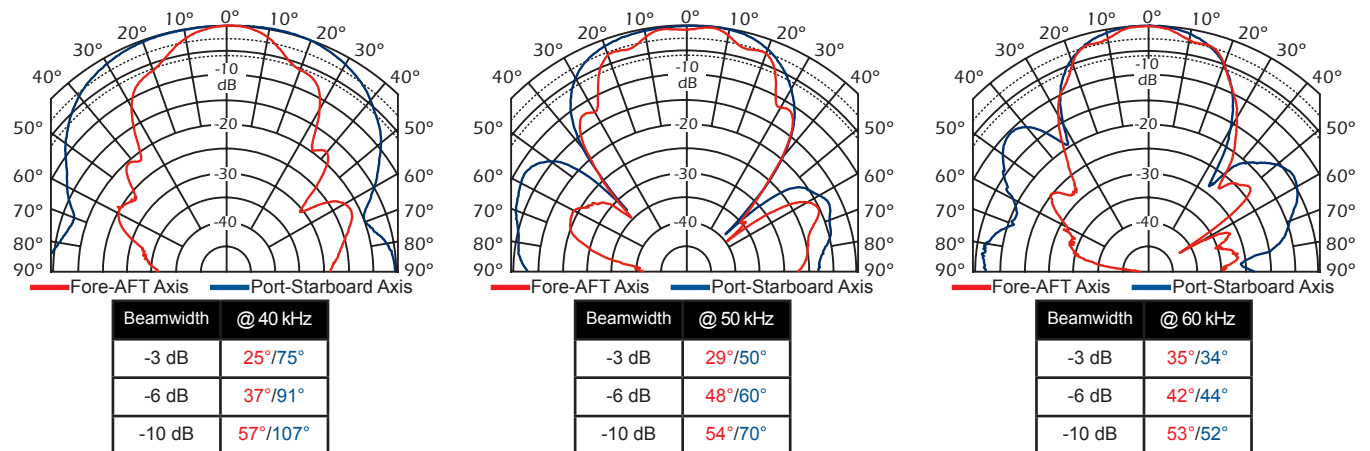
Cable Length: 15 m (50')

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



*Sensing Technology*

# Technical Data Catalog

## 40 to 60 kHz-B (Broadband)

Transformed to 120 ohms

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
30.00	280.74	-63.35	125.91	-250.92	1.60	3.18	625.94	16890.12
31.00	249.26	-62.50	115.08	-221.10	1.85	3.56	539.85	18270.53
32.00	223.17	-60.64	109.41	-194.51	2.20	3.91	455.24	19424.23
33.00	199.48	-58.84	103.23	-170.69	2.59	4.29	385.47	20687.73
34.00	179.03	-57.84	95.29	-151.57	2.97	4.73	336.39	22135.21
35.00	159.38	-55.83	89.52	-131.87	3.52	5.19	283.77	23605.08
36.00	144.70	-52.68	87.72	-115.08	4.19	5.50	238.70	24298.75
37.00	132.41	-47.87	88.83	-98.19	5.07	5.60	197.37	24091.34
39.00	115.61	-37.91	91.22	-71.03	6.82	5.31	146.53	21687.24
40.00	111.25	-32.62	93.70	-59.97	7.57	4.85	132.08	19280.78
41.00	109.09	-26.92	97.27	-49.39	8.17	4.15	122.35	16108.30
42.00	107.85	-20.99	100.69	-38.64	8.66	3.32	115.52	12587.73
43.00	109.46	-15.16	105.65	-28.63	8.82	2.39	113.41	8844.48
44.00	114.00	-10.81	111.98	-21.38	8.62	1.64	116.06	5949.53
45.00	118.90	-7.31	117.94	-15.13	8.34	1.07	119.88	3785.32
46.00	123.43	-5.32	122.90	-11.44	8.07	0.75	123.96	2598.37
47.00	125.31	-3.40	125.09	-7.42	7.97	0.47	125.53	1600.84
48.00	125.58	-0.62	125.57	-1.36	7.96	0.09	125.59	285.85
49.00	125.53	3.67	125.27	8.04	7.95	-0.51	125.79	-1657.83
50.00	130.69	10.18	128.64	23.09	7.53	-1.35	132.78	-4303.12
51.00	144.99	15.35	139.82	38.38	6.65	-1.83	150.35	-5697.03
52.00	162.91	17.24	155.59	48.30	5.86	-1.82	170.58	-5569.35
54.00	189.84	16.45	182.07	53.76	5.05	-1.49	197.94	-4396.39
55.00	198.09	17.58	188.84	59.83	4.81	-1.52	207.80	-4412.23
56.00	207.59	20.23	194.79	71.77	4.52	-1.67	221.23	-4733.32
57.00	225.98	23.67	206.97	90.71	4.05	-1.78	246.72	-4959.63
58.00	254.92	26.71	227.73	114.57	3.50	-1.76	285.37	-4837.61
59.00	295.21	29.32	257.38	144.57	2.95	-1.66	338.59	-4475.12
60.00	356.07	29.89	308.72	177.42	2.44	-1.40	410.68	-3711.96
61.00	437.21	28.53	384.11	208.85	2.01	-1.09	497.66	-2850.54
62.00	552.41	23.96	504.81	224.33	1.65	-0.74	604.50	-1887.10
63.00	712.56	15.22	687.55	187.11	1.35	-0.37	738.47	-930.95
64.00	888.50	-0.04	888.50	-0.64	1.13	0.00	888.50	2.03
65.00	994.66	-21.35	926.43	-362.04	0.94	0.37	1067.92	896.02
66.00	929.16	-42.10	689.45	-622.89	0.80	0.72	1252.21	1739.83
67.00	795.98	-56.95	434.05	-667.23	0.69	1.05	1459.72	2501.56
68.00	668.42	-66.52	266.32	-613.08	0.60	1.37	1677.63	3211.60
69.00	570.40	-72.64	170.15	-544.43	0.52	1.67	1912.23	3859.72
70.00	495.75	-76.68	114.19	-482.42	0.46	1.96	2152.30	4462.91



*Sensing Technology*

**40 to 75 kHz-A (Broadband)**  
Transformed to 100 ohms minimum (B1)

Power Rating:

- 300 W @ 1% duty cycle
- CW<sup>(4)</sup>: 8W in B75, B765

34.9 mm (1.37 in) PZT

Active Area: 9.6 cm<sup>2</sup> ( 1.49 in<sup>2</sup>)

Radiating Surface: Urethane

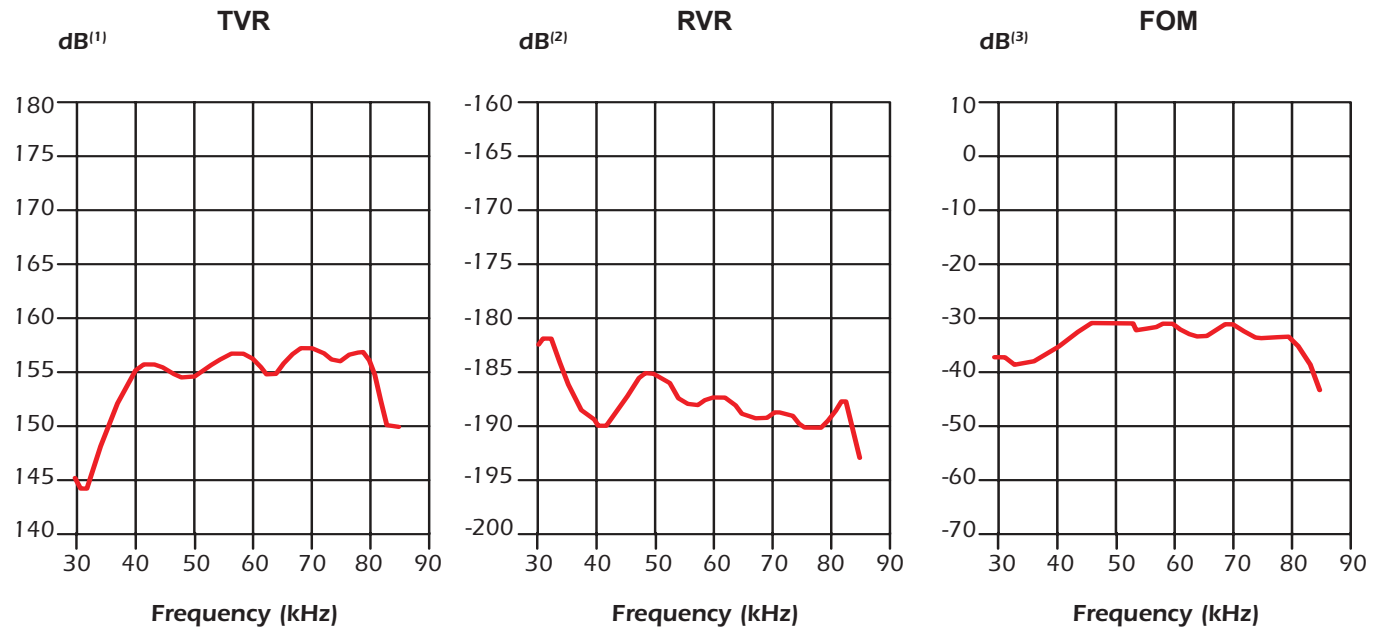
Q ≈ 2

Cable Type: C335

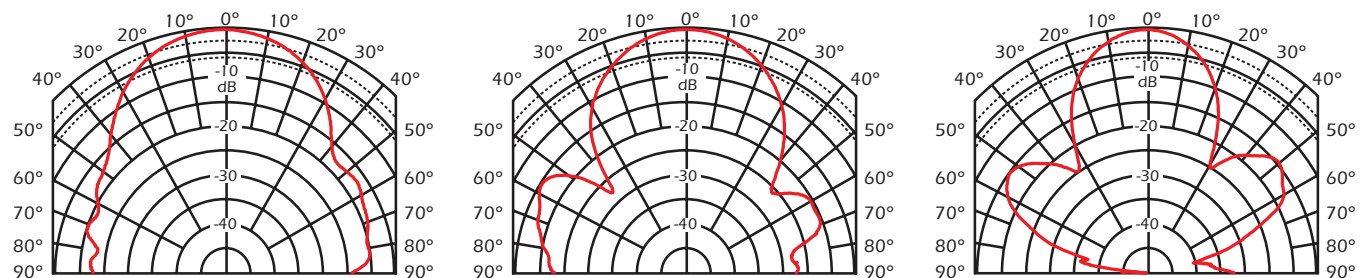
Cable Length: 12 m (40 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 50 kHz
-3 dB	32°
-6 dB	45°
-10 dB	59°

Beamwidth	@ 65 kHz
-3 dB	28°
-6 dB	40°
-10 dB	51°

Beamwidth	@ 75 kHz
-3 dB	21°
-6 dB	30°
-10 dB	39°



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# Technical Data Catalog

## 40 to 75 kHz-A (Broadband)

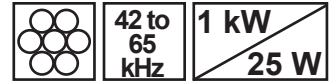
Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
35.00	280.50	-39.59	216.15	-178.77	2.75	2.27	364.01	10331.93
36.00	222.38	-39.14	172.49	-140.36	3.49	2.84	286.70	12547.90
37.00	180.38	-37.05	143.97	-108.67	4.43	3.34	225.99	14366.86
38.00	150.31	-32.91	126.19	-81.67	5.59	3.61	179.04	15138.44
39.00	127.79	-26.20	114.66	-56.43	7.02	3.46	142.43	14100.23
41.00	108.82	-5.65	108.29	-10.70	9.15	0.90	109.35	3509.24
42.00	113.47	5.35	112.97	10.58	8.77	-0.82	113.96	-3115.06
43.00	126.37	13.74	122.76	30.01	7.69	-1.88	130.09	-6955.52
44.00	147.36	18.83	139.47	47.56	6.42	-2.19	155.69	-7921.99
46.00	202.86	17.06	193.94	59.50	4.71	-1.45	212.19	-5002.56
47.00	229.26	12.23	224.06	48.55	4.26	-0.92	234.58	-3127.95
48.00	249.49	4.80	248.61	20.89	3.99	-0.34	250.36	-1112.68
49.00	256.38	-3.36	255.94	-15.04	3.89	0.23	256.82	743.36
50.00	250.77	-10.57	246.52	-45.99	3.92	0.73	255.10	2327.82
51.00	237.78	-16.19	228.35	-66.30	4.04	1.17	247.60	3659.50
52.00	220.06	-19.99	206.80	-75.22	4.27	1.55	234.16	4754.44
53.00	203.43	-22.29	188.23	-77.15	4.55	1.86	219.85	5598.31
54.00	187.81	-22.26	173.81	-71.15	4.93	2.02	202.94	5945.49
56.00	169.55	-17.81	161.42	-51.87	5.62	1.80	178.09	5127.84
57.00	168.88	-14.34	163.62	-41.84	5.74	1.47	174.32	4095.67
58.00	174.92	-11.10	171.65	-33.68	5.61	1.10	178.26	3020.46
59.00	188.53	-9.55	185.91	-31.29	5.23	0.88	191.18	2374.60
60.00	206.18	-10.63	202.64	-38.04	4.77	0.89	209.78	2373.91
61.00	222.89	-14.16	216.12	-54.52	4.35	1.10	229.87	2863.11
62.00	230.76	-20.17	216.61	-79.57	4.07	1.49	245.84	3835.96
63.00	228.53	-26.46	204.58	-101.84	3.92	1.95	255.28	4926.37
64.00	214.52	-31.41	183.08	-111.81	3.98	2.43	251.36	6042.07
66.00	181.62	-34.16	150.29	-101.98	4.56	3.09	219.49	7455.22
67.00	170.54	-32.39	144.01	-91.36	4.95	3.14	201.97	7461.74
68.00	165.26	-29.46	143.90	-81.27	5.27	2.98	189.80	6964.78
69.00	165.84	-26.13	148.89	-73.03	5.41	2.66	184.71	6124.87
71.00	180.27	-23.16	165.75	-70.89	5.10	2.18	196.07	4889.82
72.00	189.42	-24.51	172.35	-78.57	4.80	2.19	208.17	4840.84
73.00	194.65	-26.45	174.28	-86.69	4.60	2.29	217.40	4988.39
74.00	195.93	-29.00	171.35	-95.00	4.46	2.47	224.02	5322.78
76.00	187.10	-31.10	160.20	-96.65	4.58	2.76	218.52	5782.00
77.00	181.70	-29.38	158.33	-89.15	4.80	2.70	208.53	5581.27
78.00	180.79	-25.42	163.28	-77.60	5.00	2.37	200.16	4844.68
79.00	189.84	-19.05	179.44	-61.98	4.98	1.72	200.85	3464.48
80.00	223.57	-12.15	218.56	-47.07	4.37	0.94	228.70	1873.50



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**42 to 65 kHz-A (Broadband)**  
 Transformed to 100 ohms minimum (B1)

Power Rating:

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 25W in B265, PM265  
 15W in M265, TM265

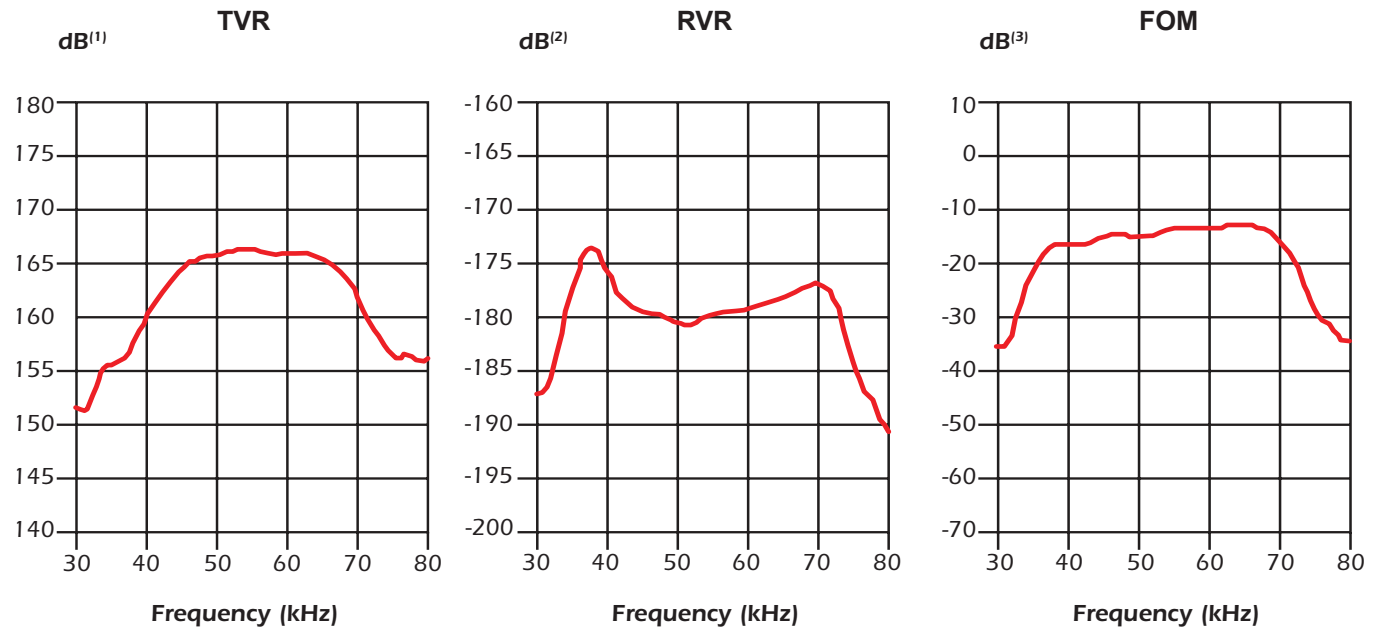
7 x 28.6 mm (1.13 in) PZT  
 Active Area: 45 cm<sup>2</sup> (6.9 in<sup>2</sup>)  
 Radiating Surface: Urethane

Q ≈ 2

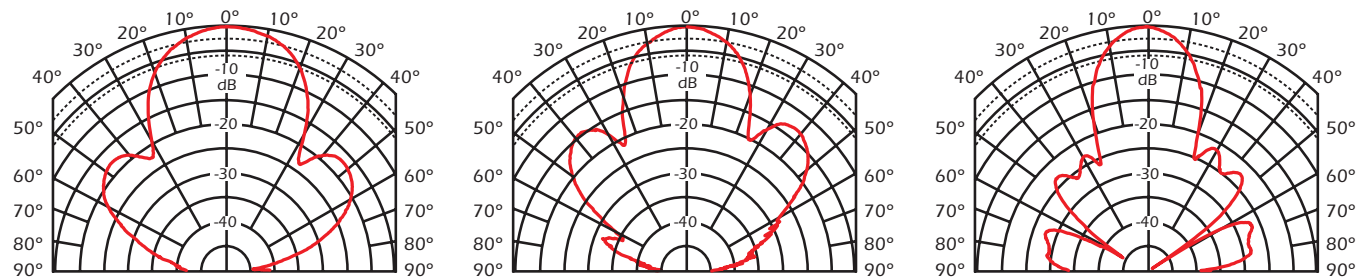
Cable Type: C335  
 Cable Length: 10 m (33 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 42 kHz
-3 dB	25°
-6 dB	35°
-10 dB	43°

Beamwidth	@ 50 kHz
-3 dB	20°
-6 dB	28°
-10 dB	34°

Beamwidth	@ 65 kHz
-3 dB	16°
-6 dB	22°
-10 dB	28°



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# Technical Data Catalog

## 42 to 65 kHz-A (Broadband)

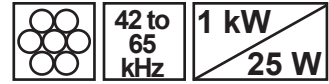
Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
40.00	305.87	-15.48	294.78	-81.62	3.15	0.87	317.38	3470.98
41.00	247.24	-19.88	232.50	-84.08	3.80	1.38	262.91	5339.42
42.00	203.32	-20.42	190.54	-70.94	4.61	1.72	216.95	6502.90
43.00	173.62	-19.56	163.60	-58.14	5.43	1.93	184.26	7138.63
44.00	152.61	-16.64	146.22	-43.70	6.28	1.88	159.28	6786.59
45.00	140.30	-12.05	137.20	-29.29	6.97	1.49	143.46	5262.71
46.00	134.39	-8.36	132.96	-19.55	7.36	1.08	135.83	3745.19
47.00	129.98	-5.84	129.31	-13.23	7.65	0.78	130.66	2651.98
48.00	126.28	-3.80	126.00	-8.37	7.90	0.53	126.55	1740.80
49.00	123.64	-1.69	123.58	-3.64	8.08	0.24	123.69	773.95
50.00	119.60	0.02	119.60	0.03	8.36	0.00	119.60	-7.13
51.00	115.87	3.54	115.65	7.15	8.61	-0.53	116.09	-1661.96
52.00	116.85	7.67	115.81	15.59	8.48	-1.14	117.91	-3495.61
53.00	120.09	11.08	117.86	23.07	8.17	-1.60	122.37	-4803.73
54.00	125.09	13.76	121.50	29.74	7.77	-1.90	128.78	-5602.29
55.00	131.10	15.44	126.37	34.90	7.35	-2.03	136.01	-5875.61
56.00	138.17	16.25	132.65	38.67	6.95	-2.03	143.92	-5757.18
57.00	144.18	16.30	138.39	40.46	6.66	-1.95	150.22	-5434.31
58.00	147.81	16.55	141.69	42.11	6.48	-1.93	154.20	-5288.48
59.00	154.64	17.23	147.70	45.81	6.18	-1.92	161.91	-5167.01
60.00	159.67	16.88	152.79	46.36	5.99	-1.82	166.86	-4823.14
61.00	164.96	17.59	157.25	49.84	5.78	-1.83	173.05	-4778.87
62.00	171.78	18.35	163.05	54.08	5.53	-1.83	180.99	-4704.40
63.00	182.10	18.89	172.28	58.97	5.20	-1.78	192.47	-4492.47
64.00	190.26	19.35	179.52	63.03	4.96	-1.74	201.65	-4330.09
65.00	203.20	20.59	190.22	71.47	4.61	-1.73	217.07	-4238.17
66.00	220.23	21.49	204.92	80.67	4.23	-1.66	236.68	-4010.94
67.00	244.22	21.86	226.65	90.94	3.80	-1.52	263.14	-3622.18
68.00	275.19	21.56	255.95	101.11	3.38	-1.34	295.89	-3124.79
69.00	319.03	20.17	299.48	109.98	2.94	-1.08	339.87	-2492.40
70.00	381.73	15.34	368.12	101.01	2.53	-0.69	395.84	-1576.06



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## 42 to 65 kHz-A (Broadband)

Transformed to 100 ohms minimum with internal diplexer (B1)

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 25W in B265, PM265  
15W in M265, TM265

7 x 28.6 mm (1.13 in) PZT

Active Area: 45 cm<sup>2</sup> (6.9 in<sup>2</sup>)

Radiating Surface: Urethane

Q ≈ 2

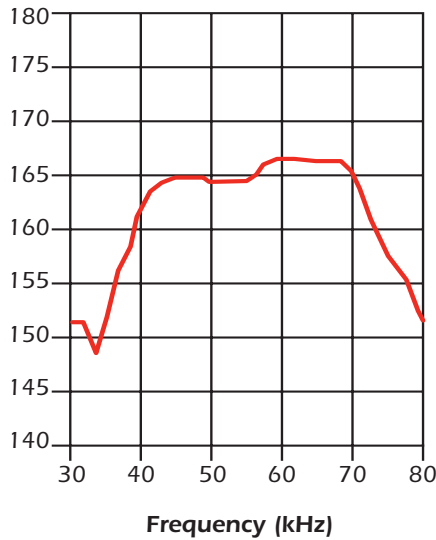
Cable Type: C332

Cable Length: 10 m (33 ft)

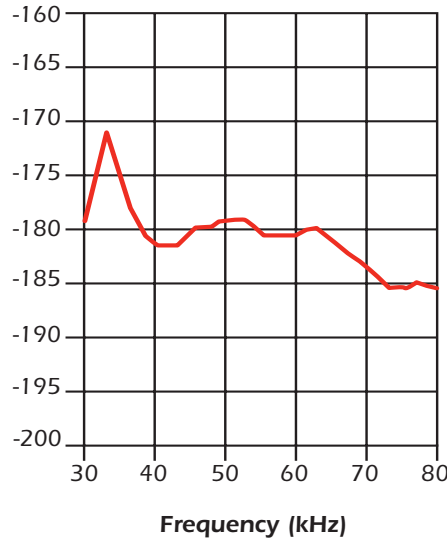
**Notes:**

- (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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.

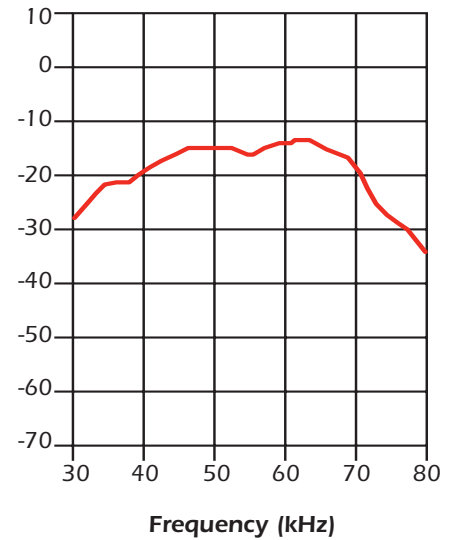
**TVR**  
dB<sup>(1)</sup>



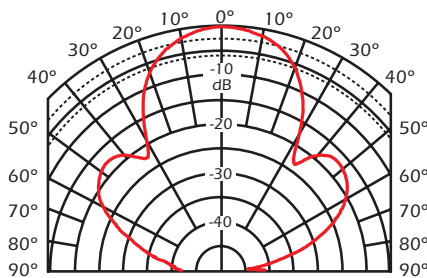
**RVR**  
dB<sup>(2)</sup>



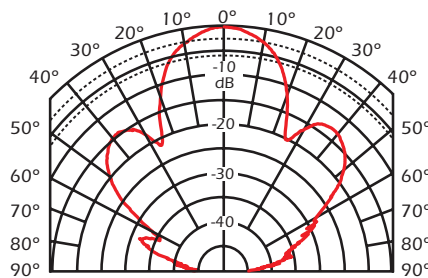
**FOM**  
dB<sup>(3)</sup>



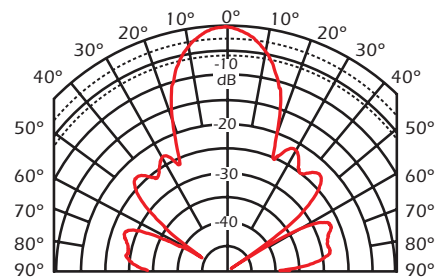
### Transmit Radiation Pattern



Beamwidth	@ 42 kHz
-3 dB	25°
-6 dB	35°
-10 dB	43°



Beamwidth	@ 50 kHz
-3 dB	20°
-6 dB	28°
-10 dB	34°



Beamwidth	@ 65 kHz
-3 dB	16°
-6 dB	22°
-10 dB	28°



*Sensing Technology*

# Technical Data Catalog

## 42 to 65 kHz-A (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
30.00	369.73	83.91	39.20	367.64	0.29	-2.69	3487.58	-14268.01
31.00	458.23	80.95	72.10	452.52	0.34	-2.16	2912.20	-11064.50
32.00	612.89	75.00	158.64	592.00	0.42	-1.58	2367.81	-7838.46
34.00	1307.23	21.62	1215.29	481.58	0.71	-0.28	1406.12	-1319.17
35.00	895.70	-24.50	815.05	-371.44	1.02	0.46	984.32	2105.29
36.00	521.51	-39.81	400.58	-333.93	1.47	1.23	678.95	5428.02
38.00	236.80	-41.41	177.59	-156.64	3.17	2.79	315.76	11699.57
39.00	179.20	-35.91	145.14	-105.10	4.52	3.27	221.25	13357.34
40.00	142.39	-27.65	126.13	-66.07	6.22	3.26	160.74	12967.03
42.00	113.37	-4.79	112.98	-9.46	8.79	0.74	113.77	2790.29
43.00	112.00	5.56	111.47	10.86	8.89	-0.87	112.53	-3204.41
44.00	118.72	12.92	115.71	26.54	8.21	-1.88	121.80	-6812.68
46.00	132.25	19.33	124.79	43.78	7.14	-2.50	140.15	-8660.73
47.00	135.14	22.06	125.24	50.76	6.86	-2.78	145.81	-9412.51
48.00	140.50	24.34	128.01	57.91	6.48	-2.93	154.21	-9726.54
50.00	156.97	25.32	141.89	67.14	5.76	-2.73	173.66	-8673.82
51.00	162.23	23.71	148.53	65.24	5.64	-2.48	177.19	-7736.13
52.00	164.41	22.36	152.06	62.54	5.63	-2.31	177.77	-7080.60
54.00	162.16	17.95	154.26	49.98	5.87	-1.90	170.45	-5602.39
55.00	154.93	16.29	148.71	43.45	6.20	-1.81	161.40	-5239.04
56.00	145.43	16.49	139.45	41.28	6.59	-1.95	151.67	-5547.28
58.00	129.54	21.14	120.83	46.72	7.20	-2.78	138.89	-7639.77
59.00	126.81	25.10	114.84	53.79	7.14	-3.34	140.04	-9023.02
60.00	128.44	29.21	112.10	62.68	6.80	-3.80	147.15	-10079.31
62.00	136.41	33.56	113.67	75.41	6.11	-4.05	163.70	-10403.53
63.00	139.81	34.06	115.82	78.31	5.93	-4.01	168.77	-10120.97
64.00	140.07	33.41	116.92	77.13	5.96	-3.93	167.80	-9776.78
66.00	128.22	34.77	105.32	73.13	6.41	-4.45	156.10	-10726.58
67.00	120.52	38.43	94.41	74.91	6.50	-5.16	153.84	-12251.04
68.00	114.92	44.40	82.11	80.40	6.22	-6.09	160.84	-14249.97
70.00	120.19	60.97	58.32	105.09	4.04	-7.28	247.70	-16541.12
71.00	131.74	67.88	49.62	122.04	2.86	-7.03	349.82	-15762.33
72.00	147.83	72.91	43.45	141.30	1.99	-6.47	502.95	-14291.97
74.00	187.22	77.96	39.06	183.10	1.11	-5.22	897.37	-11234.73
75.00	208.62	79.19	39.12	204.92	0.90	-4.71	1112.62	-9991.31
76.00	231.26	79.96	40.31	227.72	0.75	-4.26	1326.69	-8916.77
78.00	283.38	80.75	45.57	279.69	0.57	-3.48	1762.21	-7106.74
79.00	314.90	80.70	50.89	310.76	0.51	-3.13	1948.60	-6313.52
80.00	351.93	79.83	62.14	346.40	0.50	-2.80	1993.06	-5564.04

**80 to 130 kHz-A (Broadband)**  
Transformed to 100 ohms minimum (B1)

Power Rating:

- 600 W @ 1% duty cycle
- CW<sup>(4)</sup>: 6W in B75, B765, B785

43 mm (1.7 in) PZT

Active Area: 15 cm<sup>2</sup> (2.3 in<sup>2</sup>)

Radiating Surface: Urethane

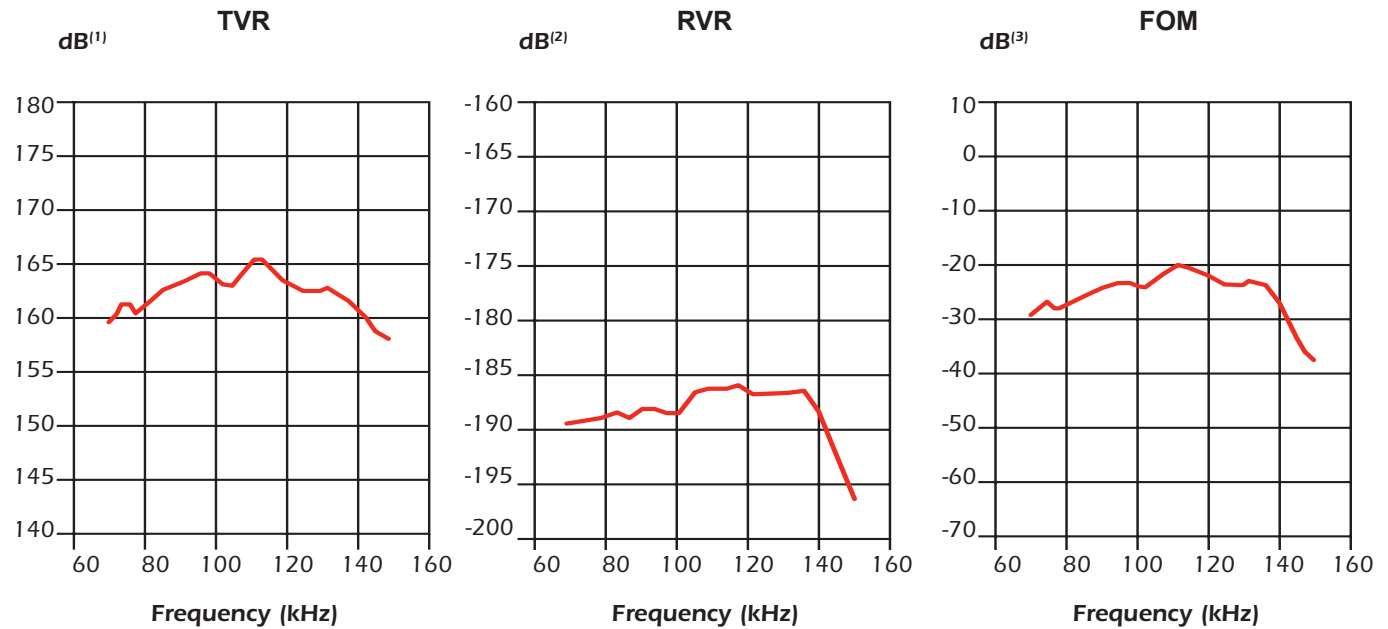
Q ≈ 2.5

Cable Type: C334

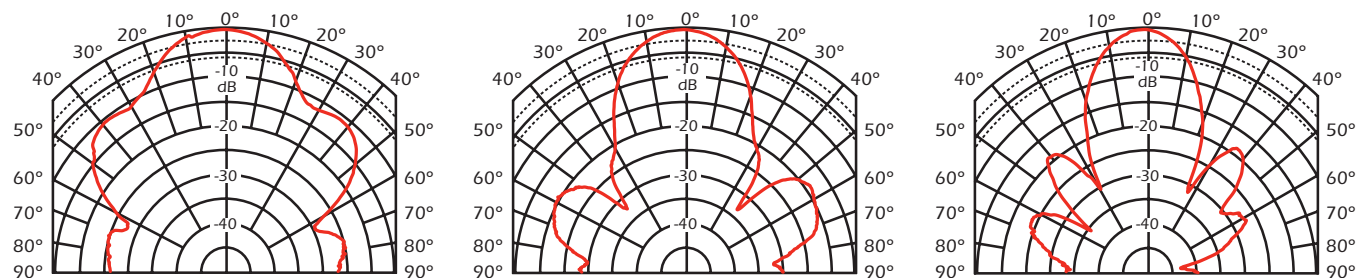
Cable Length: 12 m (40 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 80 kHz
-3 dB	24°
-6 dB	33°
-10 dB	43°

Beamwidth	@ 100 kHz
-3 dB	20°
-6 dB	29°
-10 dB	36°

Beamwidth	@ 130 kHz
-3 dB	16°
-6 dB	23°
-10 dB	29°



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# Technical Data Catalog

## 80 to 130 kHz-A (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
70.00	112.82	57.74	60.22	95.40	4.73	-7.50	211.35	-17042.10
72.00	109.93	52.61	66.76	87.33	5.52	-7.23	181.01	-15975.96
74.00	106.06	51.34	66.25	82.82	5.89	-7.36	169.77	-15835.37
76.00	109.80	51.58	68.24	86.02	5.66	-7.14	176.67	-14942.55
78.00	117.91	48.81	77.66	88.72	5.59	-6.38	179.03	-13022.05
80.00	122.20	43.56	88.55	84.21	5.93	-5.64	168.63	-11219.11
82.00	121.09	38.46	94.82	75.31	6.47	-5.14	154.64	-9968.67
84.00	116.51	35.29	95.10	67.31	7.01	-4.96	142.74	-9394.42
86.00	112.35	34.52	92.57	63.67	7.33	-5.04	136.35	-9334.78
88.00	112.53	34.68	92.54	64.02	7.31	-5.06	136.83	-9144.45
90.00	115.22	33.69	95.86	63.91	7.22	-4.81	138.48	-8514.20
92.00	115.97	31.52	98.85	60.63	7.35	-4.51	136.04	-7799.69
94.00	114.40	29.63	99.44	56.57	7.60	-4.32	131.62	-7317.73
96.00	111.06	29.59	96.58	54.84	7.83	-4.45	127.72	-7370.08
98.00	109.88	32.16	93.01	58.49	7.70	-4.84	129.79	-7868.17
100.00	114.43	35.31	93.38	66.14	7.13	-5.05	140.22	-8038.96
102.00	126.23	37.76	99.81	77.29	6.26	-4.85	159.66	-7568.24
104.00	144.84	36.21	116.86	85.57	5.57	-4.08	179.51	-6242.24
106.00	162.27	27.60	143.81	75.17	5.46	-2.85	183.10	-4286.33
108.00	156.07	19.63	147.00	52.42	6.04	-2.15	165.69	-3171.62
110.00	143.31	17.48	136.69	43.05	6.66	-2.10	150.25	-3033.01
112.00	137.74	19.31	129.99	45.55	6.85	-2.40	145.95	-3411.58
114.00	139.98	23.09	128.77	54.89	6.57	-2.80	152.17	-3911.20
116.00	153.87	25.36	139.04	65.91	5.87	-2.78	170.28	-3819.54
118.00	175.82	23.36	161.41	69.73	5.22	-2.26	191.53	-3042.09
120.00	185.83	18.33	176.40	58.44	5.11	-1.69	195.76	-2244.56
122.00	195.12	15.64	187.90	52.59	4.94	-1.38	202.62	-1801.91
124.00	208.10	11.62	203.84	41.91	4.71	-0.97	212.45	-1242.15
126.00	217.11	7.58	215.22	28.63	4.57	-0.61	219.03	-767.19
128.00	226.43	3.49	226.01	13.77	4.41	-0.27	226.85	-333.95
130.00	234.00	-1.13	233.96	-4.60	4.27	0.08	234.05	102.84
132.00	238.43	-4.07	237.83	-16.93	4.18	0.30	239.03	359.03
134.00	257.22	-5.81	255.90	-26.02	3.87	0.39	258.55	467.17
136.00	294.93	-11.35	289.16	-58.06	3.32	0.67	300.82	781.14
138.00	327.05	-22.37	302.44	-124.46	2.83	1.16	353.66	1342.03
140.00	331.62	-36.85	265.37	-198.88	2.41	1.81	414.42	2055.87

**80 to 130 kHz-B (Broadband)**  
 Transformed to 100 ohms minimum (B1)

Power Rating:

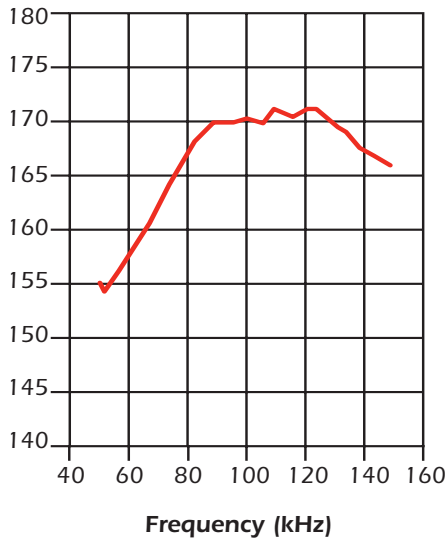
- 2 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 30W in R509, R609  
 25W in CM199, CM599,  
 PM111, R109,  
 R111, R599

88 mm (3.46 in) PZT  
 Active Area: 61 cm<sup>2</sup> (9.4 in<sup>2</sup>)  
 Radiating Surface:  
 Cast Resin/Urethane  
 Q ≈ 2  
 Cable Type: C44-02  
 Cable Length: 10 m (33 ft)

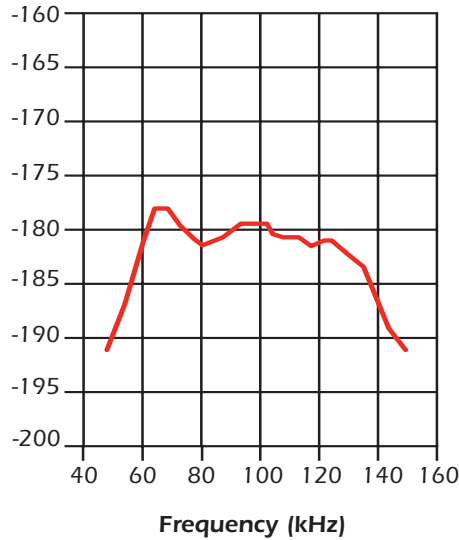
Notes:

- (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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.

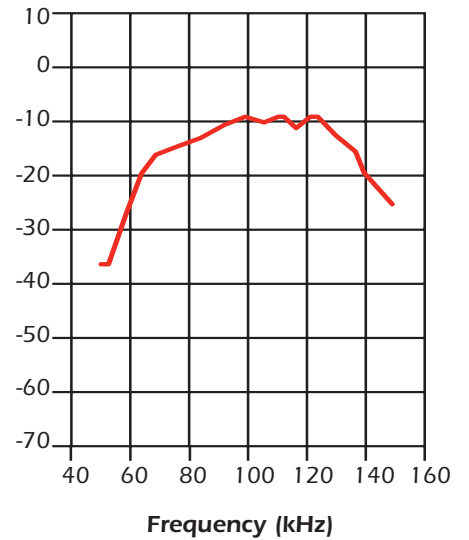
**TVR**  
dB<sup>(1)</sup>



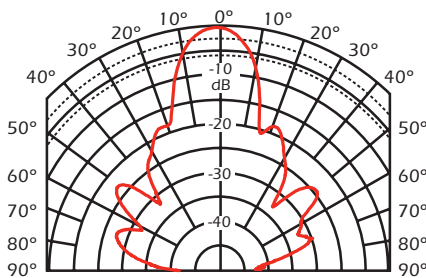
**RVR**  
dB<sup>(2)</sup>



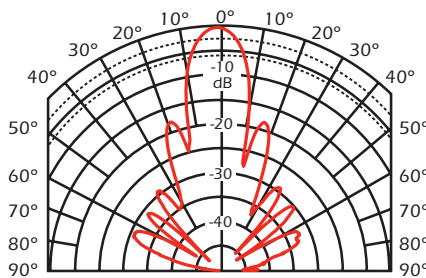
**FOM**  
dB<sup>(3)</sup>



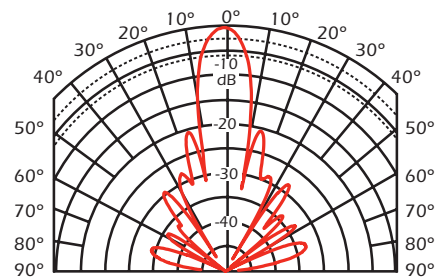
**Transmit Radiation Pattern**



Beamwidth	@ 80 kHz
-3 dB	13°
-6 dB	18°
-10 dB	23°



Beamwidth	@ 100 kHz
-3 dB	10°
-6 dB	13°
-10 dB	17°



Beamwidth	@ 130 kHz
-3 dB	8°
-6 dB	11°
-10 dB	14°



*Sensing Technology*

# Technical Data Catalog

## 80 to 130 kHz-B (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
70.00	352.49	9.16	348.00	56.10	2.80	-0.45	357.04	-1026.46
72.00	300.17	-7.39	297.68	-38.61	3.30	0.43	302.69	947.26
74.00	238.95	-15.07	230.73	-62.12	4.04	1.09	247.46	2339.85
76.00	193.20	-16.98	184.78	-56.41	4.95	1.51	202.00	3164.75
78.00	166.77	-14.88	161.18	-42.84	5.80	1.54	172.56	3142.75
80.00	152.62	-12.33	149.10	-32.60	6.40	1.40	156.22	2784.39
82.00	142.34	-10.22	140.08	-25.24	6.91	1.25	144.63	2418.34
84.00	136.54	-7.89	135.24	-18.75	7.25	1.01	137.84	1905.72
86.00	131.32	-5.61	130.69	-12.84	7.58	0.74	131.95	1377.97
88.00	128.21	-1.96	128.13	-4.39	7.80	0.27	128.28	483.53
90.00	131.64	1.95	131.56	4.48	7.59	-0.26	131.72	-456.88
92.00	141.65	3.79	141.34	9.37	7.04	-0.47	141.96	-807.72
94.00	150.64	2.53	150.50	6.66	6.63	-0.29	150.79	-497.04
96.00	156.64	-0.07	156.64	-0.19	6.38	0.01	156.64	12.52
98.00	159.32	-2.17	159.21	-6.05	6.27	0.24	159.44	386.78
100.00	162.35	-3.34	162.07	-9.46	6.15	0.36	162.62	571.22
102.00	169.56	-5.60	168.75	-16.56	5.87	0.58	170.38	898.66
104.00	174.55	-10.39	171.69	-31.47	5.64	1.03	177.45	1580.69
106.00	167.56	-15.14	161.74	-43.75	5.76	1.56	173.58	2339.90
108.00	157.16	-16.91	150.36	-45.72	6.09	1.85	164.27	2728.03
110.00	150.50	-15.71	144.88	-40.76	6.40	1.80	156.35	2603.83
112.00	153.63	-14.00	149.07	-37.18	6.32	1.58	158.34	2238.26
114.00	161.95	-15.32	156.20	-42.78	5.96	1.63	167.92	2277.07
116.00	163.62	-19.19	154.53	-53.78	5.77	2.01	173.25	2756.23
118.00	155.05	-21.19	144.57	-56.04	6.01	2.33	166.29	3144.16
120.00	152.02	-18.69	144.00	-48.73	6.23	2.11	160.49	2796.22
122.00	162.34	-17.10	155.16	-47.74	5.89	1.81	169.85	2363.38
124.00	175.29	-18.48	166.25	-55.57	5.41	1.81	184.83	2321.15
126.00	188.46	-22.04	174.69	-70.72	4.92	1.99	203.32	2515.12
128.00	197.94	-27.87	174.99	-92.52	4.47	2.36	223.91	2936.16
130.00	199.27	-34.00	165.20	-111.43	4.16	2.81	240.36	3435.51
132.00	197.51	-38.56	154.43	-123.13	3.96	3.16	252.60	3805.58
134.00	200.38	-43.53	145.29	-138.00	3.62	3.44	276.36	4082.07
136.00	199.95	-50.19	128.01	-153.60	3.20	3.84	312.32	4496.08
138.00	190.44	-57.56	102.16	-160.71	2.82	4.43	354.99	5110.90
140.00	174.34	-63.38	78.12	-155.86	2.57	5.13	389.06	5829.30



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## 85 to 135 kHz-B (Broadband)

Transformed to 100 ohms minimum (B1)

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 18W in B175, B265, B285, PM265  
12W in M265, TM185, TM265

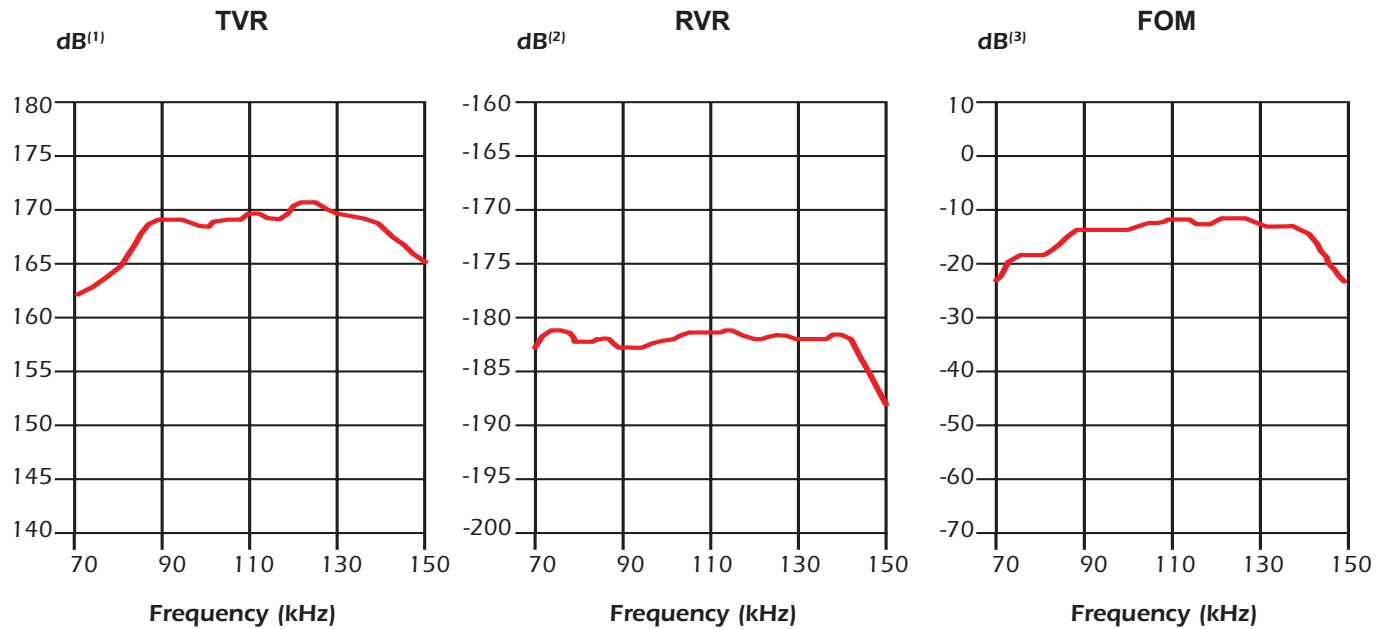
65 mm (2.56 in) PZT  
Active Area: 33 cm<sup>2</sup> (5.1 in<sup>2</sup>)

Radiating Surface: Urethane  
Q ≈ 2

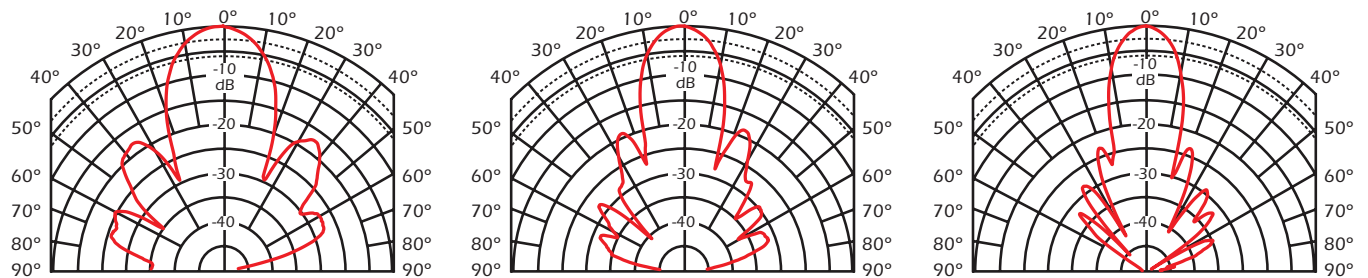
Cable Type: C335  
Cable Length: 10 m (33 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



## Transmit Radiation Pattern



Beamwidth	@ 85 kHz
-3 dB	16°
-6 dB	22°
-10 dB	29°

Beamwidth	@ 105 kHz
-3 dB	13°
-6 dB	18°
-10 dB	22°

Beamwidth	@ 135 kHz
-3 dB	11°
-6 dB	15°
-10 dB	19°



*Sensing Technology*

# Technical Data Catalog

## 85 to 135 kHz-B (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
75.00	240.21	29.30	209.48	117.57	3.63	-2.04	275.46	-4323.59
77.00	231.70	16.69	221.94	66.54	4.13	-1.24	241.89	-2561.81
79.00	204.27	7.58	202.48	26.95	4.85	-0.65	206.07	-1301.08
81.00	183.32	3.40	182.99	10.87	5.45	-0.32	183.64	-635.29
83.00	170.03	-1.06	170.00	-3.14	5.88	0.11	170.06	208.32
85.00	150.91	-5.20	150.29	-13.67	6.60	0.60	151.54	1123.61
87.00	130.38	-5.70	129.74	-12.96	7.63	0.76	131.03	1394.63
89.00	117.20	-2.52	117.09	-5.15	8.52	0.38	117.31	670.63
91.00	111.64	3.07	111.48	5.97	8.94	-0.48	111.79	-837.83
93.00	114.06	8.14	112.91	16.15	8.68	-1.24	115.22	-2124.79
95.00	120.70	10.90	118.52	22.83	8.14	-1.57	122.92	-2625.71
97.00	130.07	12.03	127.22	27.11	7.52	-1.60	133.00	-2629.03
99.00	142.17	10.29	139.88	25.39	6.92	-1.26	144.49	-2019.20
101.00	148.32	6.09	147.49	15.73	6.70	-0.71	149.16	-1126.55
103.00	149.11	3.53	148.82	9.19	6.69	-0.41	149.39	-638.51
105.00	152.85	1.70	152.78	4.52	6.54	-0.19	152.92	-293.52
107.00	156.36	-1.39	156.31	-3.80	6.39	0.16	156.40	230.91
109.00	155.91	-3.97	155.54	-10.80	6.40	0.44	156.29	648.58
111.00	156.14	-4.98	155.55	-13.55	6.38	0.56	156.73	797.02
113.00	164.32	-5.79	163.48	-16.59	6.05	0.61	165.16	865.42
115.00	174.54	-11.92	170.77	-36.06	5.61	1.18	178.39	1638.25
117.00	164.75	-19.34	155.45	-54.57	5.73	2.01	174.60	2734.69
119.00	148.66	-20.46	139.28	-51.96	6.30	2.35	158.67	3144.64
121.00	142.19	-17.38	135.70	-42.47	6.71	2.10	148.99	2762.55
123.00	147.06	-14.66	142.28	-37.23	6.58	1.72	152.02	2227.19
125.00	157.33	-15.05	151.93	-40.86	6.14	1.65	162.92	2101.98
127.00	165.42	-17.43	157.83	-49.55	5.77	1.81	173.39	2269.18
129.00	170.32	-20.27	159.77	-59.00	5.51	2.03	181.56	2509.22
131.00	173.62	-22.89	159.96	-67.53	5.31	2.24	188.46	2721.46
133.00	177.00	-24.58	160.96	-73.63	5.14	2.35	194.64	2812.33
135.00	185.77	-25.74	167.34	-80.67	4.85	2.34	206.23	2755.77
137.00	201.62	-28.69	176.86	-96.81	4.35	2.38	229.85	2766.43
139.00	219.05	-34.90	179.66	-125.31	3.74	2.61	267.06	2990.37
141.00	229.49	-43.85	165.50	-158.98	3.14	3.02	318.22	3407.39
143.00	224.57	-54.12	131.63	-181.95	2.61	3.61	383.13	4015.33
145.00	206.22	-62.51	95.20	-182.93	2.24	4.30	446.71	4721.54

**95 to 155 kHz-A (Broadband)**  
Transformed to 100 ohms minimum (B1)

Power Rating:

- 300 W @ 1% duty cycle
- CW<sup>(4)</sup>: 5W in TM150

33 mm (1.3 in) PZT

Active Area: 8.6 cm<sup>2</sup> (1.33 in<sup>2</sup>)

Radiating Surface: Plastic/Urethane

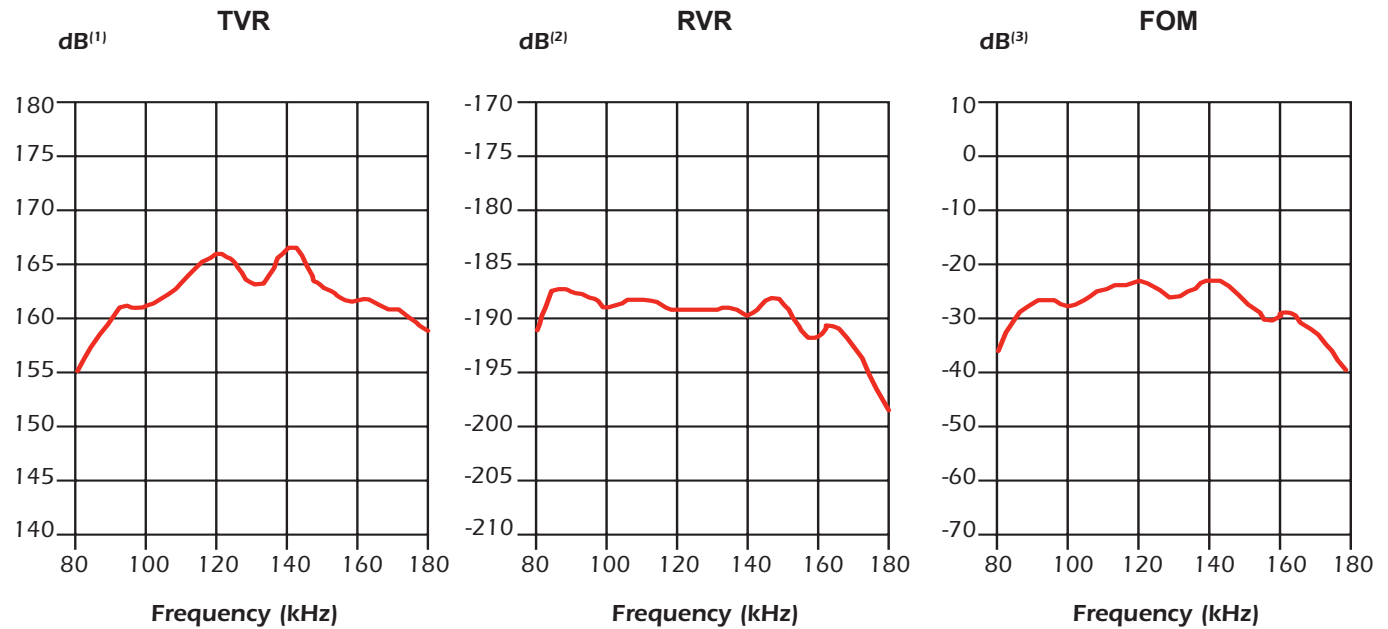
Q ≈ 2

Cable Type: C332

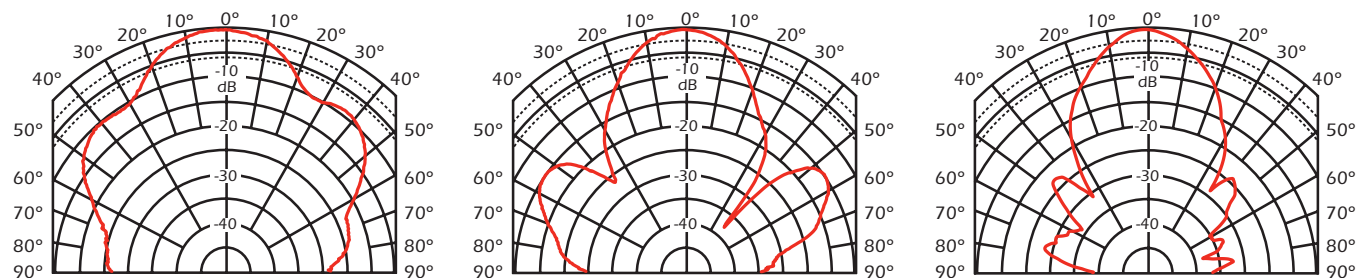
Cable Length: 12.2 m (40 ft)

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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 100 kHz
-3 dB	26°
-6 dB	36°
-10 dB	48°

Beamwidth	@ 130 kHz
-3 dB	20°
-6 dB	28°
-10 dB	38°

Beamwidth	@ 155 kHz
-3 dB	17°
-6 dB	27°
-10 dB	37°



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# Technical Data Catalog

## 95 to 155 kHz-A (Broadband)

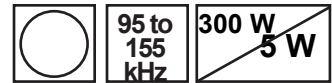
Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
80.00	178.44	67.21	69.11	164.52	2.17	-5.17	460.73	-10278.73
82.00	199.11	58.75	103.28	170.23	2.61	-4.29	383.86	-8333.88
84.00	211.58	48.29	140.78	157.95	3.14	-3.53	317.99	-6684.97
86.00	210.94	37.52	167.30	128.47	3.76	-2.89	265.95	-5343.30
90.00	180.92	23.09	166.43	70.94	5.08	-2.17	196.67	-3832.67
92.00	167.53	21.50	155.88	61.40	5.55	-2.19	180.06	-3784.37
94.00	164.56	20.99	153.64	58.93	5.67	-2.18	176.25	-3684.85
96.00	166.98	17.95	158.85	51.45	5.70	-1.85	175.52	-3059.46
100.00	154.41	11.97	151.05	32.04	6.34	-1.34	157.85	-2138.58
102.00	153.02	11.81	149.78	31.33	6.40	-1.34	156.33	-2087.81
104.00	156.97	9.20	154.95	25.10	6.29	-1.02	159.02	-1558.93
106.00	156.66	5.33	155.98	14.54	6.36	-0.59	157.34	-889.60
110.00	145.30	-1.52	145.25	-3.85	6.88	0.18	145.35	263.51
112.00	136.73	-3.95	136.40	-9.42	7.30	0.50	137.06	716.22
114.00	128.11	-5.04	127.61	-11.25	7.78	0.69	128.60	956.61
116.00	119.12	-4.37	118.77	-9.07	8.37	0.64	119.47	877.47
120.00	108.19	0.96	108.18	1.81	9.24	-0.15	108.21	-205.08
122.00	109.22	5.42	108.74	10.31	9.11	-0.86	109.72	-1127.90
124.00	114.75	9.90	113.05	19.73	8.58	-1.50	116.49	-1923.29
126.00	125.70	12.08	122.92	26.30	7.78	-1.66	128.55	-2102.27
130.00	151.43	6.81	150.36	17.96	6.56	-0.78	152.51	-958.67
132.00	162.04	2.38	161.90	6.73	6.17	-0.26	162.18	-309.14
134.00	167.14	-5.39	166.40	-15.71	5.96	0.56	167.88	667.81
136.00	152.99	-14.45	148.15	-38.17	6.33	1.63	157.99	1908.51
140.00	114.09	-9.14	112.64	-18.13	8.65	1.39	115.56	1583.09
142.00	114.08	0.71	114.07	1.41	8.77	-0.11	114.08	-121.62
144.00	130.50	8.12	129.19	18.43	7.59	-1.08	131.82	-1196.05
146.00	159.78	8.97	157.83	24.91	6.18	-0.98	161.76	-1063.50
150.00	206.57	-5.14	205.74	-18.50	4.82	0.43	207.41	459.90
152.00	207.79	-13.71	201.87	-49.26	4.68	1.14	213.89	1194.55
154.00	198.87	-19.31	187.68	-65.78	4.75	1.66	210.73	1718.79
156.00	193.00	-21.28	179.84	-70.03	4.83	1.88	207.12	1918.21
160.00	192.88	-23.41	177.01	-76.63	4.76	2.06	210.18	2048.87
162.00	208.47	-23.87	190.63	-84.37	4.39	1.94	227.98	1907.37
164.00	230.93	-28.91	202.15	-111.64	3.79	2.09	263.81	2031.57
166.00	244.13	-37.53	193.60	-148.72	3.25	2.50	307.85	2392.46
170.00	232.28	-55.00	133.22	-190.28	2.47	3.53	404.99	3301.68
172.00	216.30	-62.14	101.09	-191.22	2.16	4.09	462.79	3782.00
174.00	198.16	-67.77	74.96	-183.43	1.91	4.67	523.85	4272.92
176.00	180.20	-71.90	55.97	-171.28	1.72	5.28	580.14	4770.12
180.00	150.66	-76.77	34.47	-146.66	1.52	6.46	658.53	5713.23



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**95 to 155 kHz-A (Broadband)**  
 Transformed to 650 ohms minimum (B4)

**Power Rating:**

- 300 W @ 1% duty cycle
- CW<sup>(4)</sup>: 5W in TM150

33 mm (1.3 in) PZT

Active Area: 8.6 cm<sup>2</sup> (1.33 in<sup>2</sup>)

Radiating Surface: Plastic/Urethane

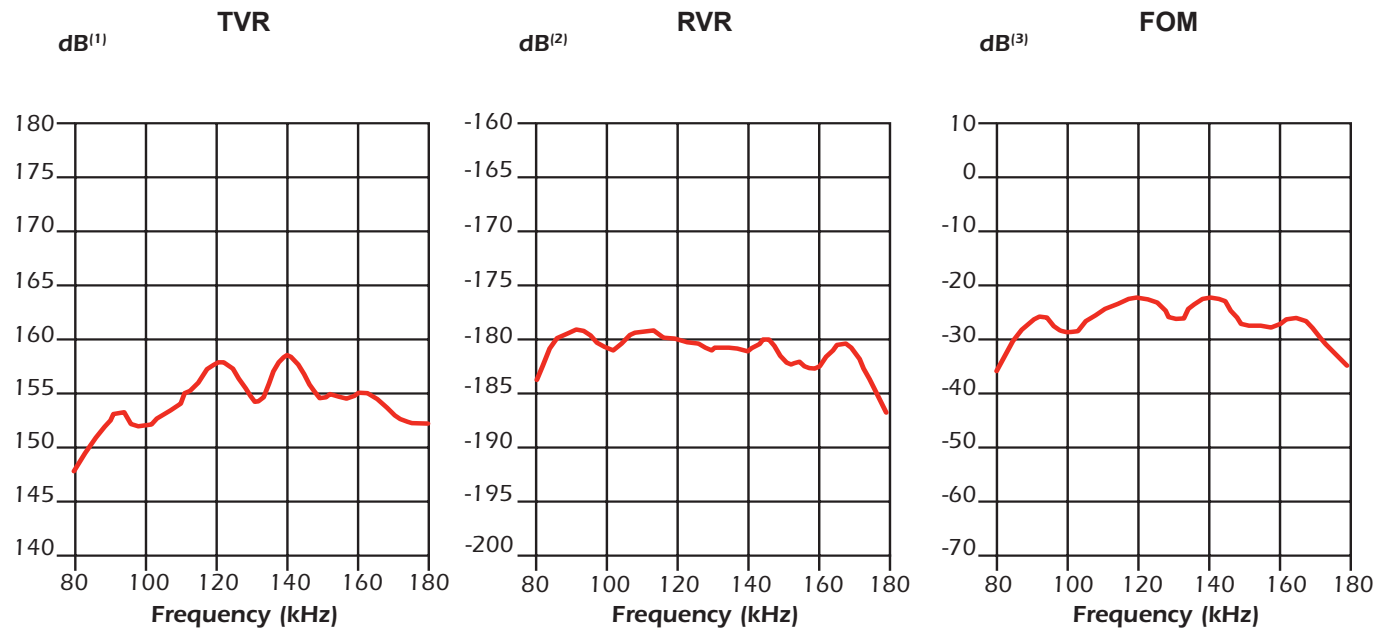
Q ≈ 2

Cable Type: C315

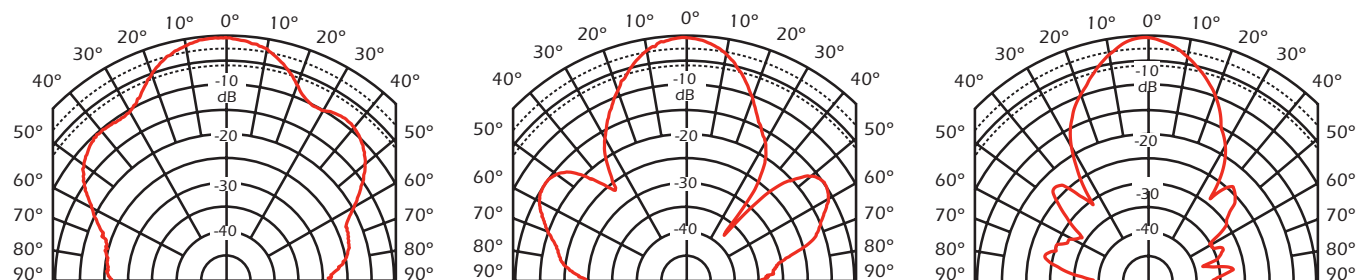
Cable Length: 12.2 m (40 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 100 kHz
-3 dB	26°
-6 dB	36°
-10 dB	48°

Beamwidth	@ 130 kHz
-3 dB	20°
-6 dB	28°
-10 dB	38°

Beamwidth	@ 155 kHz
-3 dB	17°
-6 dB	27°
-10 dB	37°



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# Technical Data Catalog

## 95 to 155 kHz-A (Broadband) Transformed to 650 ohms minimum (B4)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
80.00	916.49	70.00	313.42	861.23	0.37	-1.03	2679.93	-2039.83
82.00	997.24	62.38	462.34	883.59	0.46	-0.89	2151.00	-1724.48
84.00	1041.05	53.67	616.71	838.72	0.57	-0.77	1757.38	-1466.28
86.00	1037.49	45.50	727.24	739.94	0.68	-0.69	1480.10	-1272.18
90.00	923.15	34.64	759.51	524.75	0.89	-0.62	1122.06	-1088.88
92.00	874.76	34.23	723.19	492.13	0.95	-0.64	1058.08	-1112.59
94.00	880.40	35.21	719.29	507.67	0.93	-0.66	1077.60	-1108.96
96.00	937.96	33.87	778.79	522.73	0.89	-0.59	1129.65	-985.06
100.00	945.48	24.77	858.50	396.11	0.96	-0.44	1041.27	-705.24
102.00	927.80	23.46	851.10	369.38	0.99	-0.43	1011.41	-669.55
104.00	947.77	22.24	877.26	358.74	0.98	-0.40	1023.96	-611.17
106.00	977.01	19.68	919.96	328.97	0.96	-0.34	1037.60	-517.46
110.00	1020.93	9.61	1006.59	170.52	0.97	-0.16	1035.48	-236.71
112.00	969.61	3.07	968.22	51.90	1.03	-0.06	971.01	-78.45
114.00	884.17	-1.33	883.93	-20.54	1.13	0.03	884.41	36.68
116.00	787.44	-2.88	786.44	-39.62	1.27	0.06	788.44	87.67
120.00	641.63	3.70	640.29	41.42	1.56	-0.10	642.97	-133.43
122.00	629.35	11.42	616.89	124.61	1.56	-0.31	642.07	-410.43
124.00	674.02	18.66	638.59	215.64	1.41	-0.47	711.41	-609.24
126.00	769.04	22.06	712.75	288.81	1.21	-0.49	829.78	-616.84
130.00	978.48	18.95	925.45	317.76	0.97	-0.33	1034.56	-406.32
132.00	1110.97	13.31	1081.13	255.77	0.88	-0.21	1141.64	-249.85
134.00	1152.81	0.89	1152.67	17.81	0.87	-0.01	1152.95	-15.91
136.00	987.85	-7.62	979.13	-131.01	1.00	0.13	996.66	157.11
140.00	748.89	0.97	748.78	12.74	1.34	-0.02	748.99	-25.82
142.00	760.08	11.01	746.10	145.11	1.29	-0.25	774.32	-281.53
144.00	868.55	19.58	818.32	291.06	1.08	-0.39	921.85	-426.44
146.00	1077.20	23.04	991.29	421.56	0.85	-0.36	1170.56	-396.03
150.00	1572.14	4.28	1567.75	117.38	0.63	-0.05	1576.54	-50.39
152.00	1428.87	-5.47	1422.36	-136.22	0.70	0.07	1435.41	69.86
154.00	1342.47	-4.58	1338.19	-107.14	0.74	0.06	1346.77	61.44
156.00	1389.17	-5.03	1383.82	-121.85	0.72	0.06	1394.54	64.42
160.00	1392.87	1.12	1392.61	27.12	0.72	-0.01	1393.13	-13.90
162.00	1697.04	7.69	1681.80	226.94	0.58	-0.08	1712.42	-77.42
164.00	2306.70	7.02	2289.40	282.00	0.43	-0.05	2324.13	-51.43
166.00	3240.10	-2.33	3237.41	-131.89	0.31	0.01	3242.79	12.04
170.00	4658.03	-59.88	2337.78	-4028.90	0.11	0.19	9281.12	173.84
172.00	3392.88	-82.65	434.08	-3365.00	0.04	0.29	26519.55	270.48
174.00	2531.45	-91.55	-68.63	-2530.52	-0.01	0.39	-93375.72	361.20
176.00	2038.93	-95.74	-203.98	-2028.70	-0.05	0.49	-20381.06	441.29
180.00	1489.48	-100.18	-263.18	-1466.05	-0.12	0.66	-8429.92	584.29

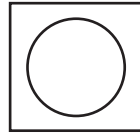


*Sensing Technology*

## 120 to 220 kHz-A (Broadband)

Power Rating: 250 W rms @ 2% duty cycle  
 21 mm (0.85") P1A  
 Active Area: 3.5 cm<sup>2</sup>  
 Epoxy/Urethane Window

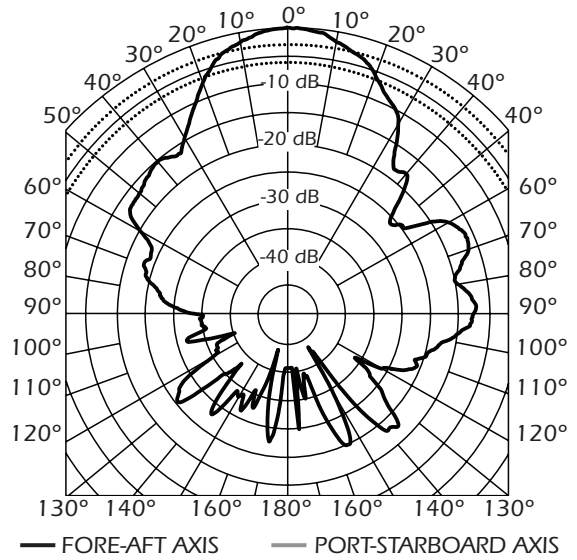
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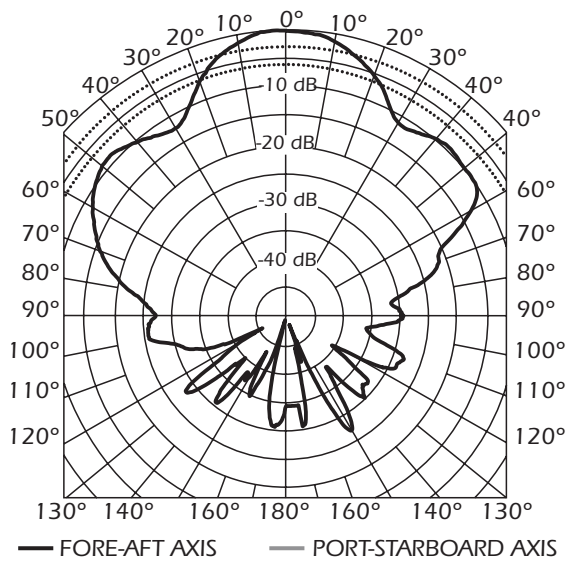
Cable Type: Custom  
 Cable Length: 9 m (30')

Beamwidth	@ 125 kHz	@ 160 kHz	@ 200 kHz
-3 dB	26°	24°	22°
-6 dB	37°	35°	31°
-10 dB	47°	46°	31°

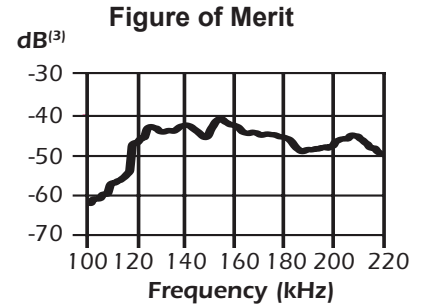
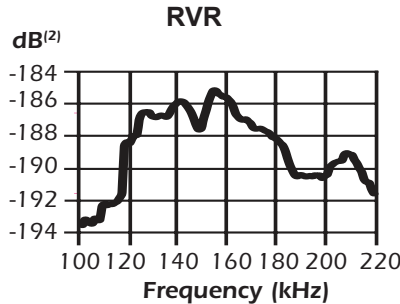
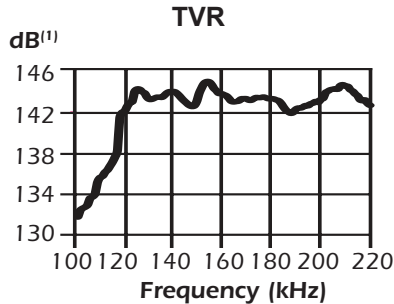
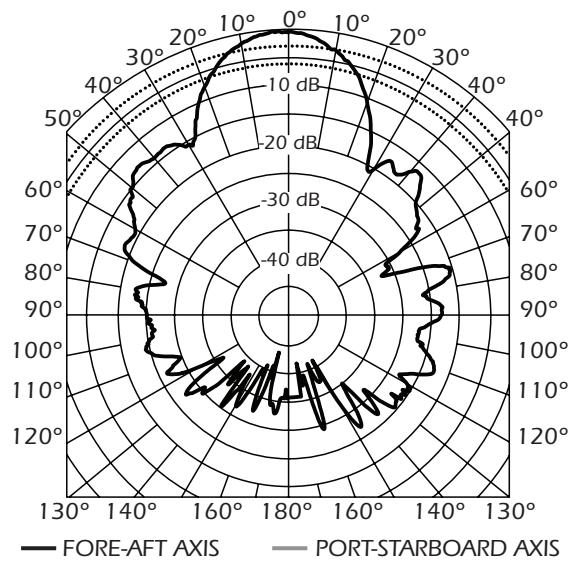
Transmit Radiation Pattern @ 160 kHz



Transmit Radiation Pattern @ 125 kHz



Transmit Radiation Pattern @ 200 kHz



Notes:

- (1) dB re 1  $\mu$ Pa per volt at 1 meter
- (2) dB re 1 volt per  $\mu$ Pa
- (3) Sum of transmitting voltage response and receiving voltage response
- (4) Nominal peak TVR, rated power, and no cavitation
- (5) Q, Nominal, less than 3.5



*Sensing Technology*



# Technical Data Catalog

## 120 to 220 kHz-A (Broadband)

Note: Impedance data includes cable

Parallel Resistance Data	
1 kHz capacitance: 620 pF: ±20%	Rp @ 160 kHz = 5500 Ω: -20%, +40%
Rp Range: 3500 to 10,000 Ω: -20%, +40%	Rp @ 200 kHz = 7000 Ω: -20%, +40%

**Unbalanced 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)
100.00	2805.63	-84.30	278.51	-2791.77	0.04	0.35	28262.79	564.47
104.00	2577.26	-83.90	273.72	-2562.68	0.04	0.39	24266.43	590.43
108.00	2357.68	-82.67	300.83	-2338.41	0.05	0.42	18477.94	619.94
112.00	2163.10	-80.59	353.84	-2133.96	0.08	0.46	13223.43	648.09
116.00	1976.58	-77.54	426.33	-1930.05	0.11	0.49	9163.92	677.80
120.00	1803.78	-71.15	582.77	-1707.04	0.18	0.52	5582.99	695.85
124.00	1785.28	-62.13	834.67	-1578.15	0.26	0.50	3818.56	635.53
128.00	1977.57	-56.23	1099.14	-1643.98	0.28	0.42	3558.03	522.69
132.00	2096.53	-56.93	1144.01	-1756.89	0.26	0.40	3842.13	481.94
136.00	2118.37	-54.84	1219.96	-1731.81	0.27	0.39	3678.38	451.63
140.00	2293.24	-52.79	1386.73	-1826.46	0.26	0.35	3792.35	394.82
144.00	2490.09	-56.58	1371.32	-2078.47	0.22	0.34	4521.58	370.48
148.00	2319.19	-61.20	1117.44	-2032.23	0.21	0.38	4813.37	406.31
152.00	2267.27	-54.16	1327.62	-1837.91	0.26	0.36	3871.97	374.37
156.00	2601.61	-54.01	1528.72	-2105.09	0.23	0.31	4427.47	317.31
160.00	2751.53	-59.96	1377.29	-2382.02	0.18	0.31	5496.98	312.97
164.00	2694.37	-64.87	1144.17	-2439.37	0.16	0.34	6344.90	326.09
168.00	2584.06	-67.36	994.86	-2384.87	0.15	0.36	6711.86	338.35
172.00	2507.60	-68.58	915.65	-2334.45	0.15	0.37	6867.29	343.53
176.00	2458.34	-69.75	851.04	-2306.33	0.14	0.38	7101.25	345.10
180.00	2420.31	-70.84	794.55	-2286.17	0.14	0.39	7372.56	345.08
184.00	2373.34	-72.75	703.95	-2266.54	0.13	0.40	8001.60	348.05
188.00	2265.23	-74.24	615.42	-2180.03	0.12	0.42	8337.89	359.67
192.00	2175.57	-73.56	615.77	-2086.61	0.13	0.44	7686.50	365.44
196.00	2144.00	-73.48	609.61	-2055.51	0.13	0.45	7540.40	363.11
200.00	2092.22	-72.53	628.08	-1995.72	0.14	0.46	6969.50	362.81
204.00	2114.02	-70.97	689.42	-1998.44	0.15	0.45	6482.38	348.87
208.00	2186.45	-71.31	700.71	-2071.13	0.15	0.43	6822.48	331.50
212.00	2225.15	-73.72	623.62	-2135.98	0.13	0.43	7939.60	323.86
216.00	2198.87	-76.29	521.31	-2136.18	0.11	0.44	9274.84	325.54
220.00	2147.10	-77.85	452.08	-2098.97	0.10	0.46	10197.40	329.38

## 130 to 210 kHz-B (Broadband)

Transformed to 60 ohms minimum (B3)

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 12W in M563

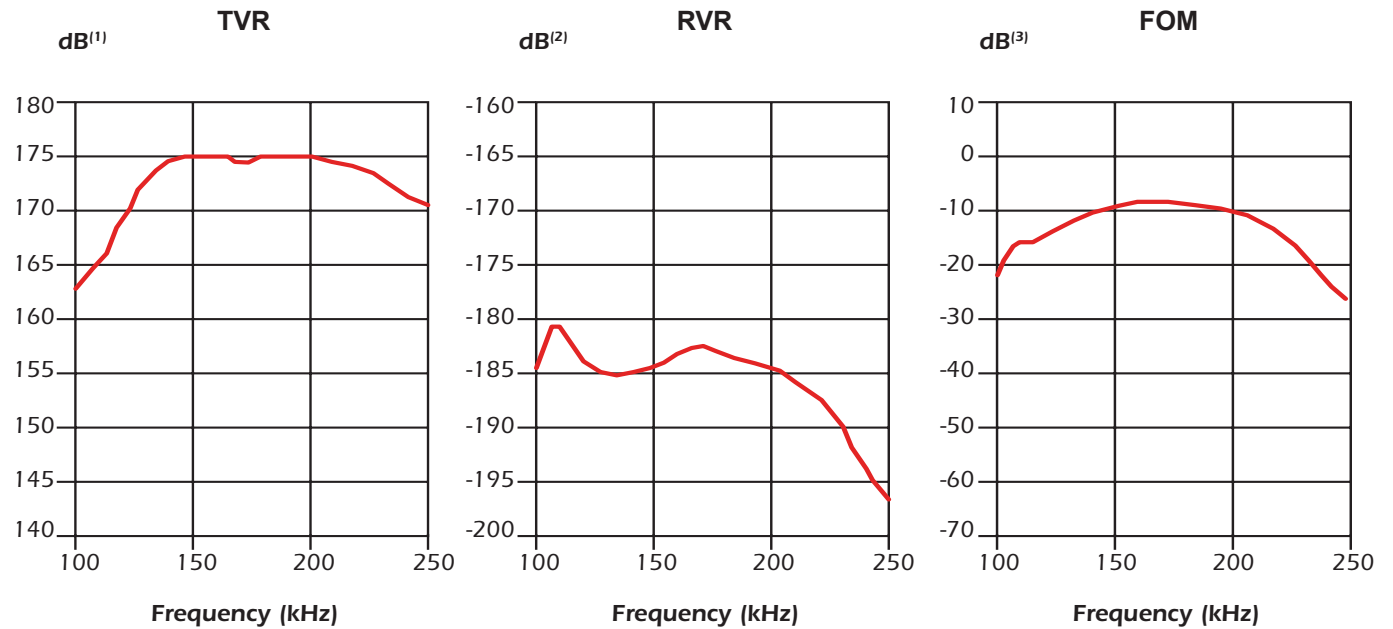
88 mm (3.46 in) PZT  
 Active Area: 61 cm<sup>2</sup> (9.4 in<sup>2</sup>)  
 Radiating Surface:  
 Cast Resin/Urethane

Q ≈ 2

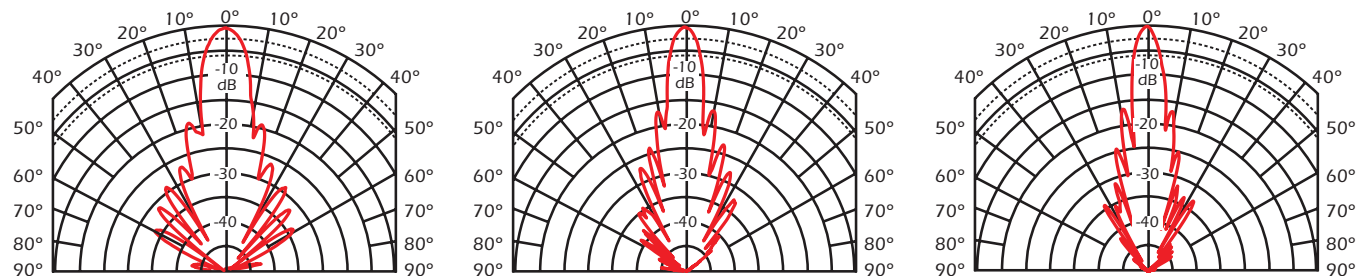
Cable Type: C44-02  
 Cable Length: 10 m (33 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	8°
-6 dB	11°
-10 dB	13°

Beamwidth	@ 170 kHz
-3 dB	5°
-6 dB	7°
-10 dB	10°

Beamwidth	@ 210 kHz
-3 dB	4°
-6 dB	6°
-10 dB	8°



*Sensing Technology*

# Technical Data Catalog

## 130 to 210 kHz-B (Broadband)

Note: Impedance data includes cable

### Balanced Impedance Table (Nominal Value) in 20°C Water

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)
100.00	220.47	53.26	131.89	176.67	2.71	-3.63	368.55	-5784.85
104.00	281.46	32.21	238.15	150.01	3.01	-1.89	332.64	-2897.86
108.00	269.04	2.00	268.88	9.40	3.71	-0.13	269.21	-191.34
112.00	205.58	-15.71	197.90	-55.68	4.68	1.32	213.57	1871.96
116.00	158.45	-25.23	143.33	-67.55	5.71	2.69	175.17	3691.53
120.00	124.84	-28.56	109.65	-59.69	7.04	3.83	142.14	5079.26
124.00	105.15	-28.78	92.16	-50.62	8.34	4.58	119.96	5876.99
125.00	101.53	-28.85	88.93	-48.98	8.63	4.75	115.91	6050.44
129.00	87.41	-29.03	76.43	-42.42	10.00	5.55	99.97	6849.70
130.00	84.11	-28.68	73.79	-40.36	10.43	5.70	95.87	6984.37
134.00	72.78	-26.05	65.39	-31.96	12.34	6.03	81.01	7166.26
138.00	65.13	-20.82	60.88	-23.15	14.35	5.46	69.68	6293.52
142.00	61.40	-13.57	59.69	-14.40	15.83	3.82	63.16	4281.84
146.00	61.79	-6.64	61.37	-7.14	16.08	1.87	62.21	2040.09
150.00	65.20	-1.05	65.19	-1.20	15.34	0.28	65.21	298.40
154.00	72.93	1.80	72.89	2.29	13.71	-0.43	72.96	-444.21
158.00	80.79	-0.64	80.79	-0.90	12.38	0.14	80.80	138.50
162.00	82.93	-4.26	82.70	-6.15	12.03	0.89	83.16	879.13
166.00	84.39	-6.46	83.86	-9.50	11.77	1.33	84.93	1278.85
170.00	84.51	-9.62	83.32	-14.13	11.67	1.98	85.72	1852.18
174.00	80.51	-10.18	79.25	-14.23	12.22	2.20	81.80	2007.81
178.00	81.72	-7.19	81.08	-10.22	12.14	1.53	82.36	1368.63
182.00	86.70	-6.73	86.10	-10.16	11.45	1.35	87.30	1181.50
186.00	92.43	-6.38	91.86	-10.27	10.75	1.20	93.01	1028.71
190.00	103.88	-8.52	102.74	-15.40	9.52	1.43	105.04	1194.99
194.00	112.01	-14.97	108.20	-28.94	8.63	2.31	115.94	1892.20
198.00	114.96	-19.80	108.16	-38.94	8.18	2.95	122.18	2368.63
202.00	120.70	-25.52	108.92	-52.00	7.48	3.57	133.75	2812.27
206.00	122.04	-33.29	102.02	-66.99	6.85	4.50	146.00	3474.63
210.00	120.11	-39.54	92.63	-76.46	6.42	5.30	155.75	4016.89
214.00	119.09	-46.43	82.08	-86.29	5.79	6.08	172.80	4524.73
218.00	114.08	-54.55	66.17	-92.93	5.08	7.14	196.70	5213.17
222.00	104.38	-61.42	49.94	-91.66	4.58	8.41	218.20	6031.16
226.00	94.34	-66.66	37.37	-86.62	4.20	9.73	238.14	6853.89
230.00	84.93	-70.63	28.17	-80.13	3.90	11.11	256.11	7686.08



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## 130 to 210 kHz-B (Broadband)

Transformed to 100 ohms minimum (B1)

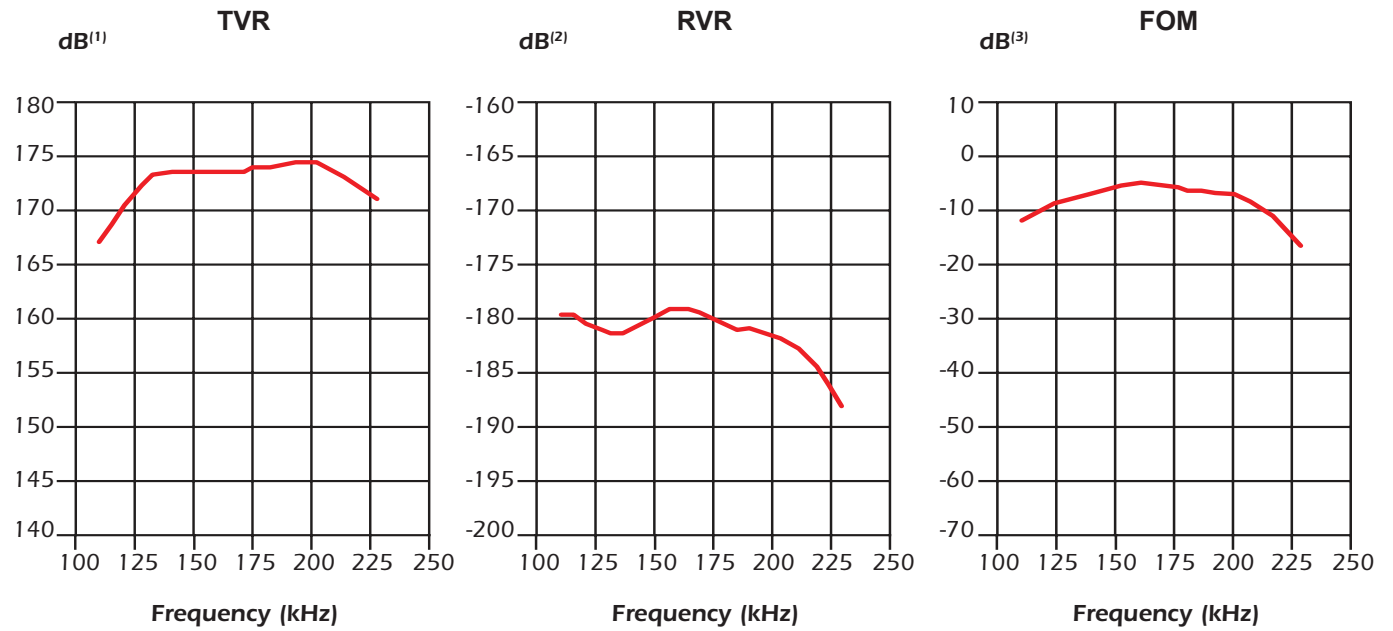
**Power Rating:**

- 2 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 30W in R509, R609  
25W in CM199, CM599,  
PM111, R109,  
R111, R599

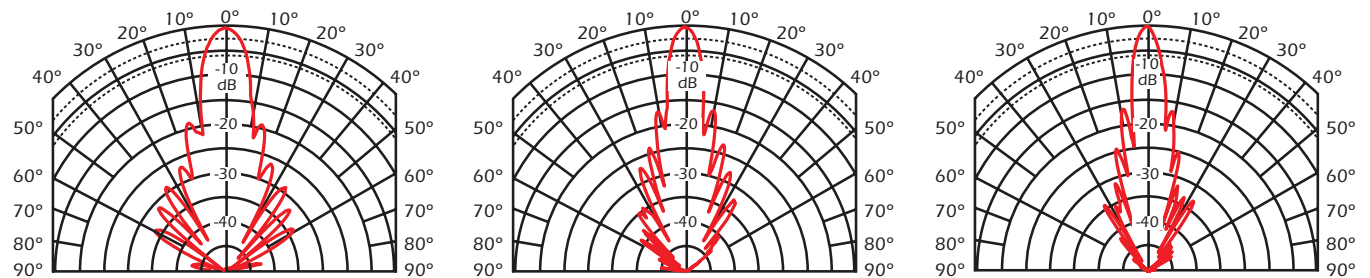
88 mm (3.46 in) PZT  
Active Area: 61 cm<sup>2</sup> (9.4 in<sup>2</sup>)  
Radiating Surface:  
Cast Resin/Urethane  
Q ≈ 2  
Cable Type: C44-02  
Cable Length: 10 m (33 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	8°
-6 dB	11°
-10 dB	13°

Beamwidth	@ 170 kHz
-3 dB	5°
-6 dB	7°
-10 dB	10°

Beamwidth	@ 210 kHz
-3 dB	4°
-6 dB	6°
-10 dB	8°



*Sensing Technology*

# Technical Data Catalog

## 130 to 210 kHz-B (Broadband)

Note: Impedance data includes cable

### Balanced Impedance Table (Nominal Value) in 20°C Water

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)
130.00	127.94	8.78	126.44	19.53	7.72	-1.19	129.46	-1460.93
132.00	123.02	10.90	120.80	23.26	7.98	-1.54	125.28	-1853.13
134.00	121.05	13.32	117.79	27.89	8.04	-1.90	124.39	-2260.49
136.00	120.96	15.92	116.32	33.18	7.95	-2.27	125.79	-2653.65
138.00	123.25	17.77	117.37	37.60	7.73	-2.48	129.42	-2855.27
140.00	126.15	19.31	119.05	41.71	7.48	-2.62	133.67	-2979.87
142.00	130.22	20.36	122.08	45.31	7.20	-2.67	138.90	-2994.68
144.00	134.62	20.96	125.71	48.16	6.94	-2.66	144.16	-2937.23
146.00	140.58	21.15	131.11	50.73	6.63	-2.57	150.73	-2798.26
148.00	146.38	20.82	136.82	52.04	6.39	-2.43	156.61	-2611.53
150.00	151.99	20.04	142.78	52.09	6.18	-2.26	161.79	-2392.65
152.00	158.03	19.08	149.35	51.66	5.98	-2.07	167.22	-2165.81
154.00	164.22	17.90	156.28	50.47	5.79	-1.87	172.57	-1933.80
156.00	171.29	16.51	164.23	48.67	5.60	-1.66	178.65	-1692.44
158.00	178.40	14.26	172.90	43.94	5.43	-1.38	184.07	-1390.72
160.00	184.28	11.31	180.71	36.14	5.32	-1.06	187.93	-1058.56
162.00	188.06	8.40	186.04	27.46	5.26	-0.78	190.09	-762.74
164.00	189.88	6.01	188.84	19.89	5.24	-0.55	190.93	-535.42
166.00	192.52	3.49	192.16	11.73	5.18	-0.32	192.88	-303.52
168.00	195.06	1.24	195.02	4.22	5.13	-0.11	195.11	-105.03
170.00	197.94	-1.87	197.84	-6.45	5.05	0.16	198.05	154.07
172.00	198.12	-5.23	197.30	-18.05	5.03	0.46	198.95	425.59
174.00	194.54	-8.52	192.39	-28.82	5.08	0.76	196.71	696.49
176.00	190.16	-10.57	186.94	-34.87	5.17	0.96	193.44	872.03
178.00	186.73	-11.85	182.76	-38.33	5.24	1.10	190.80	982.98
180.00	184.49	-12.89	179.83	-41.17	5.28	1.21	189.26	1069.46
182.00	185.09	-14.50	179.20	-46.33	5.23	1.35	191.18	1182.68
184.00	183.65	-16.45	176.13	-52.01	5.22	1.54	191.49	1333.73
186.00	180.37	-18.38	171.17	-56.88	5.26	1.75	190.07	1496.00
188.00	176.24	-19.05	166.59	-57.53	5.36	1.85	186.45	1567.92
190.00	174.66	-19.31	164.83	-57.77	5.40	1.89	185.08	1586.24
192.00	176.38	-19.83	165.92	-59.85	5.33	1.92	187.50	1594.63
194.00	178.00	-20.95	166.23	-63.65	5.25	2.01	190.60	1648.06
196.00	178.44	-22.22	165.18	-67.48	5.19	2.12	192.75	1721.01
198.00	178.66	-23.43	163.93	-71.03	5.14	2.23	194.71	1788.71
200.00	179.18	-24.11	163.55	-73.19	5.09	2.28	196.30	1814.16
202.00	182.61	-24.65	165.96	-76.18	4.98	2.28	200.93	1799.86
204.00	188.44	-25.97	169.42	-82.51	4.77	2.32	209.60	1812.81
206.00	195.13	-28.35	171.73	-92.67	4.51	2.43	221.73	1880.22
208.00	198.99	-31.52	169.64	-104.03	4.28	2.63	233.43	2010.11
210.00	200.43	-34.90	164.38	-114.68	4.09	2.85	244.39	2163.56

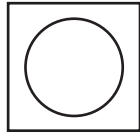


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### 130 to 210 kHz-BRIq (Broadband)

Power Rating: 2 kW @ 1% duty cycle  
 88 mm (3.5") PZT  
 Active Area: 60.8 cm<sup>2</sup>  
 Radiating Surface: Urethane

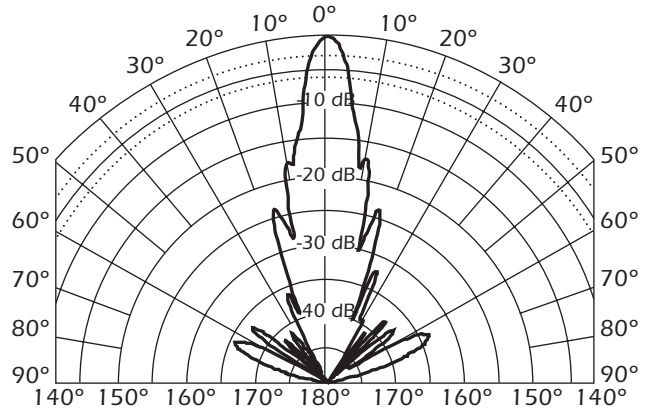
Array



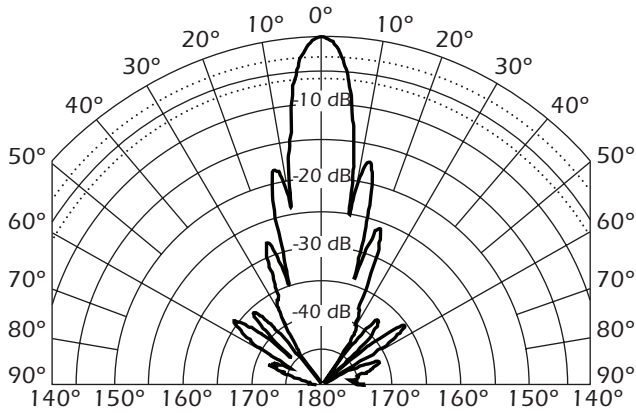
Cable Type: C44  
 Cable Length: 10 m (33')

Beamwidth	@ 140 kHz	@ 160 kHz	@ 200 kHz
-3 dB	7°	6°	5°
-6 dB	10°	8°	7°
-10 dB	12°	10°	9°

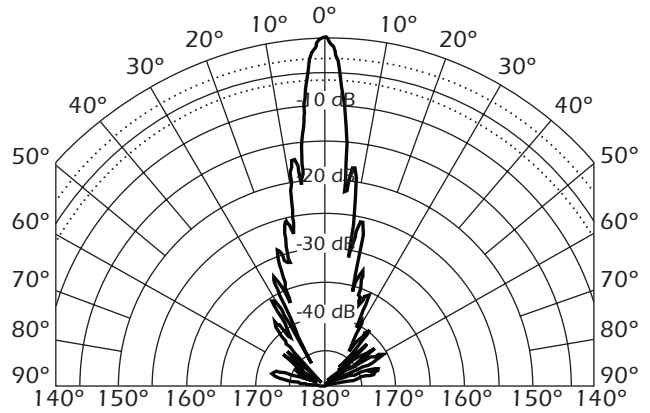
Transmit Radiation Pattern @ 160 kHz



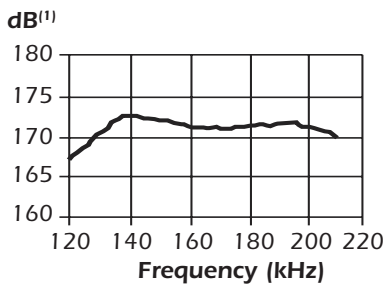
Transmit Radiation Pattern @ 140 kHz



Transmit Radiation Pattern @ 200 kHz



TVR



RVR

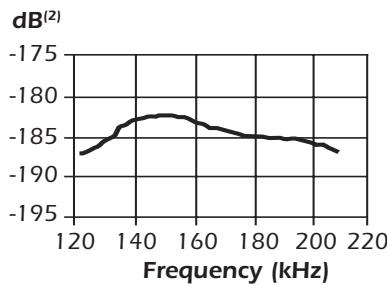
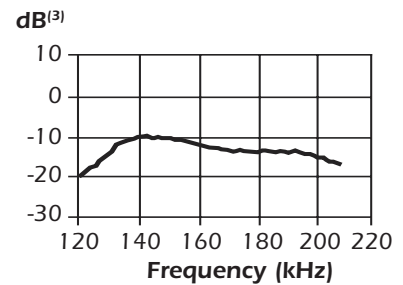


Figure of Merit



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
- (5) Q, Nominal, less than 3.5

# Technical Data Catalog

## 130 to 210 kHz-BRIq (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table**

1 kHz Capacitance: 10,250 pF: ± 20%

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)
130.00	100.71	-61.50	48.05	-88.51	4.7377	8.7262	211.07	10683.23
132.00	99.99	-58.17	52.74	-84.95	5.2748	8.4964	189.58	10244.26
134.00	101.54	-55.01	58.23	-83.19	5.6474	8.0683	177.07	9582.96
136.00	104.14	-52.38	63.57	-82.49	5.8616	7.6056	170.60	8900.51
138.00	107.58	-50.06	69.06	-82.48	5.9680	7.1271	167.56	8219.66
140.00	112.86	-48.24	75.17	-84.18	5.9015	6.6092	169.45	7513.51
142.00	118.39	-47.84	79.47	-87.76	5.6692	6.2610	176.39	7017.37
144.00	122.94	-47.79	82.60	-91.06	5.4651	6.0245	182.98	6658.54
146.00	127.68	-48.01	85.43	-94.89	5.2401	5.8208	190.83	6345.25
148.00	131.93	-48.71	87.06	-99.12	5.0021	5.6951	199.92	6124.33
150.00	135.54	-49.79	87.51	-103.50	4.7636	5.6341	209.93	5977.96
152.00	138.23	-50.77	87.43	-107.07	4.5757	5.6035	218.54	5867.22
154.00	140.86	-51.82	87.08	-110.72	4.3886	5.5802	227.86	5767.00
156.00	143.19	-53.07	86.04	-114.46	4.1964	5.5822	238.30	5695.14
158.00	144.96	-54.55	84.07	-118.09	4.0009	5.6197	249.95	5660.73
160.00	145.87	-56.27	81.01	-121.31	3.8070	5.7010	262.67	5670.91
162.00	144.93	-57.96	76.88	-122.86	3.6601	5.8493	273.22	5746.61
164.00	143.05	-59.01	73.66	-122.63	3.5997	5.9925	277.80	5815.44
166.00	141.96	-59.65	71.74	-122.50	3.5596	6.0786	280.93	5827.93
168.00	140.87	-60.30	69.80	-122.36	3.5175	6.1660	284.29	5841.38
170.00	140.22	-60.95	68.10	-122.58	3.4633	6.2341	288.74	5836.40
172.00	139.51	-61.76	66.02	-122.90	3.3920	6.3145	294.81	5842.89
174.00	138.31	-62.64	63.57	-122.83	3.3232	6.4215	300.92	5873.61
176.00	135.85	-63.37	60.89	-121.44	3.2993	6.5800	303.10	5950.20
178.00	133.53	-63.39	59.81	-119.39	3.3542	6.6956	298.14	5986.70
180.00	132.11	-63.11	59.75	-117.83	3.4235	6.7510	292.10	5969.23
182.00	131.78	-62.79	60.26	-117.19	3.4703	6.7487	288.16	5901.60
184.00	132.25	-62.82	60.41	-117.64	3.4540	6.7267	289.52	5818.40
186.00	132.12	-63.18	59.61	-117.91	3.4146	6.7547	292.86	5779.84
188.00	131.92	-63.45	58.96	-118.02	3.3877	6.7810	295.18	5740.56
190.00	131.25	-63.81	57.92	-117.78	3.3624	6.8371	297.41	5727.16
192.00	130.47	-63.57	58.06	-116.84	3.4109	6.8637	293.17	5689.50
194.00	131.07	-63.30	58.90	-117.09	3.4286	6.8157	291.66	5591.53
196.00	132.34	-63.33	59.41	-118.25	3.3923	6.7522	294.79	5482.86
198.00	134.00	-63.65	59.47	-120.08	3.3120	6.6874	301.93	5375.39
200.00	135.41	-64.46	58.38	-122.18	3.1838	6.6633	314.09	5302.48
202.00	136.11	-64.97	57.59	-123.33	3.1085	6.6569	321.70	5244.98
204.00	137.31	-65.83	56.22	-125.28	2.9816	6.6442	335.39	5183.61
206.00	137.95	-66.68	54.62	-126.68	2.8701	6.6564	348.42	5142.71
208.00	139.58	-67.63	53.13	-129.07	2.7269	6.6250	366.71	5069.26
210.00	140.76	-69.27	49.82	-131.65	2.5142	6.6443	397.74	5035.59



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## 130 to 210 kHz-C (Broadband)

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 18W in B175, B265, PM265  
12W in M265, TM265

65 mm (2.5") P1A

Active Area: 33 cm<sup>2</sup>

Radiating Surface: Epoxy/Urethane

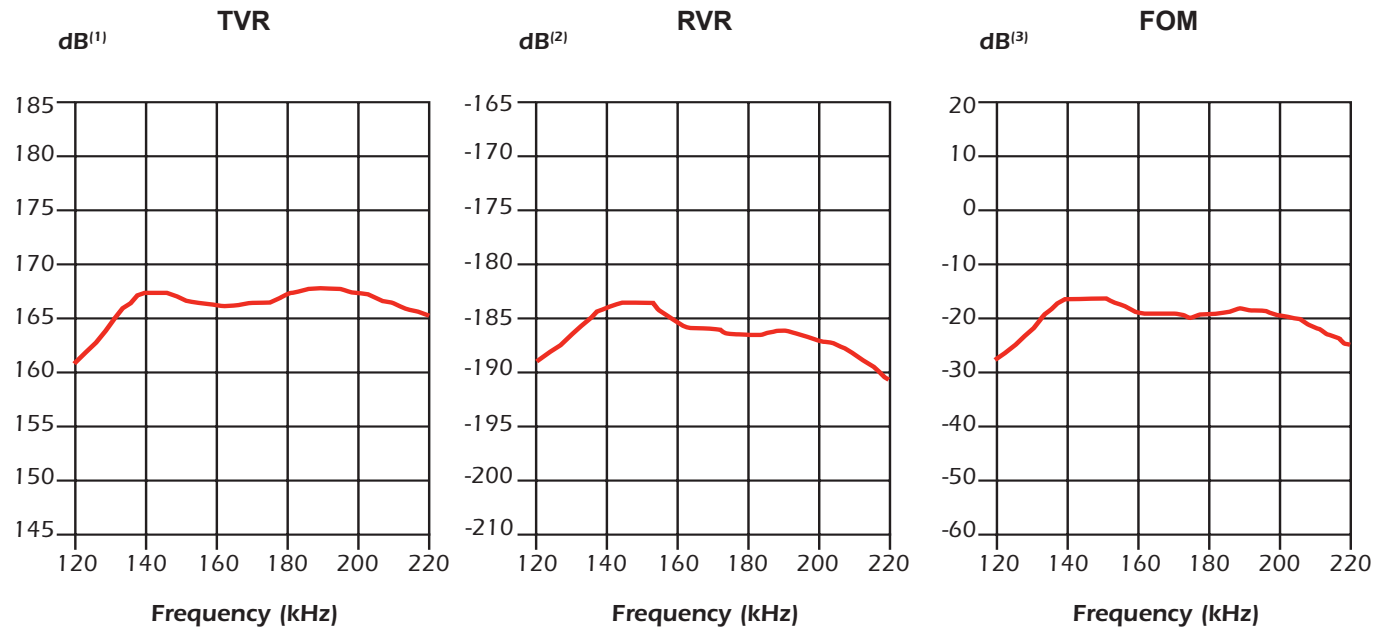
Q ≈ 2.5

Cable Type: C44

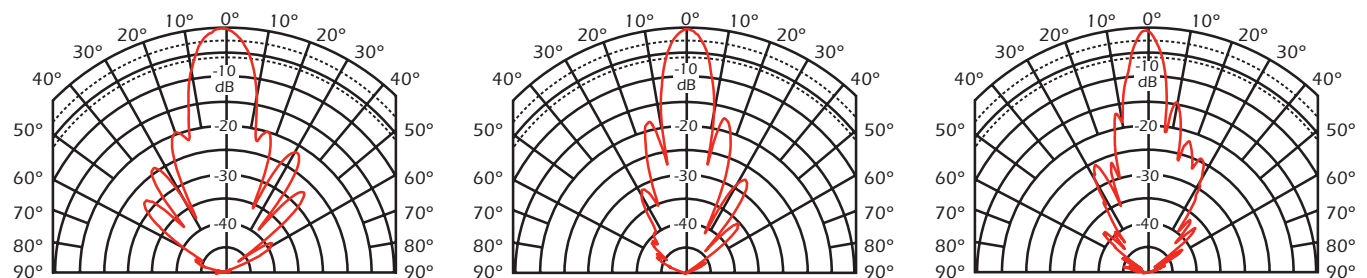
Cable Length: 10 m (50 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	11°
-6 dB	15°
-10 dB	20°

Beamwidth	@ 160 kHz
-3 dB	8°
-6 dB	12°
-10 dB	15°

Beamwidth	@ 210 kHz
-3 dB	6°
-6 dB	9°
-10 dB	12°



*Sensing Technology*

# Technical Data Catalog

## 130 to 210 kHz-C (Broadband)

Note: Impedance data includes cable

1 kHz Capacitance: 5,310 pF: ± 20%

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
130.00	196.88	-65.77	80.79	-179.54	2.08	4.63	479.80	5670.82
133.00	195.76	-61.72	92.74	-172.39	2.42	4.50	413.19	5383.41
136.00	200.56	-57.84	106.75	-169.79	2.65	4.22	376.80	4939.84
139.00	207.35	-54.27	121.09	-168.31	2.82	3.92	355.04	4482.63
142.00	221.76	-52.05	136.37	-174.88	2.77	3.56	360.64	3985.61
145.00	239.78	-51.61	148.89	-187.95	2.59	3.27	386.14	3588.16
148.00	247.57	-54.71	143.02	-202.09	2.33	3.30	428.57	3545.53
151.00	271.21	-56.98	147.81	-227.39	2.01	3.09	497.63	3258.44
154.00	265.60	-61.32	127.45	-233.02	1.81	3.30	553.50	3413.90
157.00	258.21	-62.92	117.54	-229.91	1.76	3.45	567.27	3495.61
160.00	253.64	-63.37	113.68	-226.74	1.77	3.52	565.92	3505.84
163.00	251.25	-63.83	110.79	-225.50	1.76	3.57	569.76	3488.02
166.00	249.38	-64.41	107.71	-224.92	1.73	3.62	577.38	3467.41
169.00	248.51	-65.25	104.02	-225.69	1.68	3.65	593.69	3441.57
172.00	245.28	-67.40	94.25	-226.44	1.57	3.76	638.29	3482.91
175.00	233.69	-67.78	88.37	-216.34	1.62	3.96	618.01	3602.69
178.00	228.21	-66.22	92.02	-208.84	1.77	4.01	565.97	3585.41
181.00	228.89	-64.67	97.93	-206.89	1.87	3.95	535.02	3472.26
184.00	232.15	-64.28	100.74	-209.15	1.87	3.88	534.98	3356.89
187.00	235.99	-64.38	102.03	-212.80	1.83	3.82	545.87	3251.98
190.00	240.10	-65.84	98.26	-219.07	1.70	3.80	586.66	3183.28
193.00	235.70	-67.51	90.18	-217.76	1.62	3.92	616.04	3232.53
196.00	231.73	-66.55	92.21	-212.60	1.72	3.96	582.38	3214.73
199.00	236.46	-65.56	97.83	-215.27	1.75	3.85	571.54	3079.22
202.00	246.62	-66.44	98.56	-226.07	1.62	3.72	617.11	2928.50
205.00	251.39	-68.64	91.58	-234.11	1.45	3.70	690.08	2876.09
208.00	252.69	-71.85	78.71	-240.12	1.23	3.76	811.28	2877.46
210.00	247.95	-73.95	68.56	-238.28	1.12	3.88	896.75	2937.42

**130 to 210 kHz-C (Broadband)**  
 Transformed to 100 ohms minimum (B1)

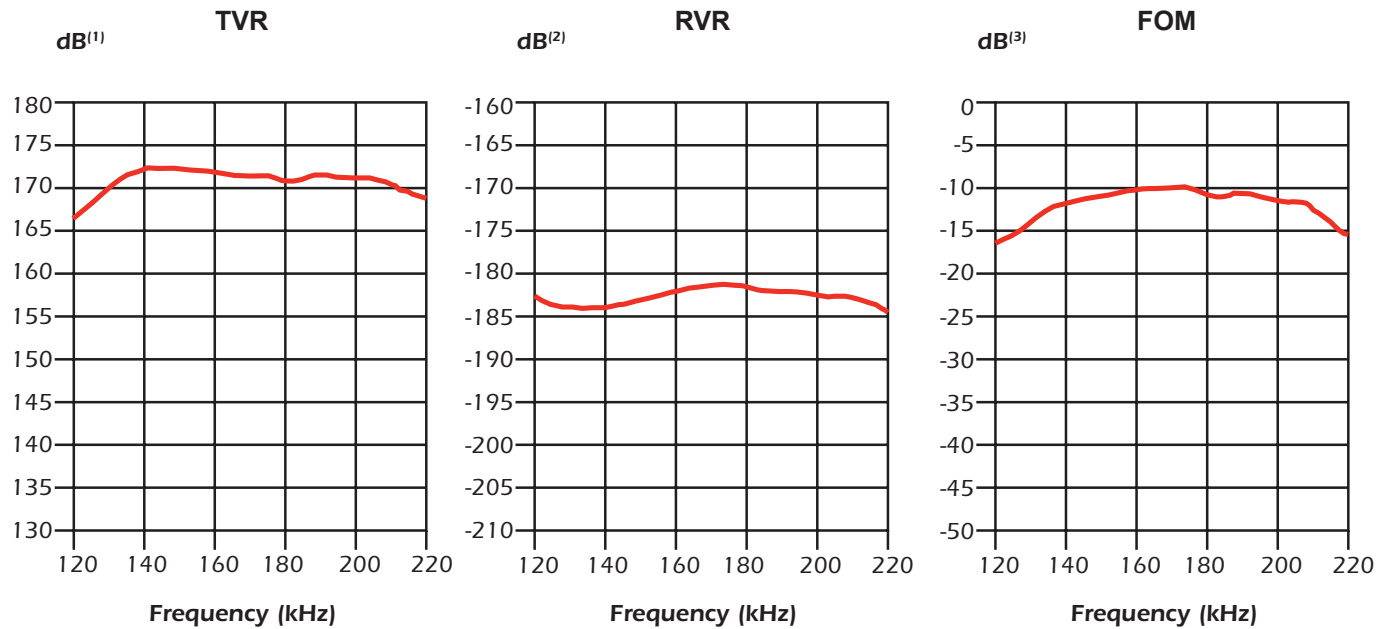
Power Rating:

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 18W in B175, B265, PM265  
 12W in M265, TM265

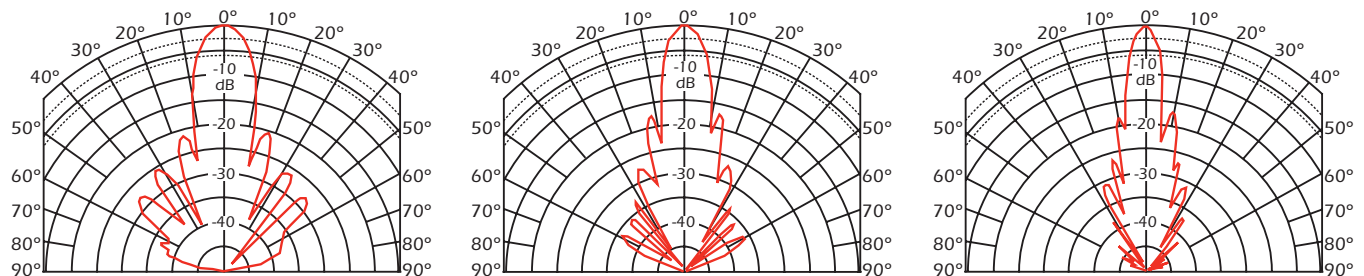
65 mm (2.56 in) PZT  
 Active Area: 33 cm<sup>2</sup> (5.1 in<sup>2</sup>)  
 Radiating Surface: Urethane

Q ≈ 2  
 Cable Type: C335  
 Cable Length: 10 m (33 ft)

- 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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



**Transmit Radiation Pattern**



Beamwidth	@ 130 kHz
-3 dB	10°
-6 dB	14°
-10 dB	18°

Beamwidth	@ 160 kHz
-3 dB	8°
-6 dB	12°
-10 dB	15°

Beamwidth	@ 210 kHz
-3 dB	6°
-6 dB	8°
-10 dB	11°



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# Technical Data Catalog

## 130 to 210 kHz-C (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
120.00	208.31	-17.43	198.75	-62.39	4.58	1.44	218.33	1906.87
123.00	177.31	-19.75	166.89	-59.91	5.31	1.91	188.39	2465.59
126.00	152.23	-18.99	143.95	-49.52	6.21	2.14	160.99	2699.47
129.00	133.22	-16.34	127.84	-37.48	7.20	2.11	138.83	2605.27
132.00	120.55	-12.05	117.89	-25.17	8.11	1.73	123.27	2088.34
135.00	112.76	-6.38	112.06	-12.54	8.81	0.99	113.46	1162.56
138.00	109.48	-0.54	109.48	-1.04	9.13	0.09	109.49	99.87
141.00	109.94	4.87	109.55	9.33	9.06	-0.77	110.34	-871.61
144.00	114.62	9.71	112.98	19.33	8.60	-1.47	116.29	-1626.25
147.00	121.20	13.15	118.02	27.58	8.03	-1.88	124.47	-2032.96
150.00	129.57	15.12	125.09	33.80	7.45	-2.01	134.22	-2135.96
153.00	138.30	15.64	133.18	37.28	6.96	-1.95	143.61	-2027.51
156.00	146.78	16.08	141.05	40.65	6.55	-1.89	152.76	-1924.61
159.00	157.83	16.02	151.70	43.56	6.09	-1.75	164.21	-1750.40
162.00	170.16	14.70	164.60	43.17	5.68	-1.49	175.92	-1464.75
165.00	181.46	12.13	177.41	38.14	5.39	-1.16	185.61	-1117.37
168.00	189.54	9.04	187.18	29.80	5.21	-0.83	191.93	-785.73
171.00	196.75	5.79	195.75	19.86	5.06	-0.51	197.76	-477.60
174.00	203.68	3.22	203.35	11.45	4.90	-0.28	204.00	-252.53
177.00	210.86	-0.59	210.84	-2.18	4.74	0.05	210.87	44.16
180.00	215.04	-4.94	214.24	-18.53	4.63	0.40	215.85	354.23
183.00	211.15	-9.70	208.13	-35.56	4.67	0.80	214.21	693.78
186.00	203.43	-11.87	199.07	-41.86	4.81	1.01	207.87	865.47
189.00	200.71	-12.44	195.99	-43.24	4.87	1.07	205.53	903.98
192.00	203.60	-13.26	198.17	-46.70	4.78	1.13	209.18	933.89
195.00	208.49	-15.13	201.27	-54.40	4.63	1.25	215.97	1021.47
198.00	211.19	-18.13	200.70	-65.71	4.50	1.47	222.22	1184.30
201.00	209.20	-20.47	195.99	-73.17	4.48	1.67	223.31	1323.75
204.00	210.75	-21.44	196.17	-77.03	4.42	1.73	226.42	1353.04
207.00	217.91	-22.49	201.34	-83.35	4.24	1.76	235.85	1349.54
210.00	229.47	-25.57	207.00	-99.03	3.93	1.88	254.38	1425.29
213.00	240.32	-30.09	207.94	-120.48	3.60	2.09	277.74	1558.76
216.00	244.20	-35.87	197.88	-143.09	3.32	2.40	301.36	1768.05
219.00	244.10	-41.77	182.06	-162.59	3.06	2.73	327.26	1983.11
220.00	242.56	-43.83	174.98	-167.99	2.97	2.86	336.26	2065.48

## 130 to 210 kHz-C (Broadband)

Transformed to 100 ohms minimum with internal diplexer (B2)

**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 18W in B175, B265, PM265  
12W in M265, TM265

Q ≈ 2

Cable Type: C332

Cable Length: 10 m (33 ft)

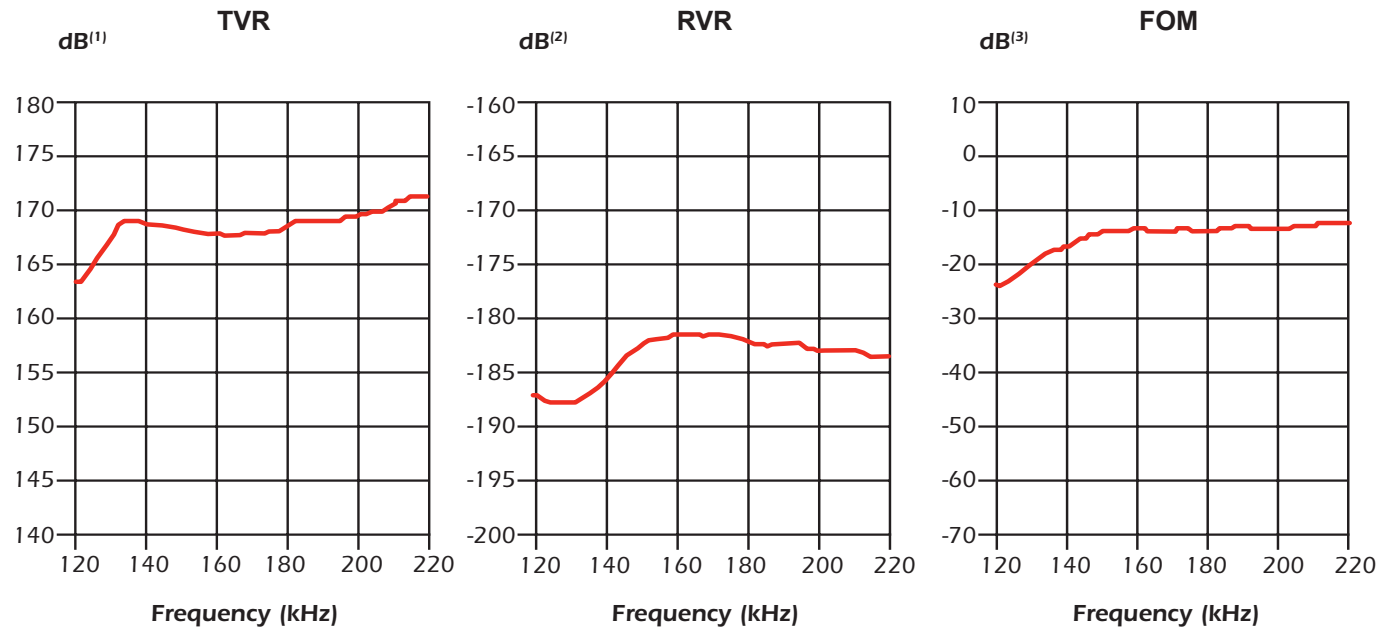
**Notes:**

- (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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.

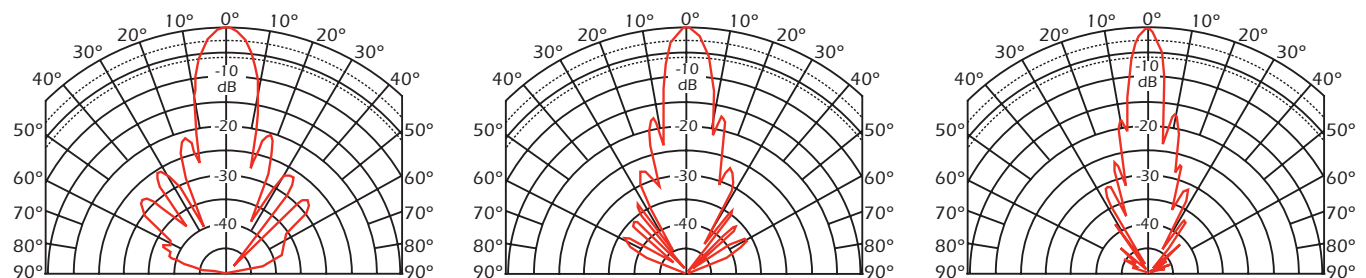
65 mm (2.56 in) PZT

Active Area: 33 cm<sup>2</sup> (5.1 in<sup>2</sup>)

Radiating Surface: Urethane



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	10°
-6 dB	14°
-10 dB	18°

Beamwidth	@ 160 kHz
-3 dB	8°
-6 dB	12°
-10 dB	15°

Beamwidth	@ 210 kHz
-3 dB	6°
-6 dB	8°
-10 dB	11°



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# Technical Data Catalog

## 130 to 210 kHz-C (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
117.00	190.30	-31.19	162.79	-98.55	4.50	2.72	222.45	3701.83
120.00	174.84	-30.44	150.74	-88.59	4.93	2.90	202.80	3843.36
123.00	149.11	-29.58	129.67	-73.61	5.83	3.31	171.46	4283.90
126.00	125.94	-24.42	114.67	-52.07	7.23	3.28	138.32	4146.95
129.00	109.04	-15.17	105.24	-28.54	8.85	2.40	112.98	2961.73
132.00	100.47	-1.63	100.43	-2.86	9.95	0.28	100.51	341.44
135.00	103.22	13.01	100.57	23.24	9.44	-2.18	105.94	-2571.09
138.00	116.39	24.67	105.76	48.58	7.81	-3.59	128.08	-4136.54
141.00	137.80	32.11	116.72	73.25	6.15	-3.86	162.69	-4354.48
144.00	163.58	35.65	132.93	95.34	4.97	-3.56	201.31	-3937.89
147.00	190.50	35.69	154.71	111.14	4.26	-3.06	234.56	-3316.05
150.00	213.60	33.42	178.29	117.64	3.91	-2.58	255.91	-2735.71
153.00	230.31	30.05	199.37	115.31	3.76	-2.17	266.06	-2261.39
156.00	245.48	27.11	218.52	111.85	3.63	-1.86	275.77	-1893.62
159.00	264.12	25.25	238.89	112.67	3.42	-1.62	292.02	-1616.63
162.00	278.88	22.66	257.35	107.44	3.31	-1.38	302.20	-1357.15
165.00	281.76	17.75	268.34	85.91	3.38	-1.08	295.85	-1043.79
168.00	274.63	15.83	264.22	74.90	3.50	-0.99	285.45	-940.79
171.00	278.01	12.91	270.98	62.14	3.51	-0.80	285.23	-748.23
174.00	281.95	10.34	277.37	50.62	3.49	-0.64	286.60	-582.48
177.00	279.81	8.71	276.58	42.37	3.53	-0.54	283.07	-486.59
180.00	262.62	6.80	260.77	31.09	3.78	-0.45	264.48	-398.63
183.00	240.25	7.17	238.37	29.99	4.13	-0.52	242.15	-451.93
186.00	230.51	10.43	226.70	41.75	4.27	-0.79	234.39	-672.31
189.00	239.40	11.78	234.35	48.87	4.09	-0.85	244.55	-718.13
192.00	250.69	12.45	244.80	54.03	3.90	-0.86	256.72	-712.65
195.00	249.22	12.29	243.51	53.05	3.92	-0.85	255.07	-697.14
198.00	237.16	12.40	231.63	50.91	4.12	-0.91	242.82	-727.63
201.00	226.56	13.62	220.19	53.36	4.29	-1.04	233.12	-823.17
204.00	229.61	14.70	222.09	58.25	4.21	-1.10	237.37	-862.00
207.00	231.44	14.83	223.73	59.24	4.18	-1.11	239.41	-850.33
210.00	222.21	16.17	213.42	61.88	4.32	-1.25	231.37	-949.76
213.00	204.87	19.50	193.12	68.40	4.60	-1.63	217.34	-1217.62
216.00	189.92	25.16	171.91	80.73	4.77	-2.24	209.82	-1649.12
219.00	189.19	32.17	160.14	100.74	4.47	-2.81	223.51	-2045.44
222.00	198.09	39.18	153.56	125.14	3.91	-3.19	255.54	-2286.33
225.00	208.35	45.51	146.01	148.63	3.36	-3.42	297.32	-2421.93
228.00	218.55	51.80	135.15	171.75	2.83	-3.60	353.41	-2510.12



*Sensing Technology*

## 130 to 210 kHz-D (Broadband)

Transformed to 100 ohms minimum (B2)

**Power Rating:**

- 600 W @ 1% duty cycle
- CW<sup>(4)</sup>: 6W in B75, B765

43 mm (1.7 in) PZT

Active Area: 14.5 cm<sup>2</sup> (2.25 in<sup>2</sup>)

Radiating Surface: Urethane

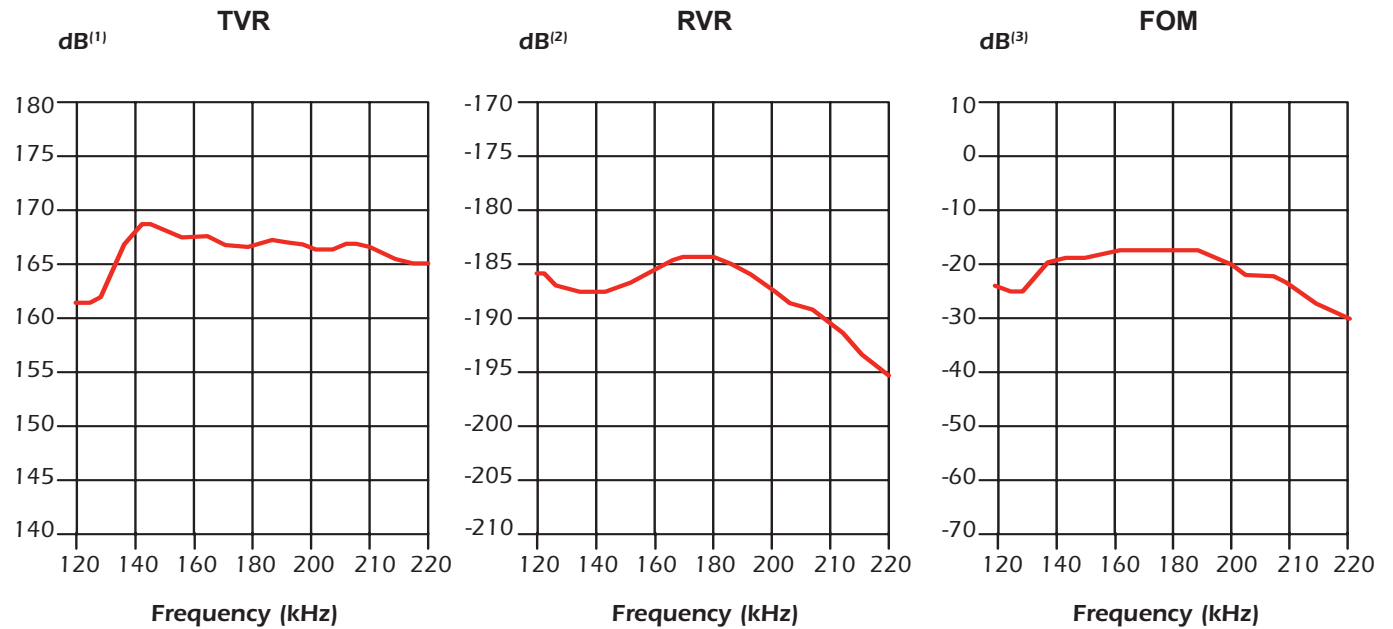
Q ≈ 2

Cable Type: C334

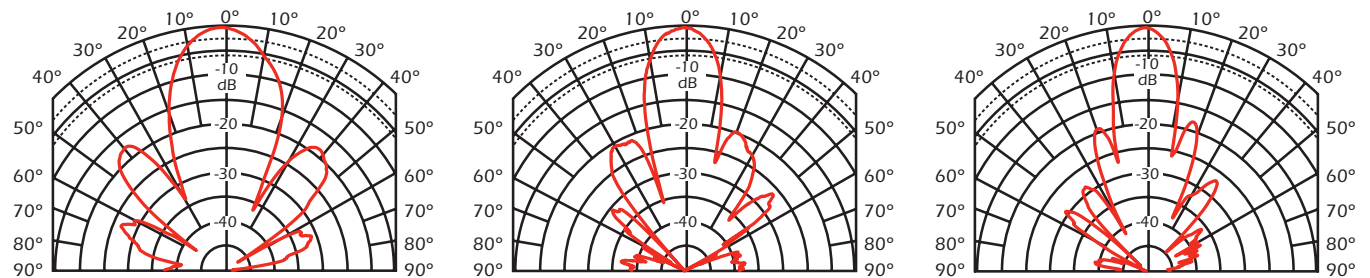
Cable Length: 10 m (33 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	15°
-6 dB	22°
-10 dB	29°

Beamwidth	@ 170 kHz
-3 dB	12°
-6 dB	16°
-10 dB	20°

Beamwidth	@ 210 kHz
-3 dB	9°
-6 dB	13°
-10 dB	17°



*Sensing Technology*



# Technical Data Catalog

## 130 to 210 kHz-D (Broadband)

Note: Impedance data includes cable

**Balanced Impedance Table (Nominal Value) in 20°C Water**

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)
120.00	269.48	3.01	269.11	14.13	3.71	-0.19	269.85	-258.06
122.00	260.47	0.21	260.47	0.96	3.84	-0.01	260.47	-18.49
124.00	253.05	-4.36	252.32	-19.26	3.94	0.30	253.79	386.00
128.00	220.57	-14.96	213.09	-56.94	4.38	1.17	228.31	1455.39
130.00	197.24	-19.13	186.35	-64.63	4.79	1.66	208.76	2033.87
132.00	172.07	-21.41	160.19	-62.82	5.41	2.12	184.82	2558.24
136.00	131.39	-17.93	125.01	-40.46	7.24	2.34	138.10	2742.70
138.00	118.92	-13.01	115.86	-26.78	8.19	1.89	122.05	2183.97
140.00	112.08	-7.32	111.16	-14.27	8.85	1.14	113.00	1291.57
144.00	110.27	4.60	109.91	8.85	9.04	-0.73	110.63	-804.01
146.00	114.52	9.74	112.87	19.37	8.61	-1.48	116.19	-1610.33
148.00	120.86	13.64	117.45	28.50	8.04	-1.95	124.37	-2098.09
152.00	139.10	17.26	132.84	41.26	6.87	-2.13	145.65	-2233.16
154.00	147.85	17.35	141.13	44.09	6.46	-2.02	154.90	-2084.22
156.00	154.97	17.03	148.17	45.40	6.17	-1.89	162.08	-1928.57
160.00	169.60	17.72	161.56	51.62	5.62	-1.79	178.05	-1785.02
162.00	180.74	17.78	172.11	55.19	5.27	-1.69	189.81	-1659.67
164.00	193.67	17.24	184.96	57.40	4.93	-1.53	202.78	-1485.21
168.00	223.00	13.60	216.75	52.42	4.36	-1.05	229.42	-998.59
170.00	237.88	10.71	233.73	44.21	4.13	-0.78	242.10	-731.48
172.00	250.60	6.98	248.74	30.44	3.96	-0.48	252.47	-448.53
176.00	269.52	-1.57	269.42	-7.40	3.71	0.10	269.62	92.15
178.00	273.26	-5.90	271.81	-28.09	3.64	0.38	274.71	336.36
180.00	273.40	-9.79	269.42	-46.50	3.60	0.62	277.44	550.02
184.00	272.28	-16.01	261.72	-75.09	3.53	1.01	283.27	876.14
186.00	272.80	-18.78	258.28	-87.82	3.47	1.18	288.14	1009.74
188.00	273.66	-21.49	254.64	-100.25	3.40	1.34	294.11	1133.27
192.00	276.17	-27.67	244.59	-128.23	3.21	1.68	311.82	1393.72
194.00	275.28	-31.30	235.23	-143.00	3.10	1.89	322.16	1548.08
196.00	272.18	-34.76	223.59	-155.19	3.02	2.10	331.31	1701.13
200.00	262.43	-41.20	197.46	-172.86	2.87	2.51	348.78	1997.36
202.00	256.31	-44.32	183.37	-179.08	2.79	2.73	358.26	2147.77
204.00	248.41	-47.22	168.72	-182.32	2.73	2.95	365.74	2305.12
208.00	230.57	-51.51	143.50	-180.47	2.70	3.39	370.46	2597.56
210.00	223.74	-52.91	134.93	-178.47	2.70	3.57	370.98	2702.02
212.00	218.46	-54.19	127.82	-177.16	2.68	3.71	373.35	2786.83
216.00	211.99	-57.22	114.79	-178.22	2.55	3.97	391.49	2922.17
218.00	208.53	-59.11	107.04	-178.96	2.46	4.12	406.24	3004.54
220.00	204.66	-61.23	98.51	-179.40	2.35	4.28	425.22	3098.41



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## 130 to 210 kHz-E (Broadband)

**Power Rating:**

- 1.5 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 5W in P836

80 mm (3.15 in) PZT

Active Area: 50.25 cm<sup>2</sup> (7.79 in<sup>2</sup>)

Radiating Surface: Urethane

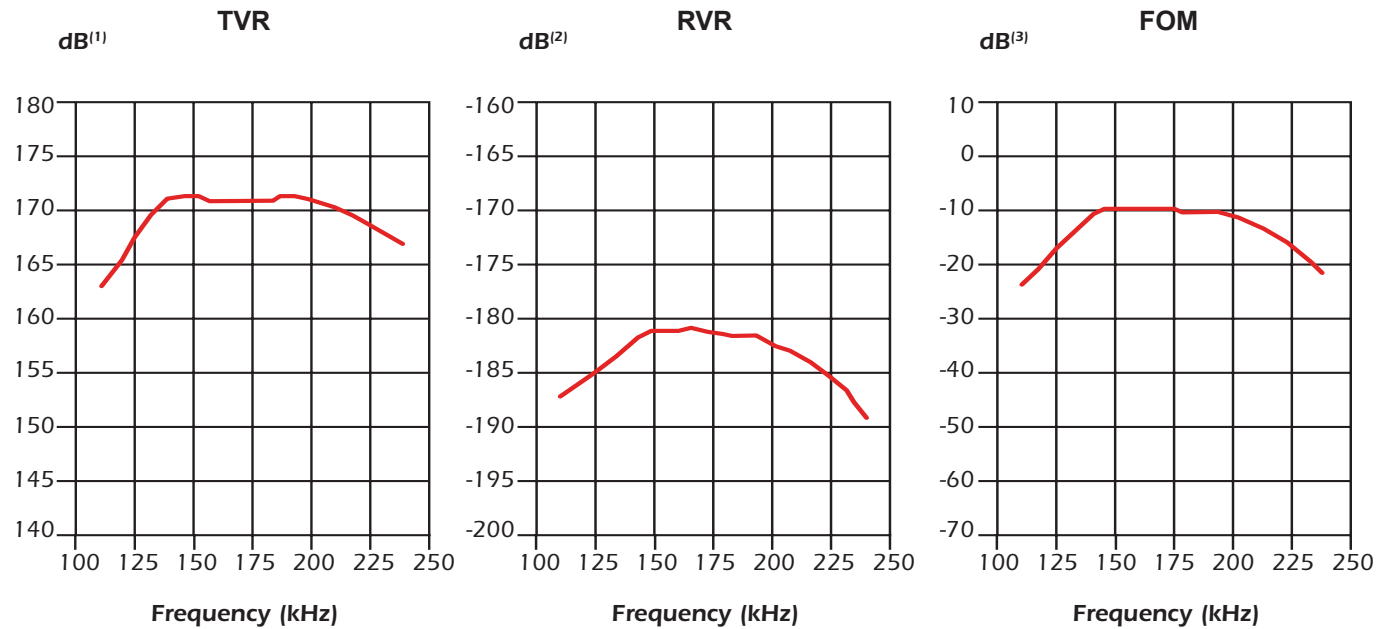
Q ≈ 2

Cable Type: Test Leads

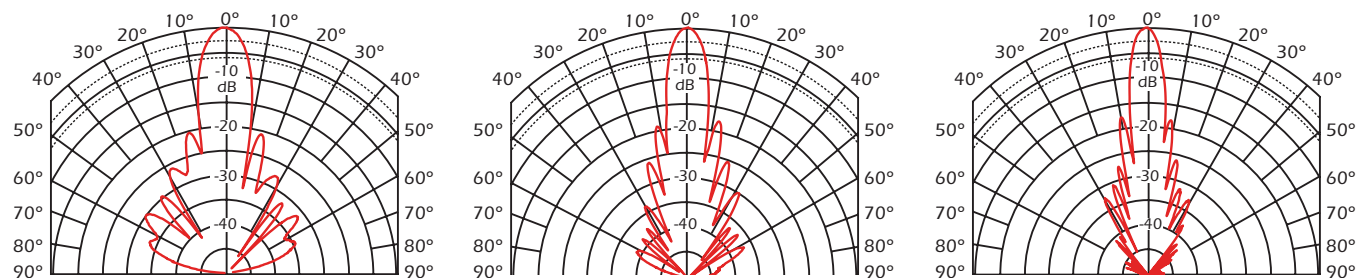
Cable Length: 0.3 m (1 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 130 kHz
-3 dB	9°
-6 dB	12°
-10 dB	15°

Beamwidth	@ 160 kHz
-3 dB	7°
-6 dB	10°
-10 dB	12°

Beamwidth	@ 210 kHz
-3 dB	6°
-6 dB	8°
-10 dB	10°



*Sensing Technology*

# Technical Data Catalog

## 130 to 210 kHz-E (Broadband)

Note: Impedance data includes cable

### Balanced Impedance Table (Nominal Value) in 20°C Water

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)
130.00	138.87	-56.44	76.78	-115.71	3.98	6.00	251.17	7346.23
132.00	139.06	-53.99	81.75	-112.50	4.23	5.82	236.56	7013.93
134.00	140.34	-51.80	86.78	-110.29	4.41	5.60	226.94	6651.12
136.00	141.82	-49.75	91.64	-108.23	4.56	5.38	219.47	6297.82
138.00	143.63	-47.34	97.32	-105.62	4.72	5.12	211.96	5905.28
140.00	146.75	-44.85	104.05	-103.50	4.83	4.81	206.99	5463.04
142.00	152.00	-42.90	111.34	-103.48	4.82	4.48	207.51	5019.74
144.00	157.81	-41.56	118.08	-104.69	4.74	4.20	210.90	4646.35
146.00	164.26	-40.80	124.35	-107.33	4.61	3.98	216.99	4336.30
148.00	171.12	-40.23	130.64	-110.52	4.46	3.77	224.14	4058.82
150.00	177.82	-40.21	135.81	-114.79	4.29	3.63	232.84	3851.78
152.00	184.35	-40.64	139.88	-120.08	4.12	3.53	242.96	3699.56
154.00	190.15	-41.55	142.30	-126.13	3.94	3.49	254.10	3605.06
156.00	194.23	-42.49	143.22	-131.19	3.80	3.48	263.40	3547.96
158.00	197.47	-43.45	143.36	-135.80	3.68	3.48	271.99	3507.98
160.00	199.81	-44.24	143.16	-139.39	3.59	3.49	278.88	3472.96
162.00	202.32	-44.92	143.25	-142.87	3.50	3.49	285.73	3428.98
164.00	205.45	-45.62	143.69	-146.84	3.40	3.48	293.75	3376.05
166.00	208.10	-46.39	143.53	-150.67	3.31	3.48	301.70	3335.94
168.00	210.60	-47.50	142.28	-155.27	3.21	3.50	311.73	3316.52
170.00	212.03	-48.77	139.75	-159.46	3.11	3.55	321.70	3320.71
172.00	211.93	-49.82	136.74	-161.91	3.04	3.60	328.46	3335.69
174.00	210.96	-50.55	134.06	-162.89	3.01	3.66	331.97	3347.85
176.00	211.03	-51.05	132.67	-164.10	2.98	3.69	335.65	3332.37
178.00	212.34	-51.60	131.91	-166.40	2.93	3.69	341.82	3299.73
180.00	213.62	-52.39	130.39	-169.22	2.86	3.71	350.00	3278.65
182.00	214.09	-53.39	127.67	-171.86	2.79	3.75	359.01	3278.79
184.00	212.98	-54.32	124.21	-173.01	2.74	3.81	365.20	3299.07
186.00	211.44	-54.82	121.82	-172.82	2.72	3.87	366.99	3307.75
188.00	210.63	-55.10	120.51	-172.74	2.72	3.89	368.12	3296.37
190.00	211.45	-55.19	120.71	-173.60	2.70	3.88	370.38	3252.56
192.00	213.35	-55.46	120.97	-175.74	2.66	3.86	376.26	3200.35
194.00	215.18	-56.27	119.48	-178.96	2.58	3.87	387.51	3170.80
196.00	216.15	-57.33	116.67	-181.96	2.50	3.89	400.45	3162.41
198.00	216.03	-58.17	113.93	-183.54	2.44	3.93	409.63	3161.41
200.00	215.67	-58.77	111.81	-184.42	2.40	3.97	416.00	3155.22
202.00	216.41	-59.30	110.50	-186.08	2.36	3.97	423.86	3130.40
204.00	217.86	-59.92	109.20	-188.52	2.30	3.97	434.66	3098.76
206.00	219.54	-60.74	107.30	-191.54	2.23	3.97	449.20	3070.17
208.00	221.03	-61.87	104.22	-194.91	2.13	3.99	468.75	3052.90
210.00	221.82	-63.30	99.68	-198.16	2.03	4.03	493.62	3052.24



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## 150 to 250 kHz-A (Broadband)

Transformed to 100 ohms minimum (B1)

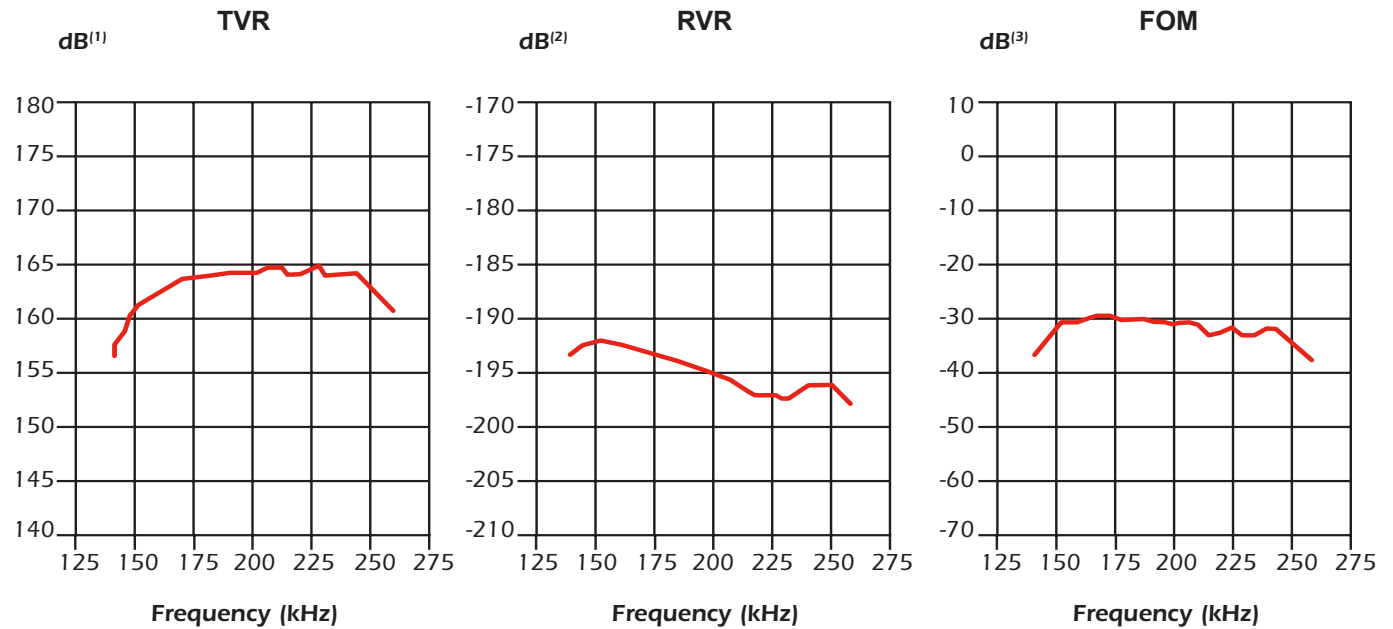
**Power Rating:**

- 1 kW @ 1% duty cycle
- CW<sup>(4)</sup>: 18 W in B175, B275, B285, CM599, PM111, PM275, R109, R509  
12W in CM275, TM185, TM275

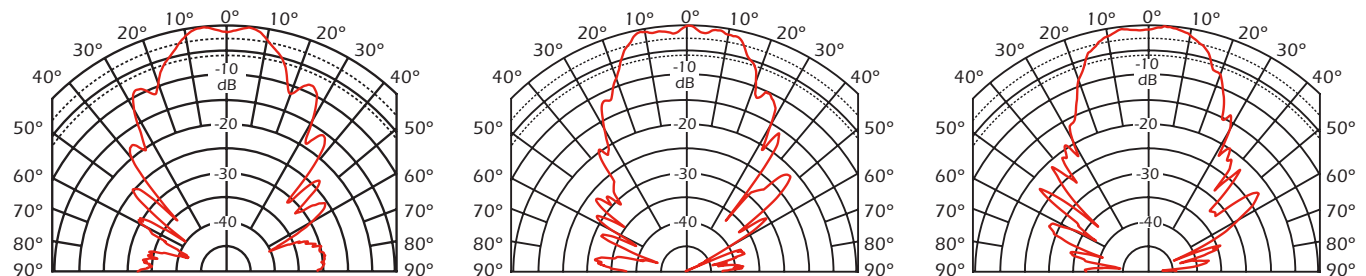
65 mm (2.56 in) PZT  
 Active Area: 34.4 cm<sup>2</sup> (5.3 in<sup>2</sup>)  
 Radiating Surface: HPC/Urethane  
 Q ≈ 2.3  
 Cable Type: C334  
 Cable Length: 12 m (40 ft)

**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) CW Power ratings is for 20°C seawater temperature. Consult Airmar for different housing CW ratings.



### Transmit Radiation Pattern



Beamwidth	@ 160 kHz
-3 dB	24°
-6 dB	32°
-10 dB	39°

Beamwidth	@ 200 kHz
-3 dB	30°
-6 dB	38°
-10 dB	44°

Beamwidth	@ 235 kHz
-3 dB	26°
-6 dB	33°
-10 dB	43°



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# Technical Data Catalog

## 150 to 250 kHz-A (Broadband)

Note: Impedance data includes cable

### Balanced Impedance Table (Nominal Value) in 20°C Water

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)
140.00	213.73	23.07	196.63	83.76	4.30	-1.83	232.31	-2084.55
142.00	210.53	18.00	200.22	65.07	4.52	-1.47	221.36	-1645.47
146.00	193.34	9.57	190.65	32.13	5.10	-0.86	196.06	-937.09
148.00	182.66	6.91	181.33	21.98	5.43	-0.66	184.00	-708.56
152.00	168.28	4.38	167.78	12.85	5.93	-0.45	168.77	-475.15
154.00	162.84	3.22	162.58	9.15	6.13	-0.35	163.09	-356.77
158.00	154.21	1.38	154.16	3.71	6.48	-0.16	154.25	-156.98
160.00	150.70	0.74	150.69	1.94	6.64	-0.09	150.72	-85.05
164.00	146.19	-0.85	146.17	-2.16	6.84	0.10	146.20	98.16
166.00	142.90	-2.10	142.80	-5.24	6.99	0.26	142.99	246.27
170.00	134.45	-3.02	134.26	-7.08	7.43	0.39	134.64	366.64
172.00	131.48	-2.92	131.31	-6.70	7.60	0.39	131.65	358.37
176.00	128.39	-2.48	128.27	-5.55	7.78	0.34	128.51	304.44
178.00	127.87	-2.35	127.76	-5.25	7.81	0.32	127.98	287.00
182.00	129.72	-1.93	129.64	-4.38	7.70	0.26	129.79	227.58
184.00	131.65	-3.45	131.41	-7.92	7.58	0.46	131.89	395.40
188.00	126.92	-6.72	126.04	-14.85	7.83	0.92	127.80	780.66
190.00	123.22	-6.96	122.31	-14.94	8.06	0.98	124.14	824.33
194.00	119.44	-5.67	118.86	-11.80	8.33	0.83	120.03	678.49
196.00	120.32	-4.77	119.91	-10.00	8.28	0.69	120.74	560.88
200.00	124.52	-5.54	123.93	-12.02	7.99	0.78	125.10	617.12
202.00	125.98	-7.40	124.93	-16.24	7.87	1.02	127.04	805.97
206.00	119.49	-11.90	116.92	-24.64	8.19	1.73	122.11	1333.10
208.00	113.53	-11.49	111.25	-22.61	8.63	1.75	115.85	1342.41
212.00	110.69	-8.53	109.46	-16.42	8.93	1.34	111.92	1006.20
214.00	111.72	-7.92	110.66	-15.40	8.87	1.23	112.80	917.63
218.00	111.18	-8.27	110.02	-16.00	8.90	1.29	112.35	944.92
220.00	110.57	-8.17	109.44	-15.71	8.95	1.28	111.70	929.56
224.00	106.52	-8.15	105.44	-15.10	9.29	1.33	107.61	945.73
226.00	103.16	-6.65	102.47	-11.94	9.63	1.12	103.86	790.09
230.00	104.24	-0.17	104.24	-0.30	9.59	0.03	104.24	19.23
232.00	109.08	2.09	109.01	3.98	9.16	-0.33	109.16	-229.43
236.00	119.52	2.97	119.36	6.19	8.36	-0.43	119.68	-292.38
238.00	122.98	2.87	122.83	6.15	8.12	-0.41	123.14	-271.84
242.00	129.46	3.52	129.21	7.95	7.71	-0.47	129.70	-312.09
244.00	134.32	4.59	133.89	10.75	7.42	-0.60	134.75	-388.72
248.00	151.36	6.37	150.43	16.79	6.57	-0.73	152.30	-470.39
250.00	165.02	6.14	164.07	17.64	6.03	-0.65	165.97	-412.42
254.00	197.22	1.17	197.18	4.01	5.07	-0.10	197.26	-64.62
256.00	210.94	-3.31	210.59	-12.18	4.73	0.27	211.29	170.16
260.00	228.00	-13.43	221.77	-52.95	4.27	1.02	234.41	623.51



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