Transducer Specification

Part Number:	BII-7708
Signal Type:	Spike (Negative or Positive), pulsed SINE/Square/Chirp, FSK, PSK, Frequency Hopping DSSS, CDMA/DSSS, etc.
Resonant Frequency f_s:	160 kHz ± 5%
	1. Efficiency is low in the frequency range far from f_s, so it is NOT recommended to operate transducer at frequency far from f_s. **2. Transducer can operate in low power at frequency far from fs, the input power P_i should be much less than 1% MCIP at f_s.**
Quality Factor Q_m:	Default: Q_m = 7.
	Customized low Q_m (Q_m ≈ 4.5) is available with TVR ≈ 130 dB µPa/V at 1m at f_s.
TVR:	Refer to **TVR Graph**, Transmitting Voltage Response.
Radiation Sound Level SL:	SL = 20*logV_i + TVR, dB µPa@1m. Driving Voltage V_i is in unit of V_{rms}.
Admittance or Impedance:	Refer to **Admittance Graph and Admittance Graph**
Transducer without Impedance Matching Unit	
Driving Voltage V_i at f_s:	**Pulsed Driving Signal and Duty Cycle D < 100%:** Maximum V_i, V_{imax} = 130 V_{rms}.
	Continuous Operation at 100% Duty Cycle: Maximum V_i, V_{imax} = 47 V_{rms}.
Transducer with Impedance Matching Unit	
Driving Voltage V_i at f_s:	**Pulsed Driving Signal and Duty Cycle D < 100%:** V_{imax} = √(MIPP * |Z|), in V_{rms}. Z is impedance with Impedance Matching Unit at fs.
	Continuous Operation at 100% Duty Cycle: Maximum V_i, V_{imax} = √(MCIP * |Z|), in V_{rms}.
Input Power P_i:	$P_i = V_i^2$ * G. Refer to **G-B Graph:** G is conductance, G_{max} is maximum G at f_s.
MIPP at f_s:	71 Watts, Maximum Input Pulse Power.
MPW at MIPP and f_s:	3 Seconds, Maximum Pulse Width.
MCIP at f_s:	9 Watts, Maximum Continuous Input Power.
How to determine pulse width, duty cycle and off-time with input pulse power (peak power) at f_s: 1. Determine the input pulse power (IPP, peak power) with sound intensity required by the project. IPP MUST be less than MIPP. 2. Pulse Width ≤ (MIPP * MPW*(120°c-T)/103°c)/IPP. T: Water Temperature in °c. 3. Duty Cycle D ≤ MCIP*(120°c-T)/103°c)/IPP. 4. Off-time ≥ PW*(1-D)/D.	
FFVS at f_s:	-205.3 dB V/µPa, Free-field Voltage Sensitivity.
	$Sensitivity\ Loss\ over\ extension\ cable\ at\ f_s\ (dB) = 20 * \log\{(1 + 2\pi f_s C_c/B)/\sqrt{[G^2 + (B + 2\pi f_s C_c)^2]/(G^2 + B^2)}\}$ G: Conductance at f_s; B: Susceptance at f_s; C_c: Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.
Receiving Sound Level SL:	SL = 20*logV_o - FFVS, dB µPa. Receiving Voltage V_o is in unit of V_{rms}.
-3dB Beam Width:	Horizontal x Vertical = Omnidirectional x 60°
Directivity Pattern:	Hemispherical
Side Lobe Level:	No side lobes
Free Capacitance C_f:	2.55 nF ± 10% @ 1kHz, 1m cable.
Dissipation D:	0.004 @ 1kHz, 1m cable.
Operating Depth:	Maximum, 500 m and Limited by the cable length if the cable has wire leads or a non-waterproof connector.
Mounting Options:	1. Default: Free Hanging (FH) 2. Thru-hole Mounting with Single O-ring (THSO) 3. Thru-hole Mounting with Double O-ring (THDO) 4. Bolt Fastening Mounting (Stainless Steel): (BFMSS) 5. End-face Mounting: (EFM) 6. Flange Mounting: (FGM) Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.
Cable:	1. Two Conductor Shielded Cable (SC) 2. 50 Ω RG58 Coax (RG58)
Cable:	1. Two Conductor Shielded Cable (SC), Rubber or PVC Jacket. 2. 50 Ω RG58 Coax (RG58) 3. 50 Ω RG174/U Coax (RG174) 4. 50 Ω RG178/U Coax (RG178) (Operating Temperature Range: -70°C To +200°C) 5. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, ΦD=3.2 mm (SC32), up to 200°C, AWG26 Conductors. 6. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, ΦD=4.0 mm (SC40), up to 200°C, AWG20 Conductors. 7. Two Conductor Unshielded Cable (USC)
	Handling: Do not use the cable to support transducer weight in air and water if the transducer has a mounting part. Do not bend the cable.
Cable Length:	1. Default: 1m 2. Custom
Connector:	1. Default: Wire Leads (WL) 2. Male BNC (BNC) 3. SMA (Plug, Male Pin) (SMA) 4. SMC (Plug, Female Socket) (SMC) 5. MIL-5015 Style (pin) (5015) 6. LEMO (Plug Male Pins) (LEMO) 7. Underwater Mateable Connector (pin) (UMC) 8. Customized, buyer specifies the connector. Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.

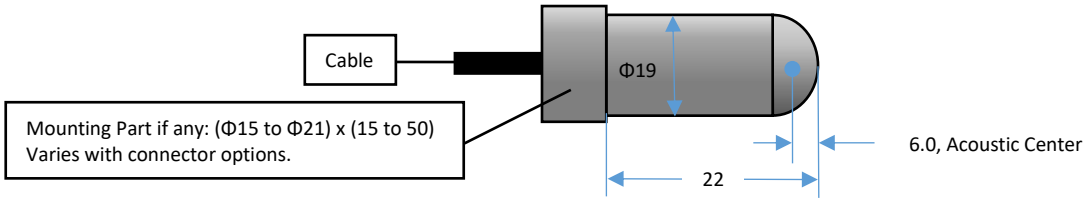
Physical Size:	Refer to Mechanical Drawing.
Weight in Air:	100 grams, 1 m cable.
Operation Temperature:	1. Default: -10°C to +60°C or 14°F to 140°F. 2. Bespoke High Temperature Transducer: -10°C to 120°C, or 14°F to 248°F. Append HT to part number.
Storage Temperature:	-20°C to +60°C or -4°F to 140°F.
Impedance Matching:	BII-6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately. Append **IM** to the part number for integrating BII-6000 in the transducer, and specify impedance in Ω. For example, BII-xxxxIM50Ω: BII-xxxx transducer with built-in Impedance Matching unit as a 50 Ω load.

WARNING: DANGER — HIGH VOLTAGE on wires. Wires shall be insulated for safety. DO NOT TOUCH THE WIRES BEFORE THE DRIVING SIGNAL IS SHUT DOWN. Cable shield must be grounded firmly for safety.

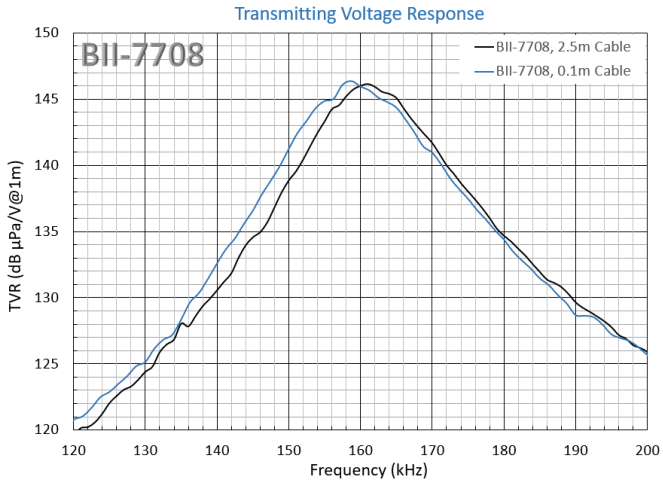
for 50Ω BNC Male connector, it is buyer's sole responsibility to make sure that the (female) BNC shield of the signal source is firmly grounded for operating safety before hooking up transducer/hydrophone to the signal source. Coax with BNC is not intended for hand-held use at voltages above 30Vac/60Vdc.

Wiring:	**Two Conductor Shielded Cable**	**BNC, SMC, or SMA.**	**Underwater Connector**	**MIL-5015 Connector**
Signal	White or Red	Center Contact	Contact 2	Contact C
Signal Common	Black	Shield	Contact 1	Contact B
Shielding and Grounding	Shield	Shield	Contact 3	Contact A

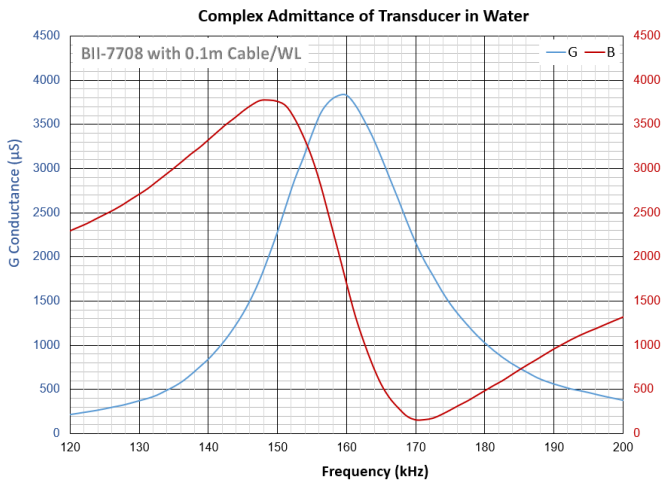
Physical Size (unit: mm):



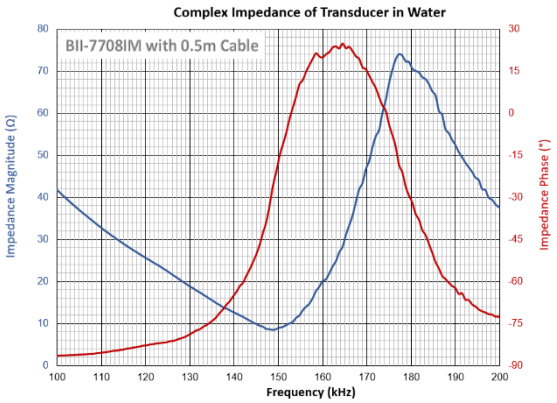
Transmitting Voltage Response (TVR)



Admittance



Impedance with Built-in Impedance Matching Unit (Customized)



Directivity Response