



## Hemispherical Transducer

### BII7700 Series Hemispherical Transducer

BII's hemispherical transducers range from 5 to 300 kHz and provide hemispherical directivity response patterns.

### Typical Applications

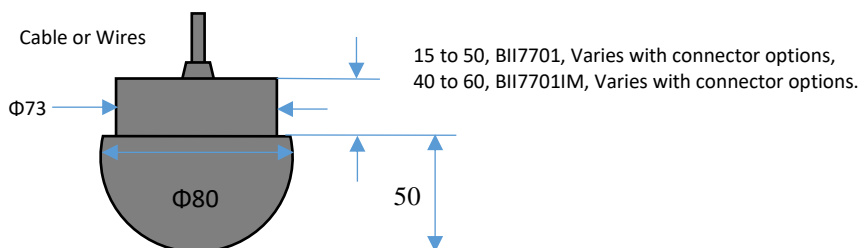
Directional Communication	Forward-looking Navigation, Pinger, Locator, Transponder, Tracking, Beaconing.	Acoustic Positioning: LBL, SBL, USBL
---------------------------	--	--------------------------------------

### Specification

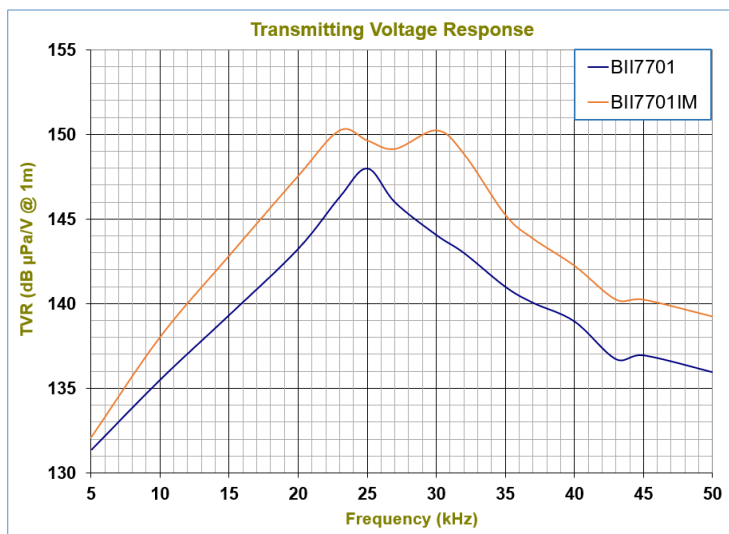
Part Number:	BII7701		BII7701IM	
Signal Type:	Spike (Negative or Positive), pulsed SINE/Square/Chirp, FSK, PSK, Frequency Hopping DSSS, CDMA/DSSS, etc.			
Directivity Pattern:	Hemispherical at fs; Omnidirectional at f ≤ 6.3 kHz. Refer to <b>Beam Pattern Graph</b> .			
-3dB Beam Width:	Horizontal x Vertical = Omnidirectional x 60° at fs.			
Side Lobe Level:	No side lobes			
Free Capacitance Cr:	36.0 nF ± 10% @ 1kHz, 1m cable.		N/A	
Dissipation D:	0.004 @ 1kHz, 1m cable.		N/A	
Resonant Frequency fs:	25 kHz ± 5%			
Operating Frequency:	Minimum, 1 kHz		Minimum, 5 kHz	
Quality Factor Qm:	4		2	
ηea at fs at fs:	≥ 0.75 in Water, Electroacoustic Efficiency, Load Medium Dependent.			
ηea at f << fs:	at f << fs, ηea / ηea at fs ≈ 0.2*(k*ΦD)². Wave Number k = 2π/λ; ΦD = Transducer Diameter.			
	<b>1. Electroacoustic Efficiency ηea is quite low at f &lt;&lt; fs and drops gradually at f &gt; fs, so it is NOT recommended for transducers to emit high power sounds at frequencies far from fs.</b> <b>2. Transducer can emit low power sounds at frequencies far from fs such as input power Pi ≤ ηea * MIPP at f ≤ 0.8*fs and Pi ≤ 0.2 * MIPP at f ≥ 1.3*fs.</b>			
Power Factor at fs:	≥ 0.7 at 15m Cable.		≥ 0.94	
TVR at fs:	148.0 dB μPa/V@1m, Transmitting Voltage Response.		150.2 dB μPa/V@1m	
Radiation Sound Level SL:	SL = 20*logVi + TVR, dB μPa@1m. Driving Voltage Vi is in unit of Vrms.			
Admittance or Impedance:	Gmax = 12.0 mS, B = 3.8 mS @ fs.		Z = 50*ejθ, in Ω, and Phase Angle  θ  ≤ 20° at fs.	
Driving Voltage Vi at fs:	<b>Pulsed Driving Signal and Duty Cycle D &lt; 100%:</b> Maximum Vi, Vimax = V(MIPP/Gmax) or 600, whichever is less, in Vrms.		<b>Pulsed Driving Signal and Duty Cycle D &lt; 100%:</b> Vimax = V(MIPP *  Z ), in Vrms. Z is impedance with Impedance Matching Unit at fs.	
	<b>Continuous Operation at 100% Duty Cycle:</b> Maximum Vi, Vimax = V(MCIP/Gmax), in Vrms.		<b>Continuous Operation at 100% Duty Cycle:</b> Maximum Vi, Vimax = V(MCIP *  Z ), in Vrms.	
	To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.			
Input Power Pi:	Pi = Vi² * G. Refer to <b>G-B Graph</b> : G is conductance, Gmax is maximum G at fs.			
MIPP at fs:	Maximum Input Pulse Power at fs: Pi = Vi² * Gmax or 520 Watts, whichever is less.			
MPW at MIPP and fs:	70 Seconds, Maximum Pulse Width at MIPP and at fs.			
MCIP at fs:	240 Watts, Maximum Continuous Input Power at fs.			
<b>How to determine pulse width, duty cycle and off-time with input pulse power (peak power) at fs:</b> 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 fs:	-192.0 dB V/μPa, Free-field Voltage Sensitivity.		-194.2 dB V/μPa @ fs	
	<i>Sensitivity Loss over extension cable at fs (dB) = 20 * log {(1 + 2πfsCc/B)/√[G² + (B + 2πfsCc)²]/(G² + B²)}</i> G: Conductance at fs; B: Susceptance at fs; Cc: Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.			
Receiving Sound Level SL:	SL = 20*logVo - FFVS, dB μPa. Receiving Voltage Vo is in unit of Vrms.			
Operating Depth:	Maximum, 300 m or 3 MPa Pressure, 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) Please refer to online document <a href="#">AcousticSystem.pdf</a> for a complete list of Mounting Options and more details.			
Cable:	1. Two Conductor Shielded Cable (SC), Rubber or PVC Jacket. 2. 50 Ω RG58 Coax (RG58) 3. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, ΦD=4.0 mm (SC40), up to 200°C, AWG20 Conductors ( <b>Not Water-proofed, ONLY for Dry Air Use</b> ).			
	<b>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.</b>			
Cable Length:	1. Default: 1 m. 2. Custom.			
Connector:	1. Default: Wire Leads (WL)			

	2. Male BNC (BNC) (Max. Diameter $\Phi$ 14.3 mm) 3. MIL-5015 Style (pin) (5015) (Max. Diameter $\Phi$ 30 mm with 3 contacts) 4. Underwater Mateable Connector (pin) (UMC) (Max. Diameter $\Phi$ 21.5 to $\Phi$ 35 mm) Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.			
Size:	Refer to Mechanical Drawing.			
Weight in Air:	0.4 kg, 1m cable.		0.7 kg, 1m cable.	
	Actual weight depends on Mounting Parts, Cable Types and Length.			
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 <b>HT</b> to part number.			
Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.			
Power Amplifier:	<a href="#">BII5000</a> Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.			
Impedance Matching:	<a href="#">BII6000</a> Bespoke Impedance Matching between transducers and power amplifiers. Order Separately as standalone devices, or append <b>-IM</b> to the part number for integrating BII6000 into the transducer, and specify impedance in $\Omega$ . For example, BIIxxxxIM8 $\Omega$ : BIIxxxx transducer with built-in Impedance Matching unit as 8 $\Omega$ load.			
TR Switch:	<a href="#">BII2100</a> Transmitting & Receiving Switch. Not Included. Order Separately as standalone devices.			
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. <a href="#">Built-in temperature sensor</a> . Append <b>TS</b> to part number (BIIxxxxTS) for integrating a temperature sensor in the transducer.			
Potable Transmitter:	<a href="#">BII8030</a> series portable acoustic transmitters.			
Portable T/R System:	<a href="#">BII8080</a> series portable transmit and receive systems.			
<b>Wiring:</b>	<b>Two Conductor Shielded Cable</b>	<b>Coax/BNC</b>	<b>Underwater Connector</b>	<b>MIL-5015 Connector</b>
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
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 50 $\Omega$ BNC connector, it is buyer's sole responsibility to make sure that the 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.				

Physical Size (unit: mm):



TVR (Transmitting Voltage Response):



Beam Pattern:

