



**Omnidirectional Spherical Transducer**

BII-7520 series spherical transducers ranging from 2 to 300kHz provide omnidirectional directivity response and broadband response.

**Typical Applications**

Remote Control, Telemetry, Drifting Array Artificial Acoustic Target, Echo-Repeater Acoustic Deterrent to Marine Animals Playback Marine Animal Voices/Calls/Whistles/Songs/Clicks	Underwater Acoustic Network, Spherical Point Source Diver Communication, Underwater Telephone Pinger/Tag/Locator/Transponder/Beacon/Acoustic Release Marine Animal Behavior Research, Bioacoustic Stimuli
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**Related Products**

[Sonar Signal Generation](#) Pulse Signal      [BII5000](#) Power Amplifier      [BII8030](#) Underwater Acoustic Transmitter      [BII-8080](#) Transmitting & Receiving System

**Specification**

Transducer:	BII7526	BII7526-IM50Ω
Resonant Frequency $f_s$ :	75 kHz $\pm$ 10%	
Transmitting Frequency:	$f_s \pm 20\% * f_s$	$f_s \pm 25\% * f_s$
	Minimum Transmitting Frequency: None.	Minimum Transmitting Frequency: TBD. To be determined.
	<b>Operating Frequency &lt; Minimum Transmitting Frequency:</b> transducer impedance is very low which causes over-current issue to power amplifier, and results in overheat issue (damage) to power amplifier and the transducer.	
Impedance Matching:	No	Built-in, Impedance matching to 50Ω by default.
	TVR and FFVS variation of a transducer with built-in Impedance Matching Network: 1. When $R_{IM} < 1/G$ , TVR increases, FFVS decreases. Generally, this is true for low frequency transducers. 2. When $R_{IM} > 1/G$ , TVR decreases, FFVS increases. Generally, this is true for high frequency transducers. $R_{IM}$ : Impedance-Matched Resistance such as 50 Ω. G: Transducer Conductance at Operating Frequency.	
Signal Type:	Pulsed SINE, Chirp, PSK, FSK, Pulsed Square Waveform, etc.	
<a href="#">Directivity Pattern:</a>	Conical Beam/Toroidal Beam/Omnidirectional Beam/Hemispherical Beam at $f_s$ . Refer to Graph of <b>Directivity Pattern</b> . Omnidirectional at $f \leq f_{omni}$ or Omnidirectional at $f \ll f_s$ .	
-3dB Beam Width:	Omnidirectional	
Side Lobe Level:	No side lobes or $\leq -17.7$ (dB) (-3dB Beam Width $< 50^\circ$ ).	
Free Capacitance $C_f$ :	14.0 nF $\pm$ 10% @ 1 kHz	N/A
Dissipation D:	0.004 @ 1 kHz	N/A
Quality Factor $Q_m$ at $f_s$ :	4.0	4.0
	-3dB bandwidth $\Delta f = f_s/Q_m$ . $Q_m$ determines the transient response or the rise and fall rings of steady-state response.	
$\eta_{ea}$ at $f_s$ at $f_s$ :	0.67 in Water, Electroacoustic Efficiency, Load Medium Dependent.	
$\eta_{ea}$ at $f \ll f_s$ :	at $f \ll f_s$ , $\eta_{ea} / \eta_{ea} \text{ at } f_s \approx 0.1225 * (k * \Phi D)^2$ . Wave Number $k = 2\pi/\lambda$ ; $\Phi D$ = Transducer Diameter.	
	1. Electroacoustic Efficiency $\eta_{ea}$ is quite low at $f \ll f_s$ and drops gradually at $f > f_s$ , so it is NOT recommended for transducers to emit high power sounds at frequencies far from $f_s$ . <b>Otherwise, transducer may be damaged by overheating.</b> 2. Transducer can emit low power sounds at frequencies far from $f_s$ . For example, input power $P_i \leq \eta_{ea} * MIPP$ at $f \leq 0.8 * f_s$ and $P_i \leq 0.2 * MIPP$ at $f \geq 1.3 * f_s$ .	
Power Factor at $f_s$ :	0.87	$\geq 0.94$
<a href="#">TVR</a> at $f_s$ :	146.0 $\pm$ 2 dB $\mu Pa/V @ 1m$ .	146.5 $\pm$ 2 dB $\mu Pa/V @ 1m$ for BII7526-IM50Ω.
Radiation Sound Level SL:	SL = 20 * log $V_i$ + TVR, dB $\mu Pa @ 1m$ . Driving Voltage $V_i$ is in unit of $V_{rms}$ .	
<a href="#">Admittance or Impedance:</a>	$G_{max} = 6.67$ mS, $B = 4.84$ mS @ $f_s$ .	1. Default: $Z = 50 * e^{j\theta}$ , in $\Omega$ , and Phase Angle $ \theta  \leq 20^\circ$ at $f_s$ . 2. Customization: refer to <a href="#">Impedance Matching at <math>f_s</math></a> . Refer to <b>Z-θ Graph</b> .
Driving Voltage $V_i$ at $f_s$ : ( $V_{imax}$ : Maximum $V_i$ )	<b>Pulsed Driving Signal and Duty Cycle D &lt; 100%:</b> $V_{imax} = \sqrt{(MIPP/G_{max})}$ or <b>300</b> , whichever is less, in $V_{rms}$ .	
	<b>Continuous Operation at 100% Duty Cycle:</b> $V_{imax} = \sqrt{(MCIP/G_{max})}$ , in $V_{rms}$ .	
	To achieve higher sound level, built-in impedance matching is recommended to step up driving voltage inside the transducer.	
Input Power $P_i$ :	$P_i = V_i^2 * G$ . Refer to <b>G-B Graph</b> : G is conductance.	$P_i = V_i^2 / Z$ at $f_s$ . Z is impedance at $f_s$ .
MIPP at $f_s$ :	Maximum Input Pulse Power at $f_s$ : $P_i = V_i^2 * G_{max}$ or 330 Watts, whichever is less.	
MPW at MIPP and $f_s$ :	10 Seconds, Maximum Pulse Width at MIPP and at $f_s$ .	
MCIP at $f_s$ :	60 Watts, Maximum Continuous Input Power at $f_s$ .	
<b>How to determine pulse width, duty cycle and off-time with input pulse power (peak power) at <math>f_s</math>:</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 $\leq (MIPP * MPW * (120^\circ c - T) / 103^\circ c) / IPP$ . T: Water Temperature in $^\circ c$ . 3. Duty Cycle $D \leq MCIP * (120^\circ c - T) / 103^\circ c / IPP$ . 4. Off-time $\geq PW * (1 - D) / D$ .		
FFVS at $f_s$ :	-202.4 $\pm$ 2 dB V/ $\mu Pa$ .	-203.0 $\pm$ 2 dB V/ $\mu Pa$ for BII7522-IM50Ω.
	<i>Sensitivity Loss over extension cable at <math>f_s</math> (dB) = 20 * log { (1 + 2πf<sub>s</sub>C<sub>c</sub>/B) / √ [G<sup>2</sup> + (B + 2πf<sub>s</sub>C<sub>c</sub>)<sup>2</sup>] / (G<sup>2</sup> + B<sup>2</sup>) }</i>	

	<p><b>G:</b> Conductance at <math>f_s</math>; <b>B:</b> Susceptance at <math>f_s</math>; <b>C:</b> Capacitance of Extension Cable. Cable is of 100 pF/meter roughly. <b>FFVS:</b> Free-field Voltage Sensitivity. Please refer to online document <a href="#">AcousticSystem.pdf</a> for conversion between G-B and Z-<math>\theta</math>, if necessary.</p>	
FFVS at $f \ll f_s$ :	-200.0 $\pm$ 2 dB V/ $\mu$ Pa.	N/A
	<p>Sensitivity Loss over Extension Cable (dB) = <math>20 \cdot \log[C_h / (C_h + C_c)]</math>. Valid for hydrophone without preamplifier.  <b>C<sub>h</sub>:</b> Hydrophone Capacitance; <b>C<sub>c</sub>:</b> Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.</p>	
Receiving Sound Level SL:	SL = $20 \cdot \log V_o - \text{FFVS}$ , dB $\mu$ Pa. Receiving Voltage $V_o$ is in unit of $V_{rms}$ .	
Receiving Frequency:	1 Hz to 1.5 $\cdot$ $f_s$ .	$f_s \pm 25\% \cdot f_s$
Operating Depth:	Maximum, 600 m or 6 MPa Pressure.	Maximum, 300 m or 3 MPa Pressure.
	Limited by the cable length if the cable has wire leads or a non-waterproof connector.	
Mounting Options:	<ol style="list-style-type: none"> <li>1. Default: Free Hanging (<b>FH</b>)</li> <li>2. Thru-hole Mounting with Single O-ring (<b>THM-7/16"</b>)</li> <li>3. Thru-hole Mounting with Double O-ring (<b>THDO-7/16"</b>)</li> <li>4. Bolt Fastening Mounting (Stainless Steel) (<b>BFM-7/16"</b>).</li> <li>5. Bolt Fastening Mounting (Stainless Steel) (<b>BFM-5/8"</b>)</li> <li>6. Bolt-Fastening Mounting with Free Hanging (<b>BFM-FH</b>)</li> <li>7. Free-hanging with Male Underwater Connector (<b>FHUWC-3P</b>, <b>FHUWC-4P</b>, <b>FHUWC-6P</b>).</li> </ol>	
	Please refer to online document <a href="#">AcousticSystem.pdf</a> for a complete list of Mounting Options and more details.	
Cable Options:	<ol style="list-style-type: none"> <li>1. Two Conductor Shielded Cable (<b>SC</b>), Rubber or PVC Jacket. SC with Two Conductors for transmit signal; SC with 4 conductors for receive signal.</li> <li>2. 50 <math>\Omega</math> RG58 Coax (<b>RG58</b>)</li> <li>3. 50 <math>\Omega</math> RG174/U Coax (<b>RG174</b>)</li> <li>4. 50 <math>\Omega</math> RG178/U Coax (<b>RG178</b>) (Operating Temperature Range: -70°C To +200°C)</li> <li>5. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, <math>\Phi</math>D=3.2 mm (<b>SC32</b>), up to 200°C, AWG26 Conductors (Not Waterproofed, ONLY for Dry Air Use).</li> <li>6. Shielded Cable with Twisted Pair and Teflon (PTFE) Jacket, <math>\Phi</math>D=4.0 mm (<b>SC40</b>), up to 200°C, AWG20 Conductors (Not Waterproofed, ONLY for Dry Air Use).</li> <li>7. Two Conductor Unshielded Cable (<b>USC</b>)</li> </ol>	
	<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: 15 m. 2. Custom-fit.	
Connector Options:	<ol style="list-style-type: none"> <li>1. Default: Wire Leads (<b>WL</b>), for Transmit, Receive Signal, and DC Power Supply.</li> <li>2. Underwater Mateable Connector (3 pins) (<b>UMC3P</b>) (Max. Diameter <math>\Phi</math>21.5 to <math>\Phi</math>35 mm). Underwater Mateable Connector (4 pins) (<b>UMC4P</b>) (Max. Diameter <math>\Phi</math>21.5 to <math>\Phi</math>35 mm). UMC is from global manufacturers of underwater connectors. Its part number is listed in quote in detail.</li> <li>3. MIL-5015 Style (3 pin) (<b>MIL3P</b>) (Max. Diameter <math>\Phi</math>19 to <math>\Phi</math>30 mm). MIL-5015 Style (4 pin) (<b>MIL4P</b>) (Max. Diameter <math>\Phi</math>19 to <math>\Phi</math>30 mm).</li> <li>4. XLR Receptacle with 3 Male Pins (<b>XLR3</b>), (Max. Diameter <math>\Phi</math>20.2 mm), for SE or DF. XLR Receptacle with 4 Male Pins (<b>XLR4</b>), (Max. Diameter <math>\Phi</math>20.2 mm), for SE or DF.</li> <li>5. Male BNC (<b>BNC</b>) (Max. Diameter <math>\Phi</math>14.3 mm), for Transmit or Receive Grounded Signal. <b>BNC with RG178 Coax: Service Temperature up to 165°C or 329°F.</b></li> <li>6. 1/8" (3.5mm) TRS Plug (<b>TRS</b>) (Max. Diameter <math>\Phi</math>10.5 mm), for Receive Signal ONLY.</li> <li>7. +9VDC Battery Snap (<b>BS</b>), +9VDC or +18VDC power supply for Built-in T/R Switch Module.</li> <li>8. 4mm Banana Plug Pair (Red and Black Color) (<b>BP</b>), DC power supply for Built-in T/R Switch Module.</li> </ol>	
	<b>Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.</b>	
Physical Size:	$\Phi$ D = $\Phi$ 28.5 mm, Length $\geq$ 40 mm.	$\Phi$ D = $\Phi$ 28.5 mm, Length $\geq$ 70 mm.
	Actual length depends on Mounting Parts and/or Add-on Parts such as -TR, -IM, -HT, etc.	
Weight in Air:	$\geq$ 0.95 kg with 15 m cable.	$\geq$ 1.4 kg with 15 m cable.
	Actual weight depends on Mounting Parts, Cable Types and Length, and/or Add-on Parts such as -TR, -IM, -HT, etc.	
Operation Temperature:	<ol style="list-style-type: none"> <li>1. Default: -10 °C to +60 °C or 14 °F to 140 °F.</li> <li>2. Bespoke High Temperature Transducer: -10 °C to 120 °C, or 14 °F to 248 °F. Append <b>-HT</b> to part number.</li> </ol>	
Storage Temperature:	-20 °C to +60 °C or -4 °F to 140 °F.	
Impedance Matching at $f_s$ :	<p><a href="#">BII6000</a> Bespoke Impedance Matching between transducers and power amplifiers. Order Separately as standalone devices or append <b>-IMxx<math>\Omega</math></b> to the part number for integrating BII6000 into the transducer and specify impedance in <math>\Omega</math> at <math>f_s</math>. For example, BII7526-IM8<math>\Omega</math>: BII7526 transducer with built-in Impedance Matching unit as 8<math>\Omega</math> load at <math>f_s</math>.</p>	
	Phase Angle $ \theta $ of Complex Impedance $\leq$ 20° at $f_s$ .	
TR Switch Module:	<p><a href="#">BII2100</a> Transmitting &amp; Receiving Switch Module with Built-in Preamp and Bandpass Filter. Order Separately as standalone devices or append <b>-TR</b> to the part number for integrating BII2100 into the transducer. For example, BII7526-TR: BII7526 transducer with built-in T/R Switch Module.</p>	
Temperature Sensor:	<ol style="list-style-type: none"> <li>1. Default: No built-in temperature sensor.</li> <li>2. <a href="#">Built-in temperature sensor</a>. Append <b>-TS</b> to part number (BII7526-TS) for integrating a temperature sensor in the transducer.</li> </ol>	
Power Amplifier:	<a href="#">BII5000</a> Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.	
Potable Transmitter:	<a href="#">BII8030</a> series portable acoustic transmitters.	
Portable T/R System:	<a href="#">BII8080</a> series portable transmit and receive systems.	
<p><b>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.</b></p> <p>for 50<math>\Omega</math> 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.</p>		

**Wiring Information of a Transducer without T/R Switch.**

Transducer Wiring:	Shielded Cable	Coax, BNC.	Underwater Connector UMC3P	MIL-5015 Connector MIL3P	XLR Plug XLR3P
Signal:	White or Red	Center Contact	Contact 2	Contact C or G	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 1

**Wiring Information of Temperature Signal.**

Temperature Sensor Wiring:	Shielded Cable	Coax, BNC	Underwater Connector UMC3P	XLR Plug XLR3P	TRS Plug
Signal:	White or Red	Center Contact	Contact 2	Pin 2	Tip
Signal Common:	Black	Shield	Contact 1	Pin 3	Ring
Shielding and Grounding	Shield	Shield	Contact 3	Pin 1	Sleeve

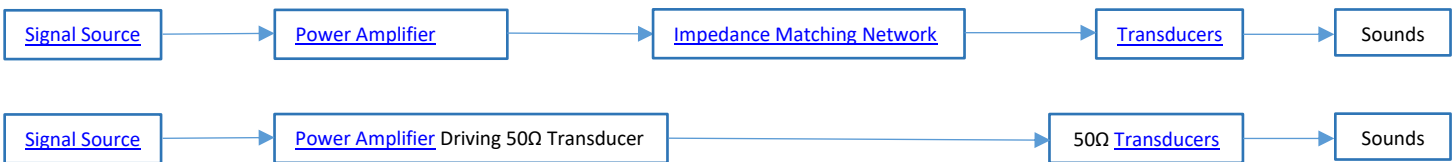
**How to Order Transducers without T/R Switches.** The default options are for stock items which are regularly available.

FH: Free Hanging. SC for Transmit: Shielded Cable (Rubber Jacket, 600V) with 2 conductors. Coax: 50 Ω Coaxial Cable. WL: Wire Leads.					
Part Number	-Appendage	-Mounting	-Cable Length	-Cable Type	-Connector for signals of Transmit and Temperature Sensor
BII7526	Default: None.	Default: BFM-FH.	Default: 15m.	SC for low frequency signal. Coax for high frequency signal.	Default: WL.
<b>Example:</b>		<b>Description</b>			
BII7526-BFM-FH-15m-SC-WL		BII7526 Transducer, Bolt-Fastening Mounting with Free Hanging: BFM-FH, 15m Shielded Cable, Wire Leads.			
BII7526-BFM-5/8"-0.3m-SC-UMC3P		BII7526 Transducer, Bolt Fastening Mounting BFM-5/8", 0.3m Shielded Cable, Male Underwater Mateable Connector.			
BII7526-HT-FH-6m-RG178-BNC		BII7526 Transducer, Service Temperature: -10 °C to 120 °C, or 14 °F to 248 °F. Free Hanging, 6m RG178 Coax, BNC Male.			
BII7526-IM50Ω-FH-20m-RG58-BNC		BII7526 Transducer, Built-in Impedance Matching Network as 50Ω load at fs, Free Hanging, 20m RG58 Coax, Male BNC.			
BII7526-IM8Ω-FH-10m-SC-XLR3P		BII7526 Transducer, Built-in Impedance Matching Network as 8Ω load at fs, Free Hanging, 10m Shielded Cable, XLR Plug.			
BII7526-TS-IM8Ω-FH-10m-SC-WL/TRS		BII7526 Transducer, Built-in Temperature Sensor, Built-in Impedance Matching Network to 8Ω at fs, Free Hanging, 10m Shielded Cable, Wire Leads for Transmit Signal, TRS for Temperature Signal.			

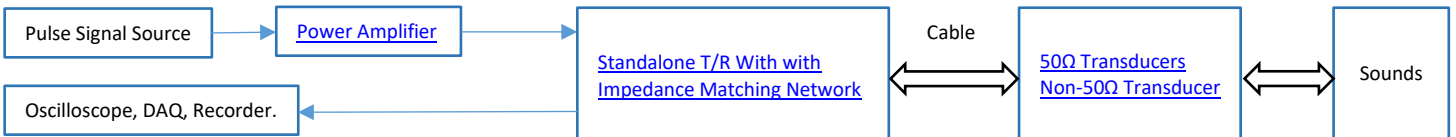
**System Setup of Transmitting Sounds ONLY with Low Power.**



**System Setup of Transmitting Sounds ONLY with High Power.**



**System Setup of Transmitting and Receiving Sounds.**



**Question:**

**What if the mating connector of my DAQ module or recording device is NOT available from BII?**

1. Buyer may order BII products with wire leads, and buyer assembles the mating connector to the cable end.
2. A connector adaptor might be assembled by BII by customization, and BII ships the adaptor to buyer as accessory of the device. Please contact BII for customizations.
3. Many adaptors for standard connectors are available in worldwide electronic suppliers such as BNC to SMA, BNC to SMC, XLR to TRS, etc. Check out your local suppliers.

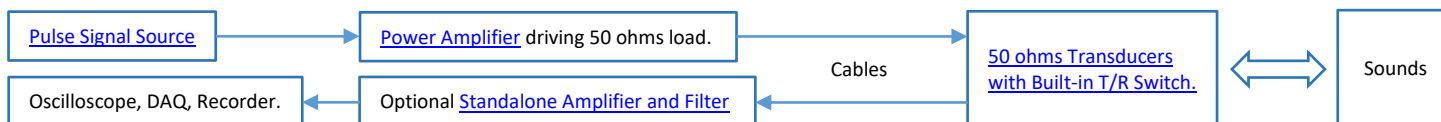
**What are the advantage and disadvantage of a built-in T/R Switch Module comparing to a standalone T/R Switch Module?**

A built-in T/R Switch Module amplifies the received signal of the sensing element before the signal is polluted by EMI noises and system ground loop noises, and before it is attenuated by capacitance, inductance, and resistance of cables. But its price is a little bit higher than standalone T/R Switch Module.

## Transducer Specifications with Built-in T/R Switch and 50Ω Impedance Matching for Sound Transmitting and Receiving.

<b>Part Number:</b>	<a href="#">BII7526-TR-IM50Q.</a>
	Refer to <a href="#">Transducer Specifications</a> for transducer specs. This table lists specifications of add-on part of TR Switches.
<b>Impedance Matching at fs:</b>	<b>-IM50Q:</b> Integrated inside transducer housing and transform its impedance to be 50Ω at fs. $Z = 50 * e^{j\theta}$ , in Ω, and Phase Angle $ \theta  \leq 20^\circ$ at fs.
<b>Receiving Preamp and Filter:</b>	<b>-TR: Transmitting &amp; Receiving Switch Module</b> , a bespoke fixed gain preamp and a bespoke bandpass filter are built inside transducer housing to receive sounds. 1. Avoid saturation caused by strong sounds levels in low frequency range. 2. Avoid signal loss over cable. 3. Avoid signal loss caused by impedance matching network which is built inside transducers.
<b>Sensitivity @ fs:</b>	-202.4 + Preamp Gain, ± 2 dB V/μPa.
<b>Sensitivity @ f &lt;&lt; fs:</b>	-200.0 + Preamp Gain, ± 2 dB V/μPa.
<b>Sensitivity Loss:</b>	No Sensitivity Loss over Cable.
<b>Preamp Gain:</b>	1. Default: 40 dB 2. Bespoke: 0 dB to 60 dB.
<b>-3dB Receiving Bandwidth:</b>	1. Default: 2 to 100 kHz. 2. Customized with fs, specify when ordering.
	Minimum -3dB cut-off frequency of high pass filter: 2 kHz.
	Band Pass Filter: 1st order, 20/Decade Roll-off.
	1. Reduce Noise. Both ocean ambient noises and the self-noises of electronic devices decrease when frequency increases. It is recommended to choose a built-in high pass filter to reject noises in low frequency range. For example, if you are interested in the signals greater than 20 kHz, you may specify a high pass filter with -3dB cut-off frequency at 2 to 5 kHz to improve signal to noise ratio of the signals of the interest. 2. Avoid Saturation. When there are strong low frequency noises, disturbances, and/or vibrations, resulting from rough surface waves and/or mechanical movements of the platform, it is recommended to specify a high pass filter to avoid hydrophone saturation in these low frequency ranges.
<b>Voltage Noise RTI <math>e_n</math>:</b>	7.0 nV/√Hz at default gain.
<b>Current Noise RTI <math>i_n</math>:</b>	0.56 fA/√Hz.
<b>Input Dynamic Range:</b>	≥ 100 dB at 100 kHz Bandwidth.
<b>Output Signal Type:</b>	Differential
<b>Output Impedance:</b>	10 Ω
<b>Cable Drive Capability:</b>	200 m
<b>Cable:</b>	Four Conductor Shielded Cable
<b>Connector:</b>	Refer to <a href="#">Connector Options</a> .
<b>Signal Conditioning:</b>	Standalone <a href="#">Programmable Gain Amplifier and Filters</a> to compensate the loss of sound propagation and spreading. Order separately.
<b>Power Supply of Receiving Circuit</b>	
<b>Supply Voltage <math>V_s</math>:</b>	+8.5 to +32 VDC
<b>Current (Quiescent):</b>	6.8 mA
<b>Suggested DC Supply:</b>	+9VDC Battery, Marine Battery, Automobile Battery, Fixed DC Linear Power Supply, Not Included. DO NOT use variable power supply whose maximum supply voltage is higher than the above rated voltage. DO NOT use switching mode DC power supply.
<b>DC Supply Cable:</b>	Two Conductor Shielded Cable if the cable of Receiving Signal is Coax.
<b>DC Supply Connector:</b>	Refer to <a href="#">Connector Options</a> .

### System Setup of Transmitting and Receiving Sounds.



### Wiring Information of Transmitting Sounds of a Transducer with T/R Switch.

<b>Transducer Wiring:</b>	<b>Shielded Cable</b>	<b>Coax, BNC.</b>	<b>UMC3P</b>	<b>MIL3P</b>	<b>XLR3P</b>
Signal:	White or Red	Center Contact	Contact 2	Contact C	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 1

Please contact us for bespoke wirings of differential transducers such as dipole, quadrupole, multimode rings, and flexensional sources.

### Wiring Information of Receiving Sounds of a Transducer with T/R Switch.

<b>Differential Output:</b>	<b>Wire Leads</b>	<b>UMC4P/XLR4P Connector</b>	<b>XLR3P + 9V Battery Snap</b>	<b>TRS + 9V Battery Snap</b>	
+VDC	Red	Pin 3	Battery Female Snap	Battery Female Snap	
Common	Black	Pin 1	Battery Male Snap	Battery Male Snap	
Signal+	White	Pin 2	XLR Pin 2	TRS Tip	
Signal-	Blue, Green, or Yellow	Pin 4	XLR Pin 3	TRS Ring	
Signal Common	N/A	N/A	XLR Pin 1	TRS Sleeve	
Shielding	Shield	N/A	XLR Metal Shell	N/A	
<b>Single Ended Output:</b>	<b>Wire Leads</b>	<b>BNC Male, 9V Battery Snap</b>	<b>UMC4P/XLR4P Connector</b>	<b>XLR3P and 9V Battery Snap</b>	<b>TRS Plug and 9V Battery Snap</b>
+VDC	Red	Female Snap	Pin 3	Battery Female Snap	Battery Female Snap

Common	Black	Male Snap	Pin 1	Battery Male Snap	Battery Male Snap
Signal	White	Center Pin or Contact	Pin 2	XLR Pin 2	TRS Tip
Signal Common	Blue, Green, or Yellow	BNC Shield	Pin 4	XLR Pin 1 and Pin 3	TRS Ring and Sleeve
Shielding	Shield	N/A	N/A	XLR Metal Shell	N/A

**4mm Banana Plug Pair:** Red Plug for +VDC, Black Plug for Common of the DC power supply.

**How to Order Transducers with -TR-IM50Ω.** The default options are for stock items which are regularly available.

**FH:** Free Hanging. **SC for Low Frequency Transmit:** Shielded Cable (Rubber Jacket, 600V) with 2 conductors. **Coax for High Frequency Transmit:** 50 Ω Coaxial Cable. **SC for Low Frequency Receive:** Shielded Cable with 4 conductors. **Coax for High Frequency Receive:** 50 Ω Coaxial Cable. **WL:** Wire Leads. **HPF:** -3dB High Pass Filter Frequency. **LPF:** -3dB Low Pass Filter Frequency. **Cable of Temperature sensor** is two-conductor shielded cable. **Cable of DC Supply** is two-conductor shielded cable in case that receive cable is coax.

**Receiving Cable is fixed to be four-conductor Shielded cable. Transmitting cable can be customized to be Coax or two-conductor shielded cable.**

**Length of Transmitting and receiving cables are same in default.**

Part Number	-Preamp Gain	-HPF/LPF	-Mounting	-Cable Length	-Transmit Cable	-Connector for signals of Transmit/Receive/DC Supply/Temperature
BII7526-TR-IM50Ω	Default: 40dB	-3dB Receive bandpass Frequencies. Default: 2kHz to 100kHz	Default: BFM-FH.	Default: 15m.	SC or Coax. Default: SC.	Default: WL.
<b>Example:</b>	<b>Description</b>					
BII7526-TR-IM50Ω-xxdB-2kHz/100kHz-BFM-FH-15m-SC-WL	BII7526 Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: xxdB, Receive Bandpass Filter: 2kHz to 100kHz. Bolt-Fastening Mounting with Free Hanging: BFM-FH, 15m cables, Transmitting Cable: Shielded Cable, Wire Leads.					
BII7526-TR-IM50Ω-xxdB-2kHz/100kHz-BFM-FH-15m-SC-MIL3P/XLR4P/BS	BII7526 Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: xxdB, Receive Bandpass Filter: 2kHz to 100kHz. Bolt-Fastening Mounting with Free Hanging: BFM-FH, 15m cables, Transmitting Cable: Shielded Cable, 3 Pin MIL-5015 Connector for Transmit Signal, 4 Pin XLR for Receive Signal, 9V Battery Snap for DC Supply.					
BII7526-TR-IM50Ω-xxdB-2kHz/100kHz-FH-10m-RG58-BNC/BNC/BS/TRS	BII7526 Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: xxdB, Receive Bandpass Filter: 2kHz to 100kHz. Free Hanging, 10m cables, Transmitting Cable: RG58 Coax, BNC Male Connector for Transmit Signal, BNC Male for Receive Signal, 9V Battery Snap for DC Supply, TRS for Temperature Signal.					
BII7526-TS-TR-IM50Ω-xxdB-5kHz/100kHz-BFM-FH-15m-SC-MIL3P/XLR4P/BS/TRS	BII7526 Transducer, Built-in Temperature Sensor, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: xxdB, Receive Bandpass Filter: 5kHz to 100kHz. Bolt-Fastening Mounting with Free Hanging: BFM-FH, 15m cables, Transmitting Cable: Shielded Cable, 3 Pin MIL-5015 Connector for Transmit Signal, 4 Pin XLR for Receive Signal, 9V Battery Snap for DC Supply, TRS for Temperature Signal.					

**Cable and Connector Information for High Power Signals (from Power Amplifier and to Transducers). Non-UL Uses.**

	Wire and Cable Types	Ratings of Voltage, Current or Power, and Temperature.
Cable:	AWG18 Wires (WR)	3000 Vrms, 10 Arms.
	Two Conductor Shielded Cable (SC)	600 Vrms, 5 Arms.
	Two Two-conductor Shielded Cable Bundle (2SC)	600 Vrms, 10 Arms.
	High Temperature Shielded Cable (HTSC199)	600 Vrms, 6 Arms, up to +199°C or 390 °F, Non-waterproof.
	Coax RG58 (50Ω) (RG58)	1400 Vrms, 4 Arms.
	Coax RG174/U (50Ω) (RG174)	1100 Vrms, 1.6 Arms.
	Coax RG178B/U (50Ω) (RG178).	750 Vrms, 0.86 Arms, up to +200°C or 390°F.
	Connector Type	Ratings of Voltage, Current or Power, and Temperature.
Connector:	1. Wire Leads (WL)	Used for Cables or Wires.
	2. 50Ω BNC (BNC), Bayonet Lock. Panel Mount or In-line. In-line BNC: Input uses Pin, output uses Socket. Panel Mount BNC: Both Input and Output use BNC Jacks.	500Vrms, 316W. -65°C to 165°C, or -53.9°F to 329°F. Used for Grounded Signal with Metal Enclosures or Coax Cables.
	3. MIL-5015 Type Connector (MIL), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.	500Vrms, 13 A; Up to +125°C or 257°F, or, 900Vrms, 13 A; Up to +125°C or 257°F. Used for Metal Enclosures or Shielded Cables.
	4. XLR Connector (XLR), Positive Latchlock. Panel Mount or In-line. Input uses Pin, output uses Socket.	133Vrms, 15 A; -25°C to +75°C or -13°F to +167°F. Used for Metal Enclosures or Shielded Cables.
	5. Underwater Mateable Connector (UMC), Thread Fastening. Panel Mount or In-line. Input uses Pin, output uses Socket.	600Vrms, 10A. Waterproof, IP68. Used for Metal Enclosures or Shielded Cables.

**How to choose cable and connector for BII devices:** Driving Voltage  $V_{drive} (V_{rms}) = \sqrt{RMS\ Power * \frac{G}{G^2+B^2}}$ .

BII lists G-B data at fs and/or the graph of G-B vs Frequency in online datasheet.

**Case 1.** Deliver 1000 Wrms to 3 kΩ transducer at fs. Note:  $G/(G^2+B^2)=3\ k\Omega$  is the resistive load of the transducer in load medium at fs.

Driving voltage to transducer  $V_{drive} = \sqrt{1000 * 3000} = 1732\ V_{rms}$ . The current to 3 kΩ transducer  $I_{drive} = V_{drive}/R_L = 1732V_{rms}/3000\Omega = 0.57733\ A_{rms}$ .

**Therefore, AWG18 Wire and Wire leads are suitable.**

**Case 2.** Deliver 500 Wrms to 300 Ω transducer at fs. Note:  $G/(G^2+B^2)=300\ \Omega$  is the resistive load of the transducer in load medium at fs.

Driving voltage to transducer  $V_{drive} = \sqrt{500 * 300} = 387.3\ V_{rms}$ . The current to 300 Ω transducer  $I_{drive} = V_{drive}/R_L = 387.3V_{rms}/300\Omega = 1.291\ A_{rms}$ .

**Therefore, Two Conductor Shielded Cable and MIL-5015 Type Connector or Underwater Mateable Connector (UMC) are suitable.**

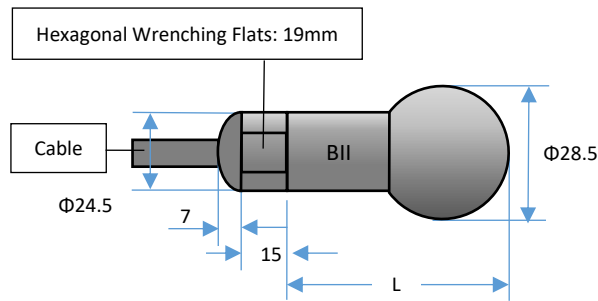
**Case 3.** Deliver 300 Wrms to 50 Ω transducer at fs.

Driving voltage to transducer  $V_{drive} = \sqrt{300 * 50} = 122.5\ V_{rms}$ . The current to 50 Ω transducer  $I_{drive} = V_{drive}/R_L = 122.5V_{rms}/50\Omega = 2.45A_{rms}$ .

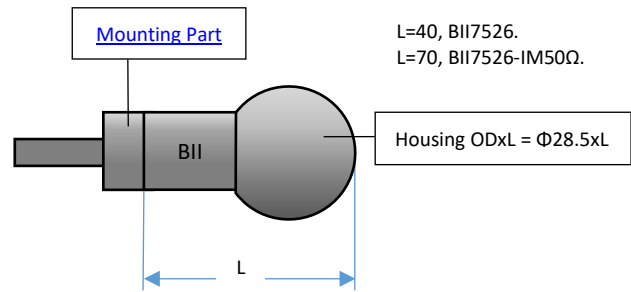
**Therefore, 50Ω RG58 Coax and BNC are suitable.**

**Physical Size (Dimensional Unit: mm):** The overall length varies with the length of mounting parts. Please refer to online information of mounting options.

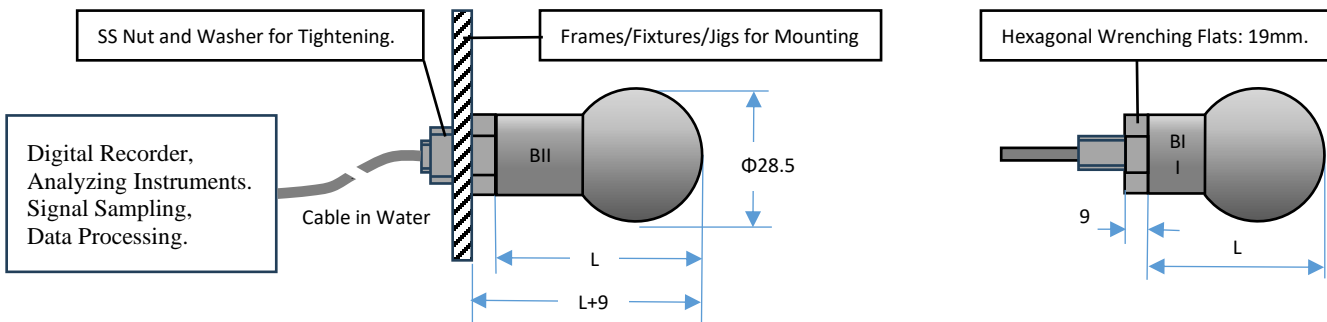
**1.a. Size information of Free Hanging.**



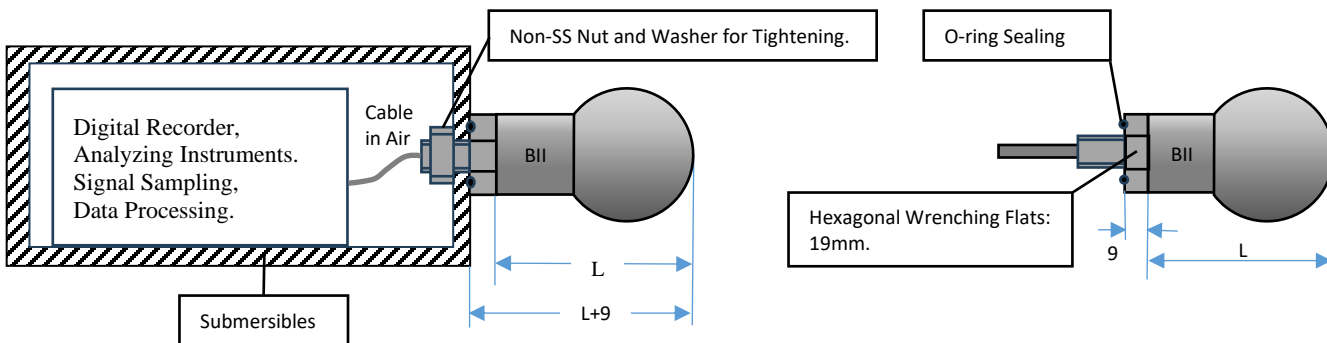
**1.b. General Size information.**



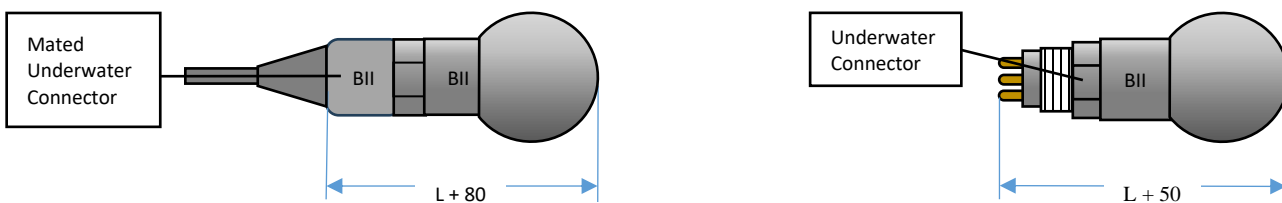
**2. Bolt-Fastening Mounting BFM-7/16" (7/16"-20x22 UNF-2A) or BFM-5/8" (5/8"-18x22 UNF).**



**3. Thru-hole Mounting with Single O-ring Sealing THM-7/16" (7/16"-20x22 UNF-2A), or THM-5/8" (5/8"-18x22 UNF).**

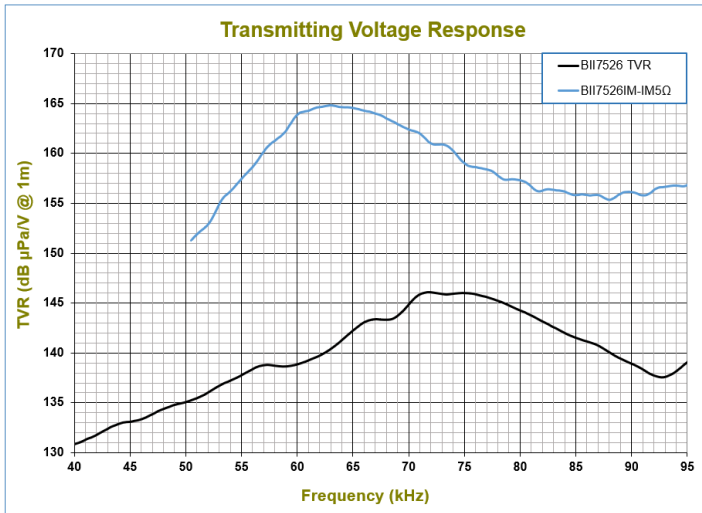


**5. Free-hanging with Underwater Connector (FHUWC-3P), 3 Pins.**

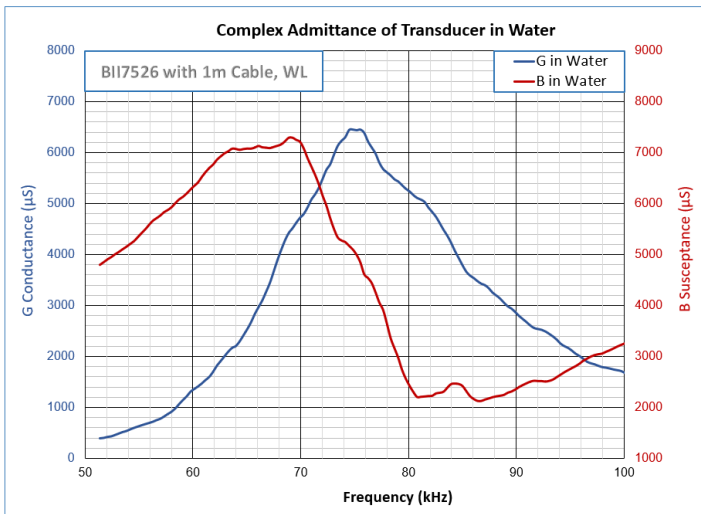


**6. More Mounting/Installation Options:** Please refer to online document [AcousticSystem.pdf](#) for a complete list of Mounting Options and details.

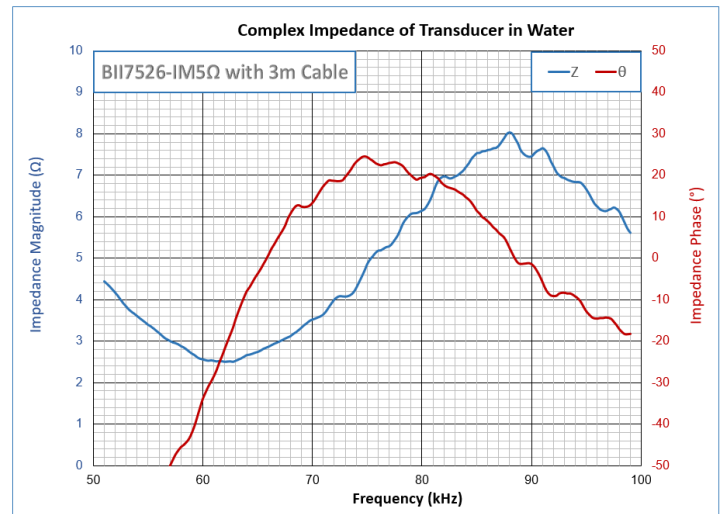
**Transmitting Voltage Response (TVR):**



**Admittance in Water:**



**Impedance in Water:**



**Directivity Pattern:**

