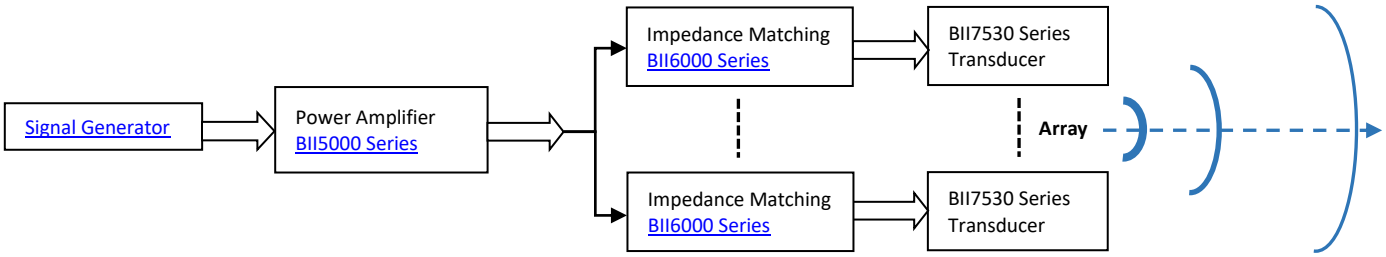
Low Frequency Transducer

BII7530 Series low frequency transducers are designed for uses in noise simulation and measurement, underwater communication, bioacoustics (marine mammals and fish sounds/behavior), and generation of sound fields. With underwater supportive mounting apparatus, multiple Low Frequency transducers can be set up to be a linear, planar, or curved array to produce higher underwater sound level or implement a particular directivity response.

An Array to Boost Sound Level and Implement Directivity Response:



Typical Applications

Array Elements, Artificial Acoustic Target	Bioacoustics: Stimuli, Playback, Measurement, and Deterrent
Noise Generation & Measurement	Diver Recall System, Underwater Voice Communication
Seismology, Geological Exploration, Ocean Waves	Generation of Plane Wave/Standing Wave/Pressure/Acceleration Field

Specifications

Part Number:	**BII7532BT**	**BII7532FR**	**BII7534BT**	**BII7534FR**	**BII7536BT**	**BII7536FR**
Resonant Frequency f_s:	6 kHz ~ 9 kHz.					
Transmitting Frequency:	100 Hz to 20 kHz					
	The sound level in low frequency range is proportional to the ratio of transducer radiation size to wavelength.					
Impedance Matching:	1. Default: No impedance matching. 2. Customization: Built-in, impedance matching to 50Ω at 7kHz by default.					
	TVR and FFVS variation of a transducer with built-in Impedance Matching Network: R_{IM} < 1/G, TVR increases, FFVS decreases. Generally, this is true for low frequency transducers. R_{IM}: Impedance-Matched Resistance such as 50 Ω. G: Transducer Conductance at Operating Frequency.					
Signal Type:	Recorded Sounds, Arbitary Signals, Continuous Waveform, Pulsed SINE, Chirp, PSK, FSK, Pulsed Square Waveform, etc.					
Radiation Faces:	Front Plane	Two Planes	Front Plane	Two Planes	Front Plane	Two Planes
Directivity Pattern:	Conical Beam at fs.					
-3dB Beam Width:	180°@f≤ 10kHz; 120°@15kHz.	Omni@f≤8kHz; 180°@f≤10kHz; 120°@15kHz.	180°@f≤5kHz; 90°@10kHz; 60°@15kHz.	Omni@f≤4kHz; 90°@10kHz; 60°@15kHz.	180°@f≤3.3kHz; 60°@10kHz; 40°@15kHz.	Omni@f≤3kHz; 60°@10kHz; 40°@15kHz.
Side Lobe Level:	No side lobes or ≤ -17.7 (dB) (-3dB Beam Width <50°).					
Free Capacitance C_f:	1.3 nF	1.3 nF	5.2 nF	5.2 nF	10.0 nF	10.0 nF
	C_f: Active Aperture Free Capacitance at 1kHz. **With cable, C_f increases by [Cable Length * 0.1nF/meter] @ 1kHz.**					
Dissipation D:	0.012 @ 1kHz					
Quality Factor Q_m at f_s:	≤ 3					
	-3dB bandwidth $\Delta f = f_s/Q_m$. Qm determines the transient response or the rise and fall rings of steady-state response.					
$\eta_{ea\ at\ fs}$ at f_s:	0.28 in Water, Electroacoustic Efficiency, Load Medium Dependent.					
η_{ea} at f << f_s:	at f << fs, $\eta_{ea} / \eta_{ea\ at\ fs} \approx 0.1225*(k*\Phi D)^2$. Wave Number k = 2π/λ; ΦD = Transducer Diameter.					
	1. Electroacoustic Efficiency η_{ea} is quite low at f << 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. Otherwise, transducer may be damaged by overheating. **2. Transducer can emit low power sounds at frequencies far from f_s. For example, input power $P_i \le \eta_{ea}$*MIPP at f ≤ 0.8*f_s and $P_i \le$ 0.2*MIPP at f ≥ 1.3*f_s.**					
Power Factor at f_s:	0.03 ~ 0.08 without Impedance matching. ≥ 0.9 with Impedance matching.					
TVR:	Refer to **TVR Graph**, Transmitting Voltage Response.					
Radiation Sound Level:	SL = 20*logV_i + TVR, dB µPa@1m. Driving Voltage V_i is in unit of V_{rms}.					
Admittance or Impedance:	Refer to **G-B Graph**.			1. Default: Z = 50*$e^{j\theta}$, in Ω, and Phase Angle |θ| ≤ 20° at fs. 2. Customization: refer to Impedance Matching at f_s. Refer to **Z-θ Graph**.		
Driving Voltage V_i at f_s: (V_{imax}: Maximum V_i.)	**Pulsed Driving Signal and Duty Cycle D < 100%:** $V_{imax} = \sqrt{(MIPP/G_{max})}$ or **600**, whichever is less, in V_{rms}.			**Pulsed Driving Signal and Duty Cycle D < 100%:** $V_{imax} = \sqrt{(MIPP * \|Z\|)}$, in V_{rms}. Z is impedance at fs.		
	Continuous Operation at 100% Duty Cycle: $V_{imax} = \sqrt{(MCIP/G_{max})}$, in V_{rms}.			**Continuous Operation at 100% Duty Cycle:** $V_{imax} = \sqrt{(MCIP * \|Z\|)}$, 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 **G-B Graph:** G is conductance.			$P_i = V_i^2 / Z$ at f_s. Z is impedance at f_s.		

MIPP:	3.5 Watts	3.5 Watts	760 Watts	760 Watts	1330 Watts	1330 Watts
	Maximum Input Pulse Power. MIPP is limited by Maximum Operating Voltage and impedance.					
MPW @ MIPP:	Continuous	Continuous	4 Seconds	4 Seconds	4 Seconds	4 Seconds
	Maximum Pulse Width at Maximum Input Pulse Power.					
MCIP:	3.5 Watts	3.5 Watts	53 Watts	53 Watts	108 Watts	108 Watts
	Maximum Continuous Input Power. MCIP is limited by Maximum Operating Voltage and impedance.					
How to determine pulse width, duty cycle and off-time with input pulse power (peak power): 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:	Free-field Voltage Sensitivity, -184.5 + 20*log[C_f/(C_f+C_c)] ± 2 dB V/µPa. C_f: Active Aperture Capacitance; C_c: Capacitance of Extension Cable. Cable is of 100pF/meter roughly.					
	$Sensitivity\ Loss\ over\ extension\ cable\ at\ f_s\ (dB) = 20 * \log\{(1+2\pi f_s C_c/B)/\sqrt{[G^2+(B+2\pi f_s C_c)^2]/(G^2+B^2)}\}$ G: Conductance at f_s; B: Susceptance at f_s; C_c: Capacitance of Extension Cable. Cable is of 100 pF/meter roughly. Please refer to online document AcousticSystem.pdf for conversion between G-B and Z-θ, if necessary.					
Receiving Frequency:	0.3 Hz to 8 kHz.	0.3 Hz to 8 kHz.	0.06 Hz to 8 kHz	0.06 Hz to 8 kHz	0.03 Hz to 8 kHz	0.03 Hz to 8 kHz
Receiving Sound Level:	SL = 20*logV_o - FFVS, dB µPa. Receiving Voltage V_o is in unit of V_{rms}.					
Operating Depth:	Maximum 150 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. Bolt-Fastening Mounting with Free Hanging (**BFMFH)** 6. End-face Mounting (**EFM**) 7. Flange Mounting (**FGM**)					
	Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.					
Cable Options:	1. Two Conductor Shielded Cable (**SC**), Rubber or PVC Jacket. SC with Two Conductors for transmit signal; SC with 4 conductors for receive signal. 2. 50 Ω RG58 Coax (**RG58**)					
	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: 1 m. 2. Custom-fit.					
Connector Options:	1. Default: Wire Leads (**WL**), for Transmit, Receive Signal, and DC Power Supply. 2. Underwater Mateable Connector (pin) (**UMC**) (Max. Diameter Φ21.5 to Φ35 mm), for Transmit or Receive Signal. 3. MIL-5015 Style (pin) (**MIL**) (Max. Diameter Φ19 to Φ30 mm), for Transmit or Receive Signal. 4. XLR Plug (pin) (**XLR**). (Max. Diameter Φ20.2 mm), for Transmit or Receive Signal. 5. Male BNC (**BNC**) (Max. Diameter Φ14.3 mm), for Transmit or Receive Grounded Signal.					
	Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for dry uses and are not waterproofed.					
Size ΦDxH:	Φ60x30 mm	Φ60x30 mm	Φ114x30 mm	Φ114x30 mm	Φ168x30 mm	Φ168x30 mm
	Actual length depends on Mounting Parts.					
Weight:	0.8 kg with 10m cable.		1.2 kg with 10m cable		2 kg with 10m cable	
	Actual weight depends on Mounting Parts, Cable Types and Length.					
Operation Temperature:	-10°C to +60°C or 14°F to 140°F.					
Storage Temperature:	-20°C to +60°C or -4°F to 140°F.					
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor. When ordering, append **TS** to part number for integrating a temperature sensor in the transducer.					
Impedance Matching:	BII6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately.					
Impedance Matching at f_s:	BII6000 Bespoke Impedance Matching between transducers and power amplifiers. Order Separately as standalone devices or append -IMxxΩ to the part number for integrating BII6000 into the transducer and specify impedance in Ω at fs. For example, BIIxxxx-IM50Ω: BIIxxxx transducer with built-in Impedance Matching unit as 50Ω load at fs.					
	Phase Angle |θ| of Complex Impedance ≤ 20° at fs.					
TR Switch Module:	BII2100 Transmitting & Receiving Switch Module with Built-in Preamp and Bandpass Filter. Order Separately as standalone devices or append -TR to the part number for integrating BII2100 into the transducer. For example, BIIxxxx-TR: BIIxxxx transducer with built-in T/R Switch Module.					
Temperature Sensor:	1. Default: No built-in temperature sensor. 2. Built-in temperature sensor. Append -**TS** to part number (BIIxxxx-TS) for integrating a temperature sensor in the transducer.					
Power Amplifier:	BII5000 Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.					
Potable Transmitter:	BII8030 series portable acoustic transmitters.					
Portable T/R System:	BII8080 series portable transmit and receive systems.					
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/SMA/SMC connector, it is buyer's sole responsibility to make sure that the BNC/SMA/SMC shield of the signal source is firmly grounded for operating safety before hooking up transducer/hydrophone to the signal source. Coax with BNC/SMA/SMC is not intended for hand-held use at voltages above 30Vac/60Vdc.						

Wiring Information of a Transducer without T/R Switch.

Transducer Wiring:	**Shielded Cable**	**Coax, BNC.**	**Underwater Connector**	**MIL-5015 Connector**	**XLR Plug**
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 flextensional sources.					

Wiring Information of Temperature Signal.

Temperature Sensor Wiring:	**Shielded Cable**	**Coax, BNC, SMC, SMA**	**Underwater Connector**	**XLR Plug**	**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.

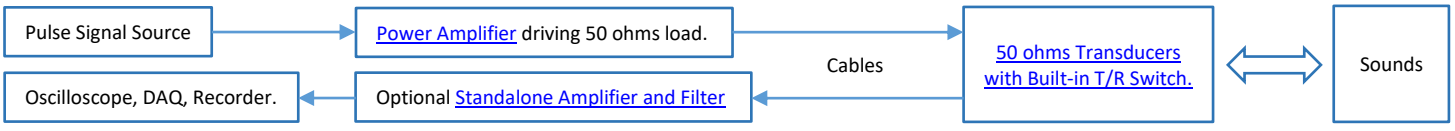
FH: Free Hanging. **SC for Transmit**: Shielded Cable (Rubber Jacket, 600V) with 2 conductors. **Coax**: 50 Ω Coaxial Cable. **WL**: Wire Leads.					
Part Number	**-Appendage**	**-Mounting**	**-Cable Length**	**-Cable Type**	**-Connector for signals of Transmit and Temperature Sensor**
BII753xxBT BII753xxFR	Default: **None**.	Default: **FH**.	Default: **10m**.	**SC** for low frequency signal. **Coax** for high frequency signal.	Default: **WL**.

Example:	Description
BII7536FR-BFMSS-0.3m-SC-UMC	BII7536FR Transducer, Bolt Fastening Mounting (Stainless Steel) (BFMSS), 0.3m Shielded Cable, Male Underwater Mateable Connector.
BII7536FR-IM50Ω-FH-20m-RG58-BNC	BII7536FR Transducer, Built-in Impedance Matching Network as 50Ω load at fs, Free Hanging, 20m RG58 Coax, Male BNC.
BII7536FR-TS-IM50Ω-FH-10m-SC-WL/TRS	BII7536FR Transducer, Built-in Temperature Sensor, Built-in Impedance Matching Network to 50Ω at fs, Free Hanging, 10m Shielded Cable, Wire Leads for Transmit Signal, TRS for Temperature Signal.

Specifications of Built-in T/R Switch for Sound Receiving with Transducer BII7xxxx-TR or BII7xxxx-TR-IMxxΩ.

Receiving Preamp and Filter:	Yes, Fixed Gain Preamp and 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.	
Receiving Gain:	1. Default: 40 dB 2. Bespoke: 0 dB to 60 dB.	1. Default: 40 dB 2. Bespoke: 20 to 60 dB.
-3dB Receiving Bandwidth:	1. Default: 2 to 450 kHz. 2. Customized with fs, specify when ordering.	1. Default: 10 kHz to 10 MHz. 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.	
Voltage Noise RTI e_n:	7.0 nV/√Hz at default gain.	1.0 nV/√Hz at default gain.
Current Noise RTI i_n:	0.56 fA/√Hz.	1.6 pA/√Hz.
Input Dynamic Range:	≥ 100 dB at 100 kHz Bandwidth.	
Output Signal Type:	Differential	Single-ended
Output Impedance:	10 Ω	50 Ω
Cable Drive Capability:	200 m	1000 m
Cable:	Four Conductor Shielded Cable	Four Conductor Shielded Cable or Two Coaxial cables. Cable type being used is determined by frequency range and cable length.
Connector:	Refer to Connector Options.	
Signal Conditioning:	Standalone Programmable Gain Amplifier and Filters to compensate the loss of sound propagation and spreading. Order separately.	
Power Supply of Receiving Circuit		
Supply Voltage V_s:	+8.5 to +32 VDC	+7.5 to +32 VDC
Current (Quiescent):	6.8 mA	8 mA
Suggested DC Supply:	+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.	
DC Supply Cable:	Two Conductor Shielded Cable if the cable of Receiving Signal is Coax.	
DC Supply Connector:	Refer to Connector Options.	

System Setup of Transmitting and Receiving Sounds.



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

Transducer Wiring:	**Shielded Cable**	**Coax, BNC.**	**Underwater Connector**	**MIL-5015 Connector**	**XLR Plug**

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 flextensional sources.					

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

Differential Output:	**Wire Leads**	**Underwater/XLR Connector**		**XLR + 9V Battery Snap**	**TRS + 9V Battery Snap**
+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
Single Ended Output:	**Wire Leads**	**BNC Male, 9V Battery Snap**	**Underwater/XLR Connector**	**XLR Plug and 9V Battery Snap**	**TRS Plug and 9V Battery Snap**
+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 T/R Switches. 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.

Part Number	**-Appendage**	**-Receive Gain**	**-HPF/LPF**	**-Mounting**	**-Cable Length**	**-Cable Type**	**-Connector for signals of Transmit/ Receive/DC Supply/Temperature**
BII753xxBT BII753xxFR	Default: **-TR-IM50Ω**	Default: **40 dB**	-3dB Receive bandpass Frequencies. Default: **2kHz to xxxkHz.**	Default: **FH**.	Default: **10m.**	Default: **SC or Coax**	Default: **WL**.

Example:	Description
BII7536FR-TR-IM50Ω-40dB-0.1kHz/50kHz-BFMSS-10m-SC-MIL/XLR/BS	BII7536FR Transducer, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: 40dB, Receive Bandpass Filter: 0.1kHz to 50kHz. Bolt-fastening Mounting (Stainless Steel), 10m Shielded Cable, MIL-5015 Connector for Transmit Signal, XLR for Receive Signal, 9V Battery Snap for DC Supply.
BII7536FR-TS-TR-IM50Ω-40dB-0.1kHz/50kHz-BFMSS-10m-SC-MIL/XLR/BS/TRS	BII7536FR Transducer, Built-in Temperature Sensor, Built-in T/R Switch, Built-in Impedance Matching Network as 50Ω load at fs, Receive Gain: 40dB, Receive Bandpass Filter: 0.1kHz to 50kHz. Bolt-fastening Mounting (Stainless Steel), 10m Shielded Cable, MIL-5015 Connector for Transmit Signal, XLR for Receive Signal, 9V Battery Snap for DC Supply, TRS for Temperature Signal.

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.

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.
	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:	**Connector Type**	**Ratings of Voltage, Current or Power, and Temperature.**
	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 f_s. Note: $G/(G^2+B^2)$=3 kΩ is the resistive load of the transducer in load medium at f_s.

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

Therefore, AWG18 Wire and Wire leads are suitable.

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

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

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

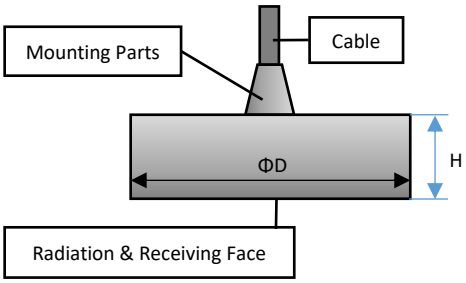
Case 3. Deliver 300 Wrms to 50 Ω transducer at f_s.

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

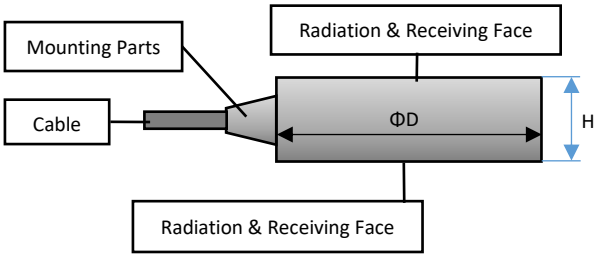
Therefore, 50Ω RG58 Coax and BNC are suitable.

Physical Size (Dimensional Unit: mm)

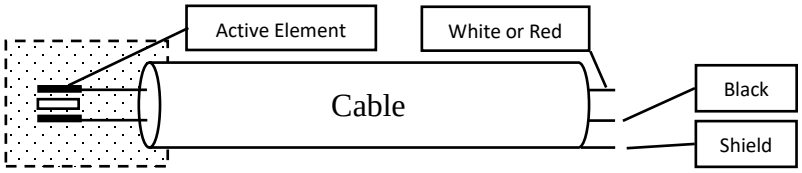
BII7532BT, BII7534BT, BII7536BT



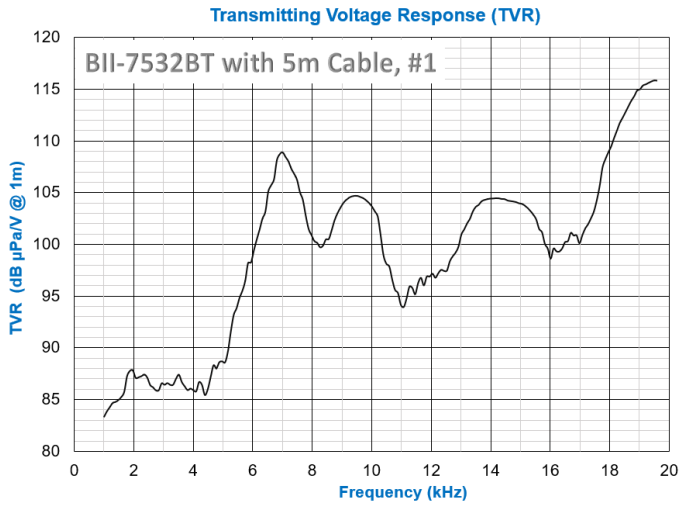
BII7532FR, BII7534FR, BII7536FR



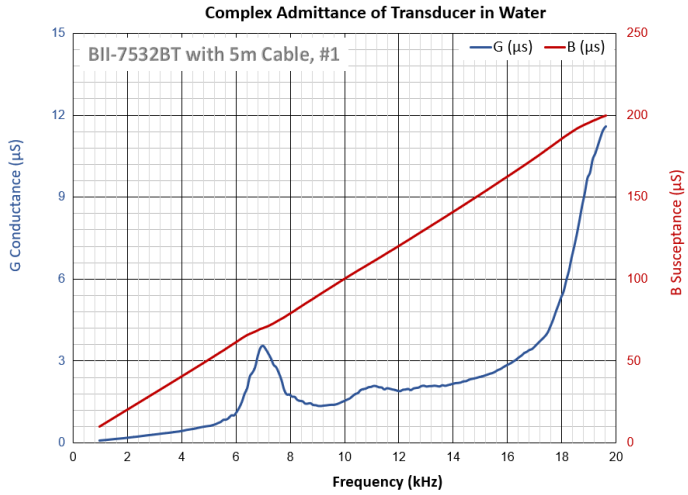
Electrical Wiring (Cable with Wire Leads)



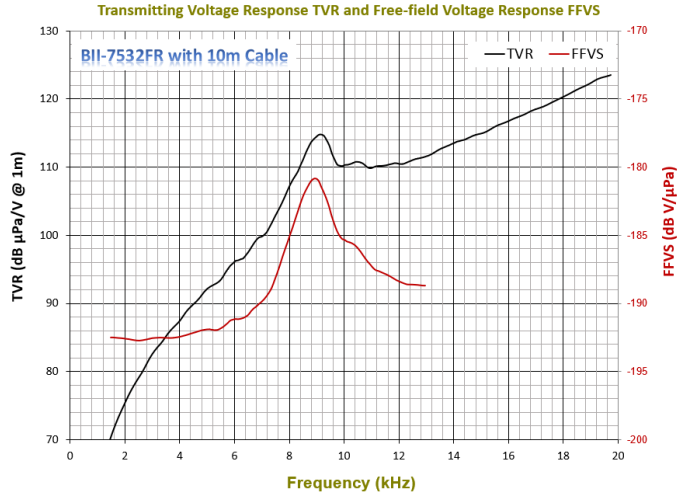
Transmitting Voltage Response (TVR)



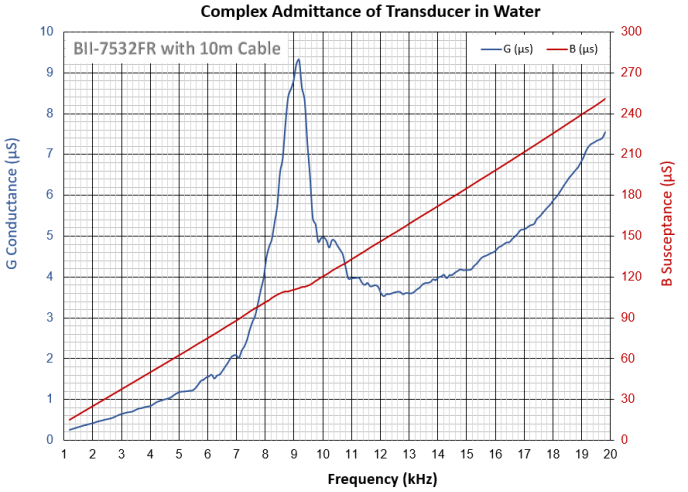
Admittance (Transducer with 5m Cable)



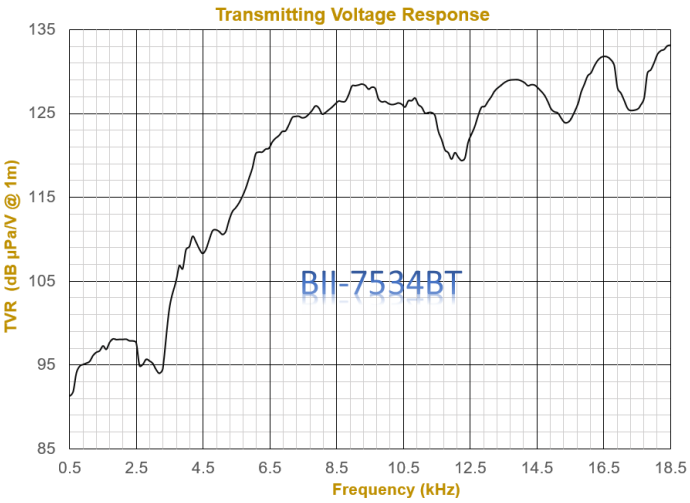
Transmitting Voltage Response (TVR)



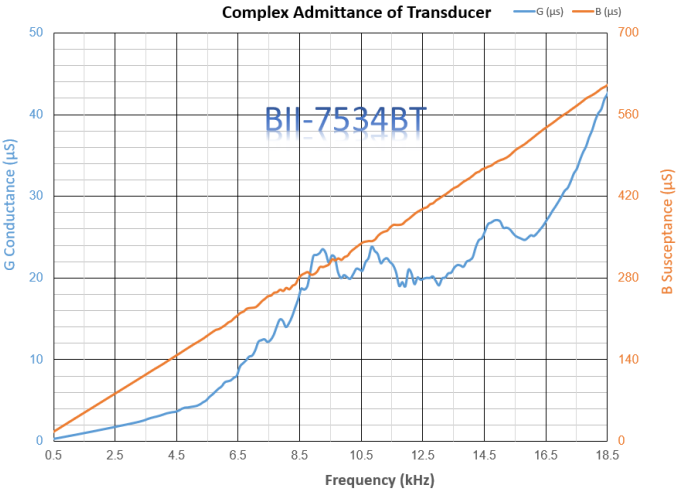
Admittance



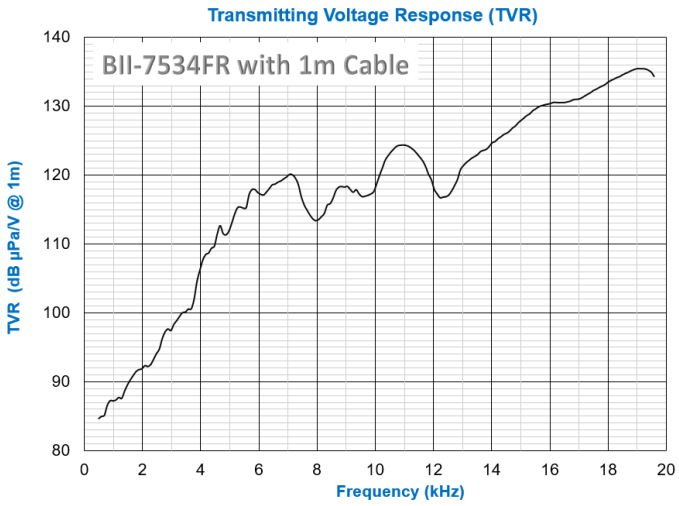
Transmitting Voltage Response (TVR)



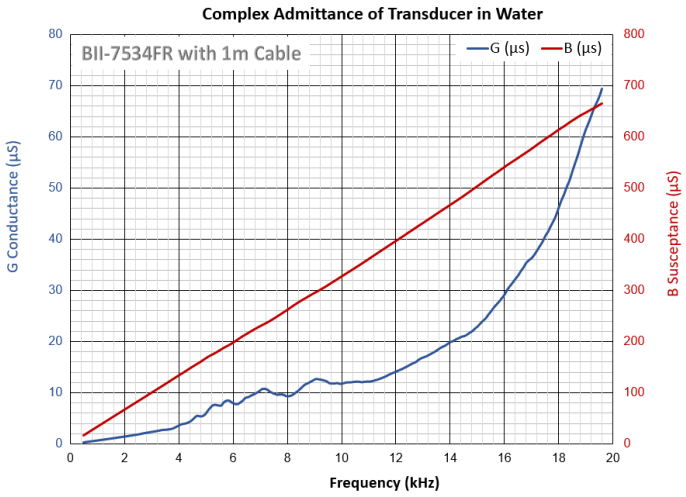
Admittance (Transducer with 1m Cable)



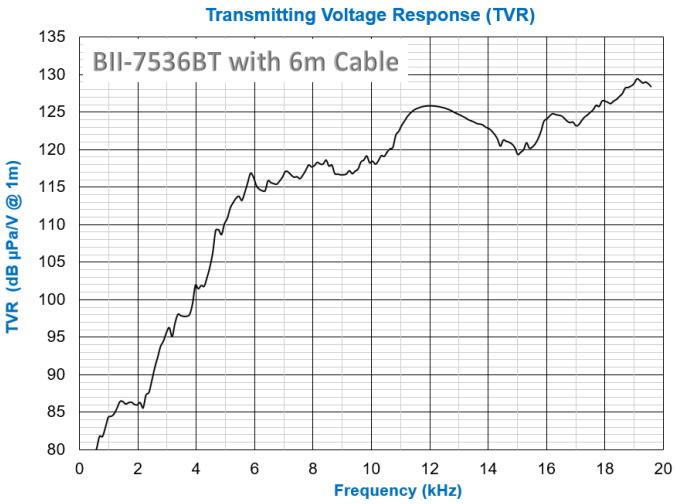
Transmitting Voltage Response (TVR)



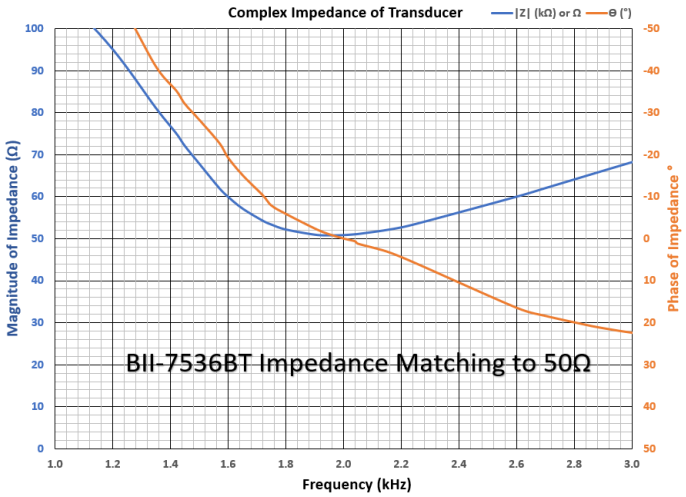
Admittance (Transducer with 1m Cable)



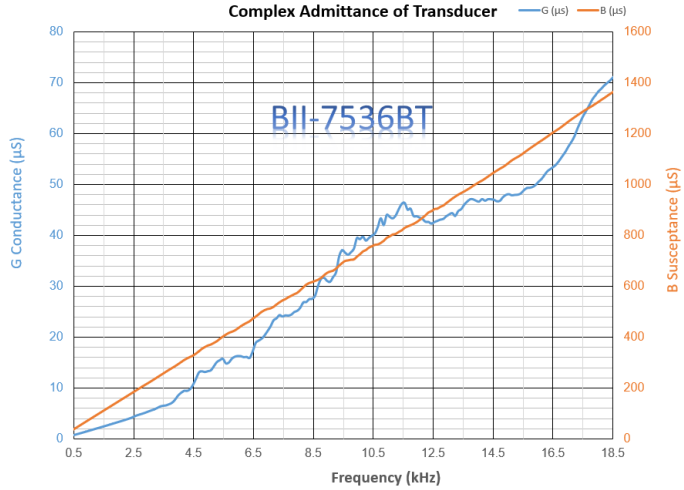
Transmitting Voltage Response (TVR)



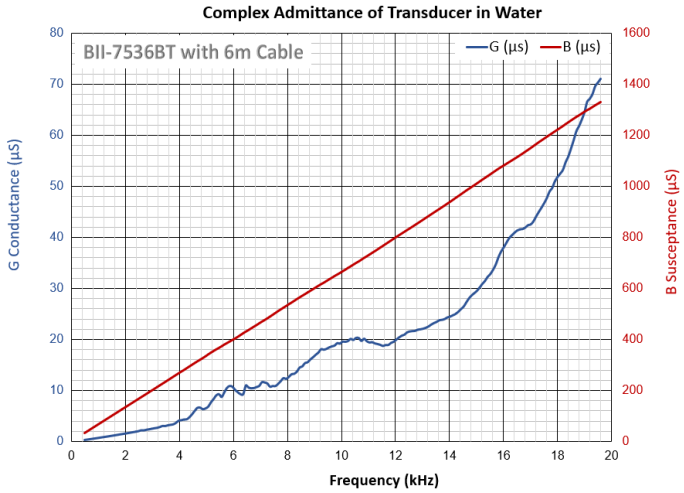
Customized Impedance Matching to 50Ω at 2 kHz



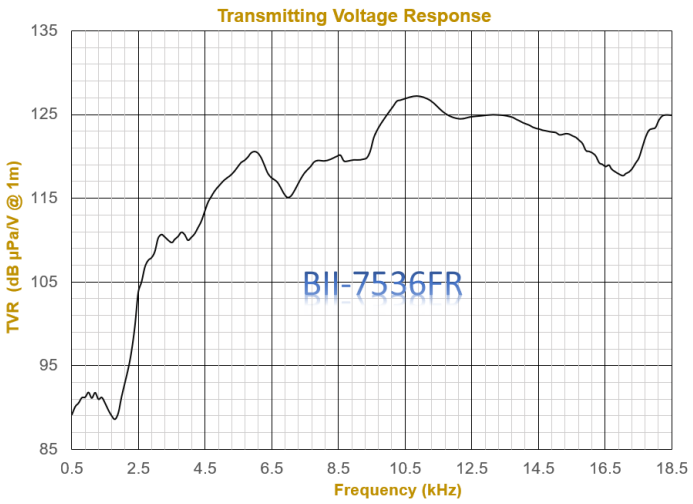
Admittance (Transducer with 1 m Cable)



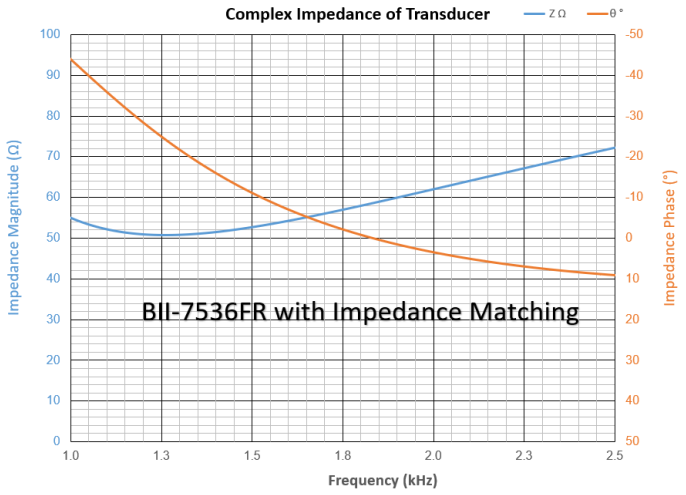
Admittance (Transducer with 6 m Cable)



Transmitting Voltage Response (TVR)



Customized Impedance Matching to 50Ω at 1.5kHz



Impedance (Transducer with 50m Cable)