

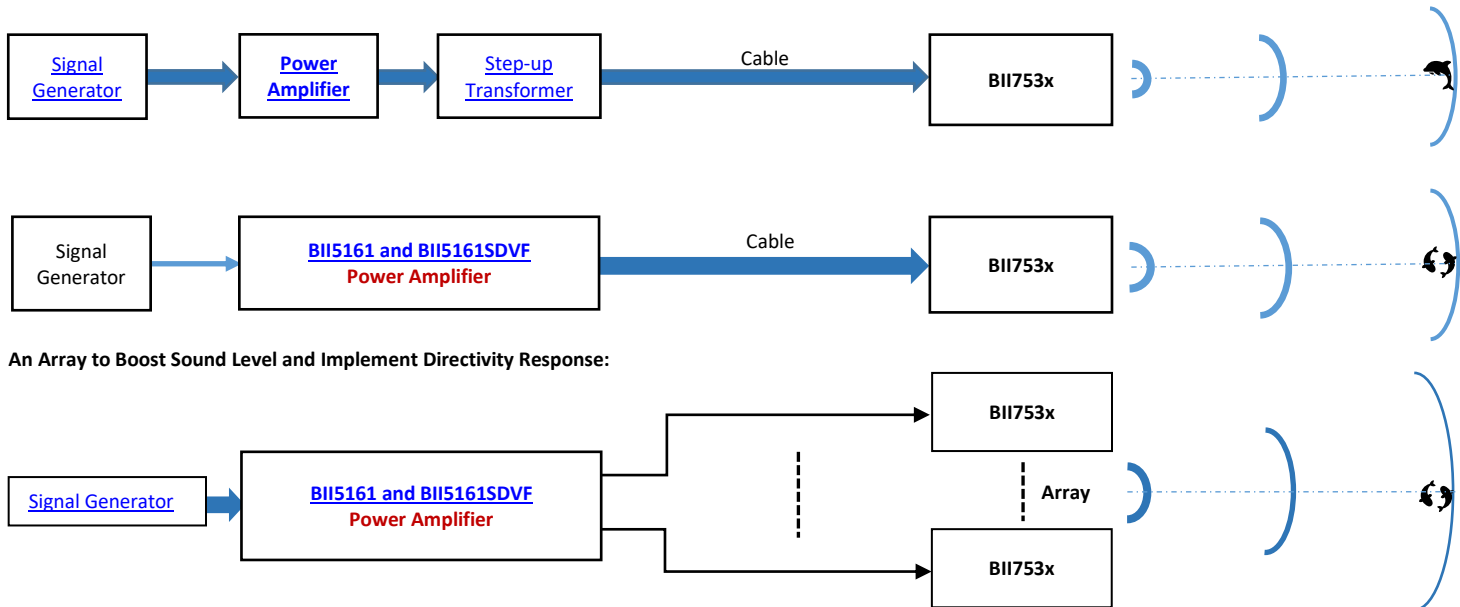


Low Frequency Transducer

BII7530 series 0.1 to 20 kHz or 100kHz low frequency transducers are designed for uses in noise simulation/generation and measurement of ocean, river, and lake, underwater communication, bioacoustics (marine mammals and fish sounds/behavior), and generation of sound fields of a small body of water. 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.

SYSTEM CONFIGURATION

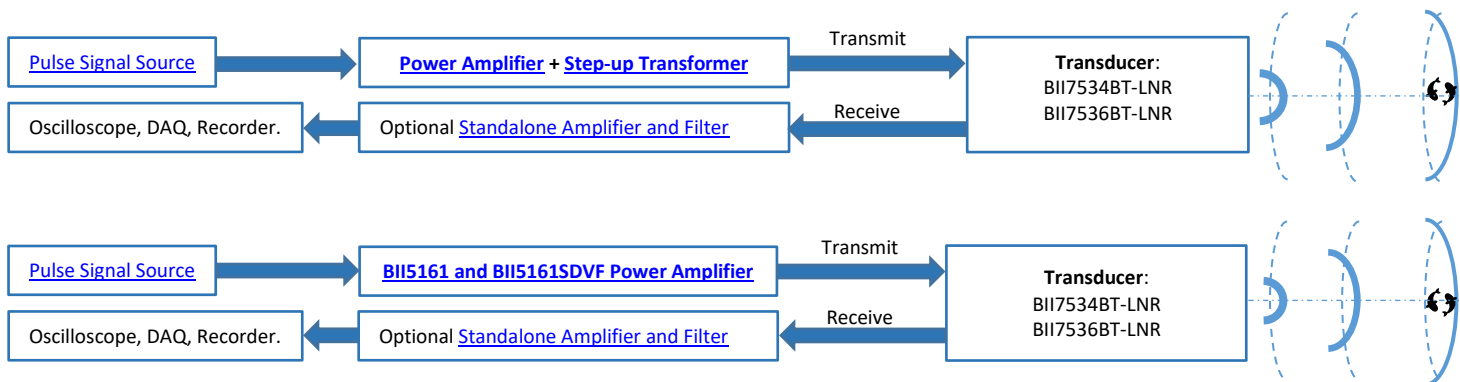
(a) Generation of Underwater Sounds with BII753x. "x" represents appendage of part number of a specific transducer in BII7530 series.



(b) Generation of Underwater Sounds with BII753x-VST50Vp. "x" represents appendage of part number of a specific transducer in BII7530 series.



(c) Transmitting and Receiving Underwater Sounds with BII7534BT-LNR and BII7536BT-LNR. "x" represents appendage of part number of a specific transducer in BII7530 series.



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.

RELATED PRODUCTS

Power Amplifier for SONAR, NDT, and HIFU	Voltage Step-up Transformer between Transducers and Amplifiers
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Specifications

Transducers are tested in water at 20°C unless stated otherwise.						
FG: Fixed Gain; PG: Programmable Gain; DF: Differential Output; SE: Single Ended Output; BPF: Band Pass Filter; HPF: High Pass Filter; LPF: Low Pass Filter.						
f_s: Resonant Frequency; IM: Impedance Matching; η_{ea}: Electroacoustic Efficiency; PF: Power Factor; TVR: Transmitting Voltage Response; SL: Sound Level; FFVS: Free-field Voltage Response, Receiving Voltage Response (RVR), or Voltage Sensitivity; DRP: Directional Response Pattern; HxV: Horizontal x Vertical Beam Angles. SLL: Sidelobe Level; SRD: Sound Ranging Distance along Axis of Main Lobe; Z: Complex Impedance; Z : Impedance Amplitude; θ: Impedance Phase; Y: Admittance; G: Conductance of Admittance; B: Susceptance of Admittance; Q_m: Mechanical Quality Factor; Q_e: Electrical Quality Factor; MIPP: Maximum Input Pulse Power; MPW: Maximum Pulse Width at MIPP and at f _s ; MCIP: Maximum Continuous Input Power. TR: Transmit and Receive; TRSW: Transmit and Receive Switch with built-in low noise preamp and bandpass filter. BW: -3dB Bandwidth or Beamwidth; PND: Pressure Noise Density, LNR: Low Noise Receiver, SC: Signal Conditioning, OPL: Overload Pressure Level.						
Part Number:	BII7532FR	BII7534BT	BII7534FR	BII7536BT	BII7536FR	BII7537
	BT: Sound Radiation from Bottom (Front) Face. FR: Sound Radiation from Front and Rear Faces.					
Status:	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE	ACTIVE
	ACTIVE: Product device recommended for new designs. LIFEBUY: BII has announced that the device will be discontinued, and a lifetime-buy period is in effect. OBSELETE: BII has discontinued production of the device.					
Resonant Frequency f _s :	7 kHz ± 20%					3 kHz ± 20%
Transmitting Frequency:	1 to 20 kHz	0.3 to 20 kHz	0.3 to 20 kHz	0.1 to 20 kHz	0.1 to 20 kHz	0.1 to 100 kHz
	Minimum Transmitting Frequency: None. The sound level in low frequency range is proportional to the ratio of transducer radiation size to wavelength.					
Impedance Matching:	No impedance matching.					
Signal Type:	Recorded Sounds, Arbitrary Signals, Noises, Continuous Waveform, SINE Pulse, Chirp, PSK, FSK, Pulsed Square Waveform, etc.					
Radiation Faces:	Front & Rear Face	Front Plane	Front & Rear Face	Front Plane	Front & Rear Face	Front Plane
Directivity Pattern:	Conical Beam at f _s .					
-3dB Beam Width:	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.	Omni@f≤4kHz; 180°@f≤10kHz; 120°@15kHz.
Side Lobe Level:	(a) No side lobes at -3dB Beam Width ≥ 50°. (b) ≤ -17.7 (dB) at -3dB Beam Width < 50°.					
Free Capacitance C _f :	1.3 nF	5.2 nF	5.2 nF	10.0 nF	10.0 nF	80.0 nF
	C _f : Free Capacitance at 1kHz. With cable, C_f increases by [Cable Length * 0.1nF/meter] @ 1kHz.					
Dissipation D:	0.012 @ 1kHz					0.005
Q _m at f _s :	≤ 3					≤ 5
	-3dB bandwidth Δf = f _s /Q _m . Quality Factor Q _m determines the transient response or the rise and fall rings of steady-state response.					
η _{ea} at f _s at f _s :	≤ 0.3 in Water, Electroacoustic Efficiency, Load Medium Dependent.					≤ 0.4 in Water
η _{ea} at f << f _s :	at f << f _s , η _{ea} / η _{ea} at f _s ≈ 0.1225*(k*ΦD) ² . Wave Number k = 2π/λ; ΦD = Transducer Diameter.					
	1. Driving Transducer with Continuous Signals:					
	(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 ≤ η _{ea} *MIPP at f ≤ 0.8*f _s and P _i ≤ 0.2*MIPP at f ≥ 1.3*f _s .					
η _{ea} at f << f _s :	2. Driving Transducer with Pulsing Signals such as SINE Pulses:					
	Electroacoustic Efficiency η _{ea} is quite low at f << f _s and drops gradually at f > f _s , so it is recommended for transducers to emit high power sounds at frequencies far from f _s with Pulsing Signals with Duty Cycle ≤ 10%, Pulse Length ≤ 100mS. Otherwise, transducer may be damaged by overheating.					
Power Factor at f _s :	0.03 ~ 0.3					≤ 0.15 in Water
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:	Refer to G-B Graph or Impedance.					
Driving Voltage V _i at f _s : (V _{imax} : Maximum V _i)	Pulsed Driving Signal and Duty Cycle D < 100%: V _{imax} = v(MIPP/G _{max}) or V_{max} , whichever is less, in V _{rms} .					
	Continuous Operation at 100% Duty Cycle: V _{imax} = v(MCIP/G _{max}) or V_{max} , in V _{rms} .					
	V_{max} = 600 V_{RMS}					V_{max} = 220 V_{RMS}
	Warning: That applied voltage exceeding V_{max} will destroy the transducer.					
Input Power P _i :	P _i = V _i ² * G. Refer to G-B Graph : G is conductance.					
MIPP:	3.5 Watts	760 Watts	760 Watts	1330 Watts	1330 Watts	200 Watts
MPW at MIPP:	Continuous	4 Seconds	4 Seconds	4 Seconds	4 Seconds	4 Seconds
MCIP:	3.5 Watts	53 Watts	53 Watts	108 Watts	108 Watts	50 Watts
MIPP: Maximum Input Pulse Power. MPW: Maximum Pulse Width. MCIP: Maximum Continuous Input Power.						
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.						
Note: following receiving parameters are for BII753x transducers used as receiving hydrophones.						
FFVS: dB V/μPa.	-184.5 ± 2 dB V/μPa. Free-field Voltage Sensitivity,					N/A
	Sensitivity Loss over extension cable at f_s (dB) = 20 * log {(1 + 2πf_sC_c/B)/√[G² + (B + 2πf_sC_c)²]/(G² + B²)}					
	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:	Simplification: Sensitivity Loss over Extension Cable (dB) = 20*log[C _h /(C _h +C _c)]. Valid for hydrophone without preamplifier.					
	C _h : Hydrophone Capacitance; C _c : Capacitance of Extension Cable. Cable is of 100 pF/meter roughly.					
	1.2 Hz to 8 kHz.	0.32 Hz to 8 kHz	0.32 Hz to 8 kHz	0.15 Hz to 8 kHz	0.16 Hz to 8 kHz	N/A

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 (1.5 MPa Pressure), and Limited by the cable length if the cable has wire leads or a non-waterproof connector.					
Transmit Mounting:	1. Default: Free Hanging (FH) 2. Thru-hole Mounting with Single O-ring (THM-7/16" or THM-5/8" .) 3. Thru-hole Mounting with Double O-ring (THDO-7/16") 4. Bolt Fastening Mounting (Stainless Steel) (BFM-7/16" or BFM-5/8" .) 5. Bolt-Fastening Mounting with Free Hanging (BFM-FH-1/4" , BFM-FH-3/8" .) 6. Free-hanging with Male Underwater Connector (FHUWC-2P , FHUWC-3P .) 7. End-face Mounting (EFMS) 8. Flange Mounting (FGM-Φ220 , FGM-Φ165 , or FGM-Φ80 .) Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.					
Transmit Cable:	1. Two Conductor Shielded Cable (SC), Rubber or PVC Jacket, Two Conductor SC for transmit signal. 2. 50 Ω RG58 Coax (RG58) 3. Two Conductor Unshielded Cable (USC) for Underwater Connector 2 pins. Handling: Do not use cable to support transducer weight in air; Always use mounting part if any; Do not bend the cable.					
Cable Length:	1. Default: 15 m with non-underwater connector. 0.6m with Underwater Mateable Connector (2 pins) (UMC2P). 2. Custom-fit.					
Transmit Connector:	1. Default: Wire Leads (WL). 2. Underwater Mateable Connector (2 pins) (UMC2P) (Max. Diameter Φ21.5 to Φ35 mm). Locking Sleeve: DLSA-M. Underwater Mateable Connector (3 pins) (UMC3P) (Max. Diameter Φ21.5 to Φ35 mm). Locking Sleeve: DLSA-M. Underwater Mateable Connectors are fixed with 0.6m unshielded cable. UMC is from global manufacturers of underwater connectors. Its part number is listed in quote in detail. 3. MIL-5015 Style (3 pin) (MIL3P) (Max. Diameter Φ19 to Φ30 mm). 4. Male BNC (BNC) (Max. Diameter Φ14.3 mm). 5. XLR Receptacle with 3 Male Pins (XLR3P), (Max. Diameter Φ20.2 mm), Maximum Voltage Rating: 133 Vrms . Underwater Mateable Connectors are for underwater uses. Other connectors/wire leads are for dry aerial uses and are not waterproofed.					
Size ΦDxH:	Φ60x24 mm	Φ114x24 mm	Φ114x24 mm	Φ168x24 mm	Φ168x24 mm	Φ60x112 mm
	Actual length depends on Mounting Parts.					
Weight with 15m cable:	0.8 kg	1.4 kg	1.4 kg	2.2 kg	2.2 kg	1.4 kg
	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.					
Voltage Step-up Transformer:	Bespoke BII6000 Voltage Step-up Transformer between transducers and power amplifiers. 1. Order Separately as standalone devices, or, 2. Append -VST50Vp to part number for integrating a BII6000 Voltage Step-up Transformer into the transducer for Input Voltage of maximum 50Vp. For example, BII7536BT-VST50Vp: BII7536BT transducer with built-in Voltage Step-up Transformer for Input Voltage ≤ 50Vp.					
Potable Transmitter:	BII5160 series Low Frequency Power Amplifiers for portable acoustic transmitters achieving low frequency sounds down to 100Hz .					
Power Amplifier:	BII5000 Power Amplifiers for SONAR, NDT, HIFU. Order Separately as standalone devices.					
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.

Transducer Wiring:	Shielded Cable	Coax, BNC.	UMC3P	MIL3P	XLR3P
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
Wiring of Unshielded Cable:	Wire Leads WL	UMC2P (0.6m USC Cable originally coming from manufacturer of the connector, Fixed.). Locking Sleeve: DLSA-M.			
Signal	White	Contact 2			
Signal Common	Black	Contact 1			

How to Order Transducers BII753xFR, BII753xBT, BII7537, and BII753x-VST50Vp. 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	-Mounting	-Cable Length	-Cable Type	-Connector for Transmit Signals
BII753xBT, BII753xFR, BII7537. BII753x-VST50Vp.	Default: FH, BFM-5/8" , BFM-FH-3/8" .	Default: 15m or 0.6m .	SC, RG58, USC , etc.	Default: WL, BNC, UMC3P .
Example:	Description			
BII7536BT-BFM-FH-3/8"-0.6m-SC-UMC3P	BII7536BT Transducer, Bolt Fastening Mounting with Free Hanging: BFM-FH-3/8", 0.6m Shielded Cable, Male Underwater Mateable Connector with Locking Sleeve: DLSA-M.			
BII7536FR-VST50Vp-BFM-5/8"-15m-RG58-BNC	BII7536FR Transducer with a built-in Voltage Step-up Transformer for 50Vp Input Voltage, Bolt Fastening Mounting (Stainless Steel) BFM-5/8", 15m RG58 Coax, Male BNC.			
BII7536FR-BFM-5/8"-15m-RG58-BNC	BII7536FR Transducer, Bolt Fastening Mounting (Stainless Steel) BFM-5/8", 15m RG58 Coax, Male BNC.			
BII7537-BFM-5/8"-15m-RG58-BNC	BII7537 Transducer, Bolt Fastening Mounting (Stainless Steel) BFM-5/8", 15m RG58 Coax, Male BNC.			
BII7537-VST50Vp-BFM-5/8"-15m-RG58-BNC	BII7537 Transducer with a built-in Voltage Step-up Transformer for Input Voltage ≤50Vp, Bolt Fastening Mounting (Stainless Steel) BFM-5/8", 15m RG58 Coax, Male BNC.			

BII7530 Series Transducer Specifications with Built-in Low Noise Receivers for Sound Transmitting and Receiving.

BII7534BT-LNR					BII7534BT-LNR-VST50Vp					BII7536BT-LNR					BII7536BT-LNR-VST50Vp				
Part Number:		Refer to Transducer Specifications for transmitting specs of corresponding transducers.																	
		This table lists receiving specs of add-on part or Low Noise Receiver.																	
Sound Transmitter:		-VST50Vp: Built-in Voltage Step-up Transformer for input voltage $\leq$ 50Vp.																	
Sound Receiver:		-LNR: Low Noise Receiver integrated inside the transducer housing.																	
Receiving Sensitivity V/ μ Pa:		Default: -160 dB.																	
		Note: bespoke Receiving Sensitivity is available upon request.																	
		Refer to Graph of FFVS vs. Frequency . Free-field Voltage Sensitivity.																	
-3dB Bandwidth: (Band Pass)		Default: 10 Hz to 300 kHz.																	
		Note: bespoke -3dB Bandwidth (Band Pass) is available upon request. Minimum available -3dB high pass frequency: 2.6 Hz.																	
		Band Pass Filter: 1st order, 20 dB/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 1kHz, you may specify a high pass filter with -3dB cut-off frequency at 100Hz to improve signal to noise ratio of the signals of the interest. 2. Avoid Saturation. Saturation may occur 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 choose a high pass filter to avoid hydrophone saturation in these low frequency ranges.																	
Signal Conditioning:		Optional, Standalone Amplifier and Filters to compensate the loss of sound propagation and spreading or filter out noises. Order separately.																	
Pressure Noise Density:		Refer to Graph of Pressure Noise Density , Referred to Input (RTI), in μ Pa/VHz.																	
Input Dynamic Range:		$\geq$ 100 dB at 20 kHz Bandwidth.																	
Output Signal Type:		Differential																	
Output Impedance:		10 Ω																	
Mounting Options:		1. Default: Free Hanging (FH) 2. Thru-hole Mounting with Single O-ring (THM-5/8") 3. Bolt-Fastening Mounting with Free Hanging (BFM-FH-3/8") 4. End-face Mounting (EFMM) 5. Flange Mounting (FGM-Φ220, FGM-Φ165.)																	
		Please refer to online document AcousticSystem.pdf for a complete list of Mounting Options and more details.																	
Cable Drive Capability:		200 m																	
Receive Cable:		Four Conductor Shielded Cable (SC), Rubber or PVC Jacket, Four Conductor Shielded Cable for receive signal.																	
Receive Connector:		Connectors for Receiving Signals:																	
		1. Default: Wire Leads (WL), for Transmit, Receive Signal, and DC Power Supply.																	
		2. Underwater Mateable Connector (4 pins) (UMC4P) (Max. Diameter Φ 21.5 to Φ 35 mm). Locking Sleeve: DLSA-M. Underwater Mateable Connectors are fixed with 0.6m unshielded cable. UMC is from global manufacturers of underwater connectors. Its part number is listed in quote in detail.																	
		4. XLR Receptacle with 3 Male Pins (XLR3P), (Max. Diameter Φ 20.2 mm). XLR Receptacle with 4 Male Pins (XLR4P), (Max. Diameter Φ 20.2 mm).																	
		5. DIN Receptacle with 3 Male Pins (DIN3P), (Max. Diameter Φ 17 mm). DIN Receptacle with 4 Male Pins (DIN4P), (Max. Diameter Φ 17 mm).																	
		6. Male BNC (BNC) (Max. Diameter Φ 14.3 mm), for Transmit or Receive Grounded Signal. BNC with RG178 Coax: Service Temperature up to 165°C or 329°F.																	
DC Supply Connector:		Connectors for DC Power Supply:																	
		(1). None , Both DC Supply and Receiving Signal share one connector.																	
		(2). Wire Leads (WL).																	
		(3). +9VDC Battery Snap (BS). +18VDC Power Supply.																	
		(4). 4mm Banana Plug Pair (Red and Black Color) (BP).																	
Note: Underwater Mateable Connector is for uses underwater. Other connectors and wire leads are for aerial dry uses and are not waterproofed.																			
Power Supply of Receiving Circuit																			
Supply Voltage V_s :		+8.5 to +32 VDC																	
Current (Quiescent):		6.8 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 Connector:		Refer to Receiving Connectors .																	

Wiring Information of Transmitting Sounds of BII7534BT-LNR, BII7536BT-LNR, BII7534BT-LNR-VST50Vp, and BII7536BT-LNR-VST50Vp.

Transmit Wiring:	Shielded Cable	Coax, BNC.	UMC3P, Locking Sleeve: DLSA-M.	MIL3P	DIN3P	XLR3P
Signal:	White or Red	Center Contact	Contact 2	Contact C or G	Pin 3	Pin 2
Signal Common:	Black	Shield	Contact 1	Contact B	Pin 1	Pin 3
Shielding and Grounding	Shield	Shield	Contact 3	Contact A	Pin 2	Pin 1
Wiring of Unshielded Cable:	Wire Leads WL	UMC2P (0.6m USC Cable originally coming from manufacturer of the connector, Fixed.). Locking Sleeve: DLSA-M.				
Signal	White	Contact 2				
Signal Common	Black	Contact 1				

Wiring Information of Receiving Sounds of BII7534BT-LNR, BII7536BT-LNR, BII7534BT-LNR-VST50Vp, and BII7536BT-LNR-VST50Vp.

Receive Wiring:	Wire Leads	UMC4P/XLR4P	DIN4P	DIN3P/XLR3P + 9V BS	TRS + 9V BS
+VDC	Red	Pin 3	Pin 4	Battery Female Snap	Battery Female Snap

Common	Black	Pin 1	Pin 1	Battery Male Snap		Battery Male Snap
Signal+	White	Pin 2	Pin 3	DIN Pin3	XLR Pin 2	TRS Tip
Signal-	Blue, Green, or Yellow	Pin 4	Pin 2	DIN Pin1	XLR Pin 3	TRS Ring
Signal Common	N/A	Pin 1	Pin 1	DIN Pin2	XLR Pin 1	TRS Sleeve
Shielding	Shield	Metal Shell	Metal Shell	Metal Shell		N/A
Optional DC Supply Connector: 4mm Banana Plug Pair, Red Plug for +VDC, Black Plug for Common of the DC power supply.						

How to Order Transducers with Built-in Low Noise Receivers. 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.

Underwater Mateable Connector UMC2P and UMC4P are fixed with 0.6m unshielded cables.

Part Number	-Mounting	-Cable Length	-Transmit/Receive Cable	-Connector for signals of Transmit/Receive/DC Supply
BII7534BT-LNR, BII7536BT-LNR, BII7534BT-LNR-VST50Vp, BII7536BT-LNR-VST50Vp.	Default: BFM-FH-3/8".	Default: Two x 15m.	Default: RG58/SC, SC/SC.	Default: BNC/XLR3P/BS, BNC/XLR3P/BP; WL/WL/WL.
Example:		Description		
BII7536BT-LNR-BFM-FH-3/8"-15m-RG58/SC-BNC/XLR3P/BS		BII7536BT Transducer, Built-in Low Noise Receiver, Bolt-Fastening Mounting with Free Hanging: BFM-FH-3/8", Two x 15m Cables, Transmit Cable: RG58 Coax, Receive Cable: 4C Shielded Cable, Transmit Connector: BNC Male, Receive Connector: XLR3P, DC Supply Connector: +9VDC Battery Snaps.		
BII7536BT-LNR-VST50Vp-BFM-FH-3/8"-15m-RG58/SC-BNC/XLR3P/BS		BII7536BT Transducer, Built-in Low Noise Receiver, built-in Voltage Step-up Transformer for Input Voltage $\leq 50Vp$, Bolt-Fastening Mounting with Free Hanging: BFM-FH-3/8", Two x 15m Cables, Transmit Cable: RG58 Coax, Receive Cable: 4C Shielded Cable, Transmit Connector: BNC Male, Receive Connector: XLR3P, DC Supply Connector: +9VDC Battery Snaps.		
BII7536BT-LNR-BFM-FH-3/8"-15m-SC-SC-WL/WL/WL		BII7536BT Transducer, Built-in Low Noise Receiver, Bolt-Fastening Mounting with Free Hanging: BFM-FH-3/8", Two x 15m Cables, Transmit and Receive Cable: Shielded Cable, Wire Leads.		
BII7536BT-LNR-BFM-FH-3/8"-0.6m-SC/SC-UMC3P/UMC4P/None		BII7536BT Transducer, Built-in Low Noise Receiver, Bolt-Fastening Mounting with Free Hanging: BFM-FH-3/8", Two x 0.6m Cables, Transmit and Receive Cable: Shielded Cable, Transmit Connector: UMC3P, Receive Connector: UMC4P, DC Supply Connector: None, Both DC Supply and Receiving Signal share UMC4P.		
BII7536BT-LNR-EFMM-0.3m-RG58/SC-WL/WL/WL		BII7536BT Transducer, Built-in Low Noise Receiver, End-face Mounting: EFMM, Two x 0.3m cables, Transmit Cable: RG58 Coax, Receive Cable: 4C Shielded Cable, Wire Leads.		

Question:

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

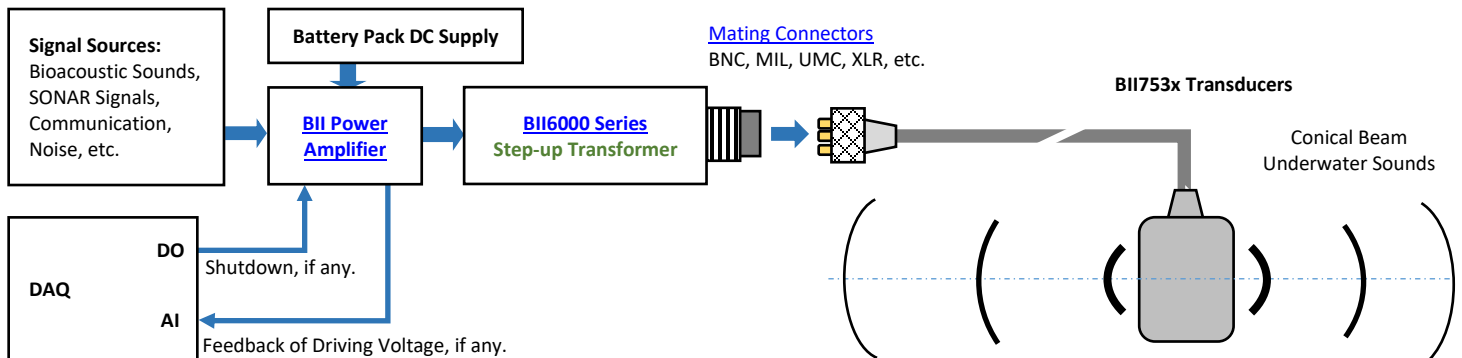
1. Buyer may order BII products with wire leads, and buyer assembles the mating connector to the cable end.
2. A connector adaptor might be assembled by BII by customization, and BII ships the adaptor to buyer as accessory of the device. Please contact BII for customizations.
3. Many adaptors for standard 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 features of the transducer when operating $f \ll f_s$ (f_s is resonance frequency)?

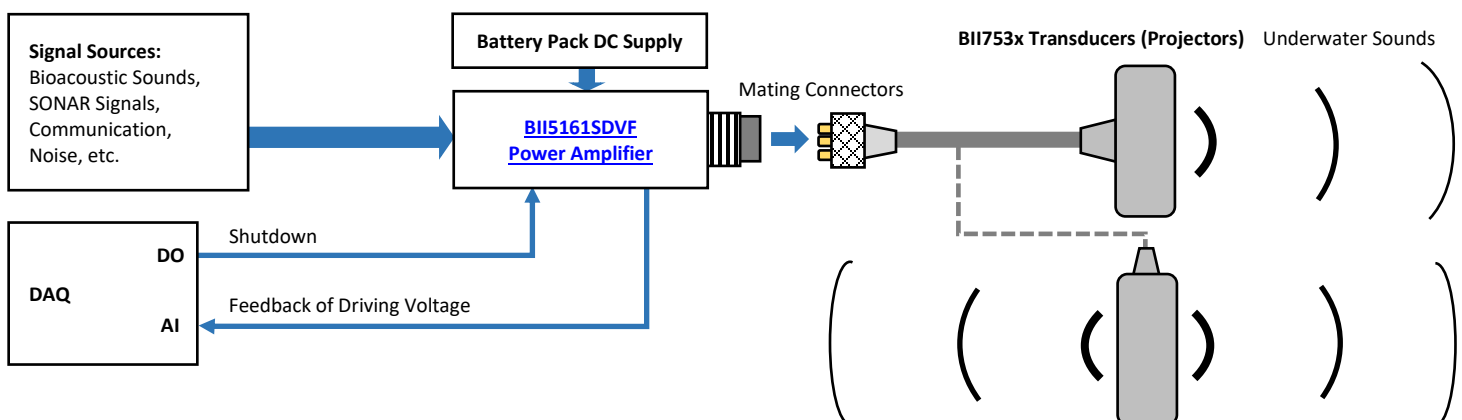
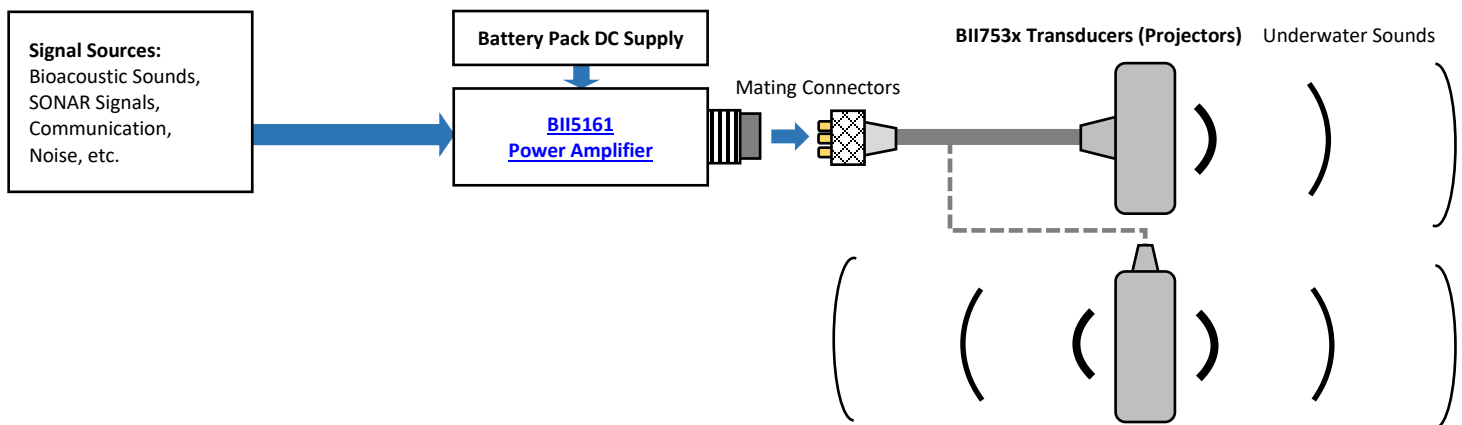
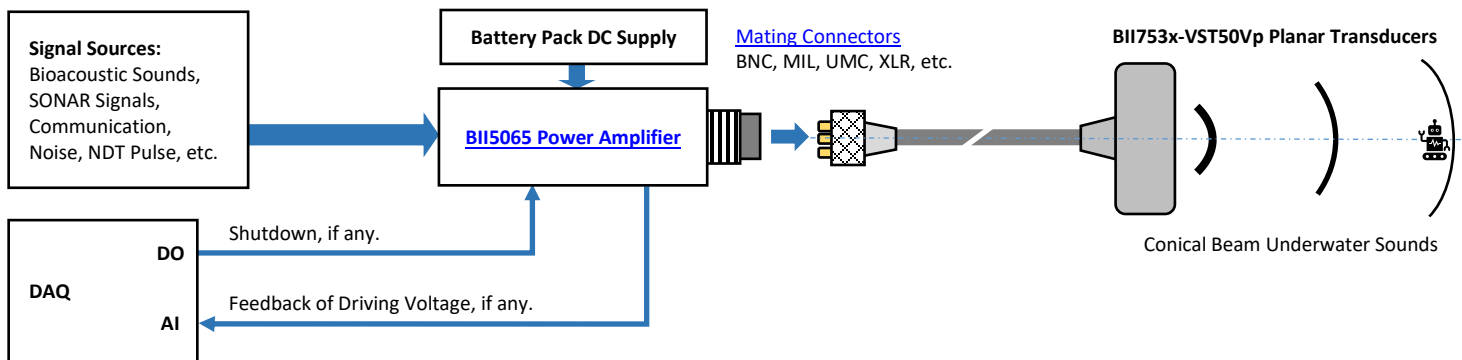
1. Roughly, the TVR drops at 6dB/Octave or 20dB/Decade. 2. Power factor drops to be half per octave or one tenth per decade. 3. Efficiency drops with frequency decreasing. More and more electrical energy is consumed by transducer to be converted to heat which damage the transducer when the temperature inside transducer is over 100°C to 120°C (212°F to 248°F) roughly. **Therefore, (1) when a transducer operates at $f \ll f_s$, the driving power from power amplifier MUST be low enough to avoid damage: Low power continuous signals, or pulsing signals with 10% duty cycle and pulse length $\leq 100mS$. (2) Use a low frequency transducer whose f_s is at or very close to the frequencies of the interest.**

System Block Diagram of Generate Sounds with BII753x. DO: Digital Outputs, AI: Analog Inputs.

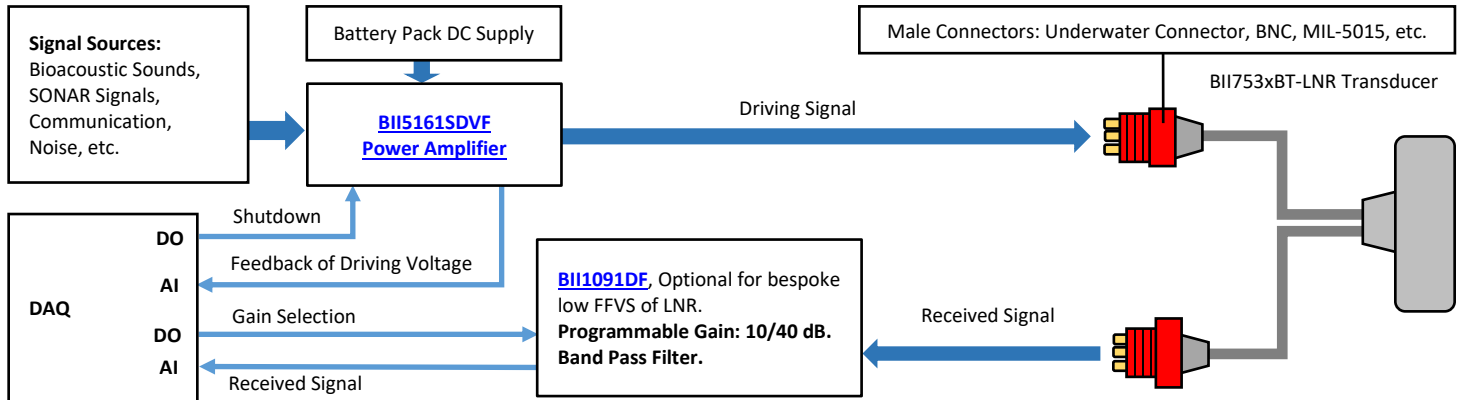
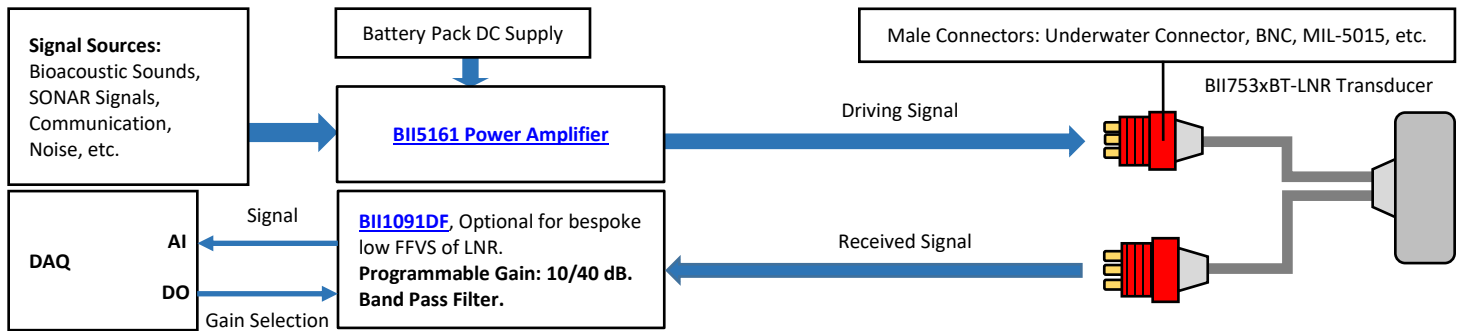
This setup is a compact and low cost solution for end users' acoustic system by integrating BII's Power amplifier (PCB form factor) and Impedance Matching device (PCB or small-enclosure form factor) into end users' grounded enclosures.



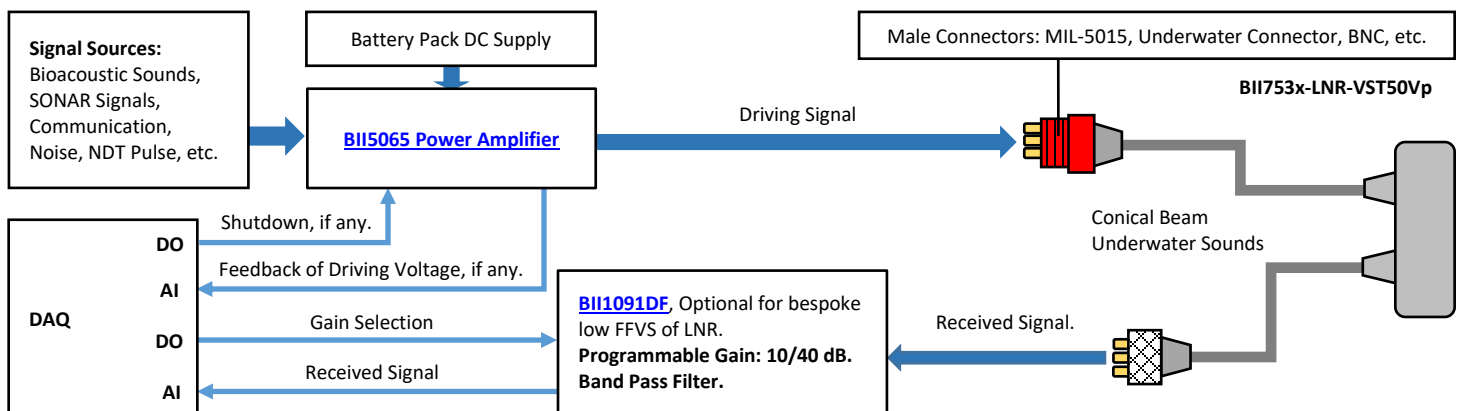
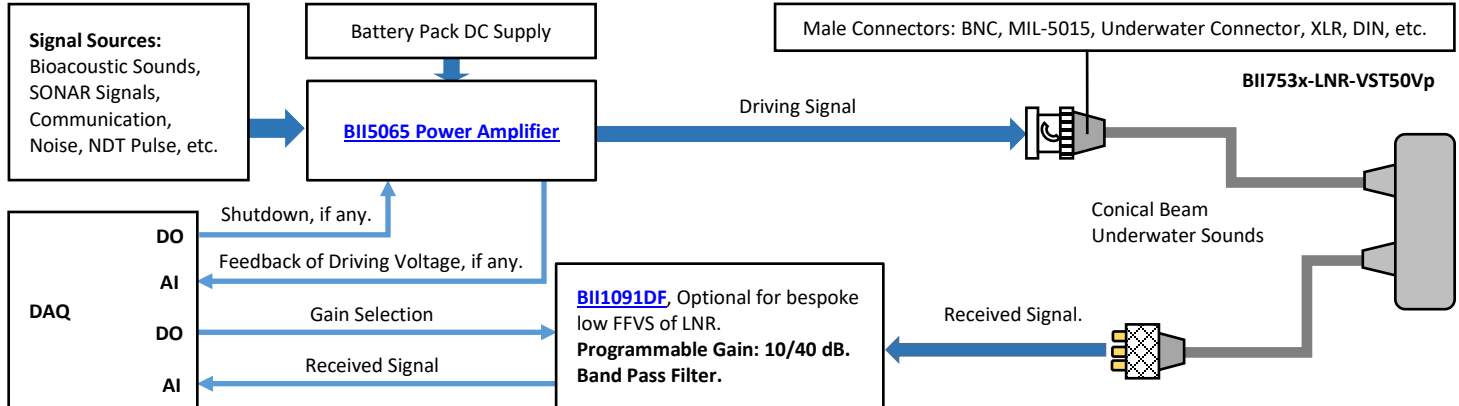
System Block Diagram of Generate Sounds with BII753x-VST50Vp. DO: Digital Outputs, AI: Analog Inputs.



System Block Diagram: Transmitting and Receiving Sounds with BII753x Transducer. DO: Digital Outputs, AI: Analog Inputs.

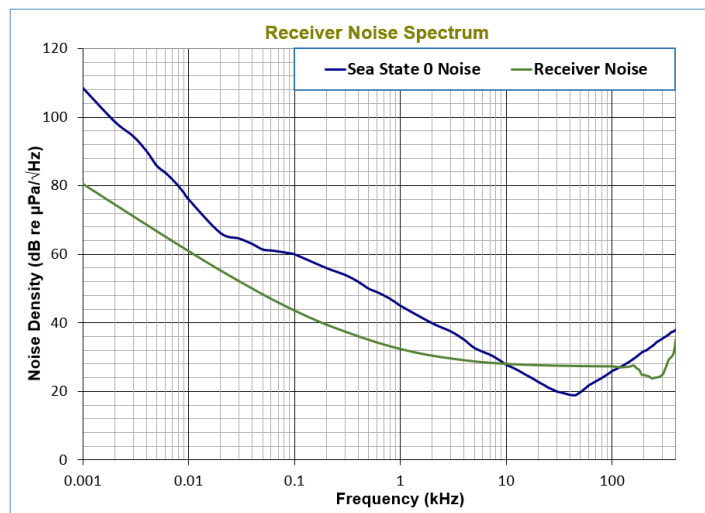
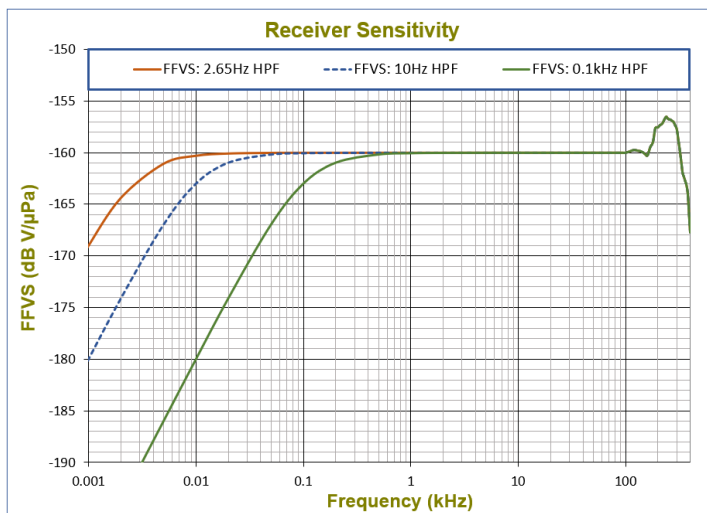


System Block Diagram of Transmitting and Receiving Sounds with BII753xBT-LNR-VST50Vp. DO: Digital Outputs, AI: Analog Inputs.



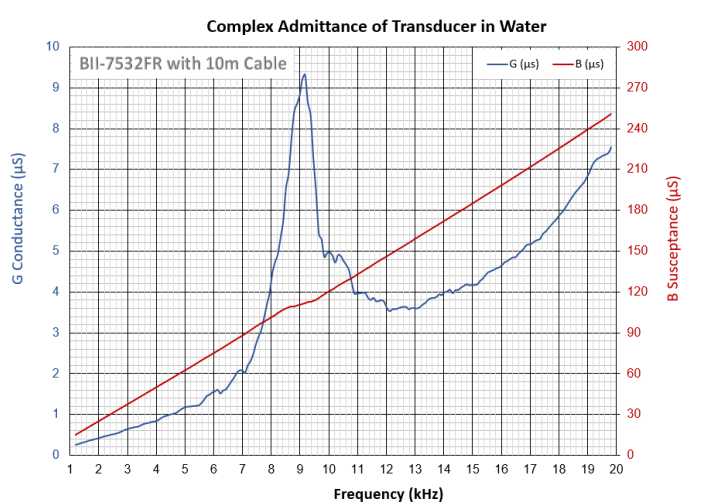
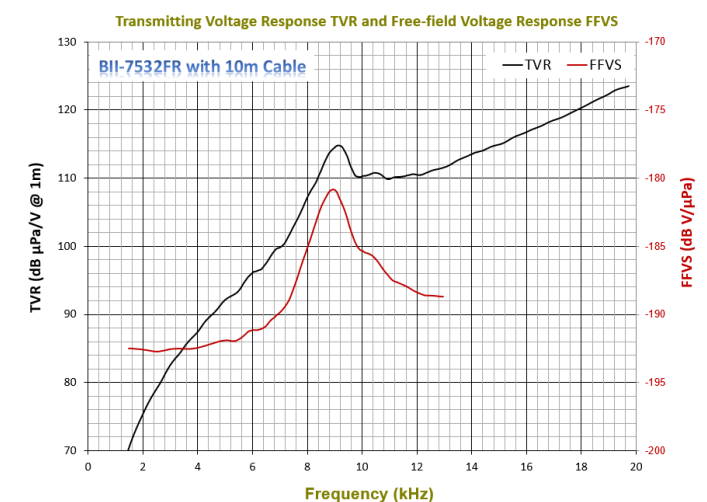
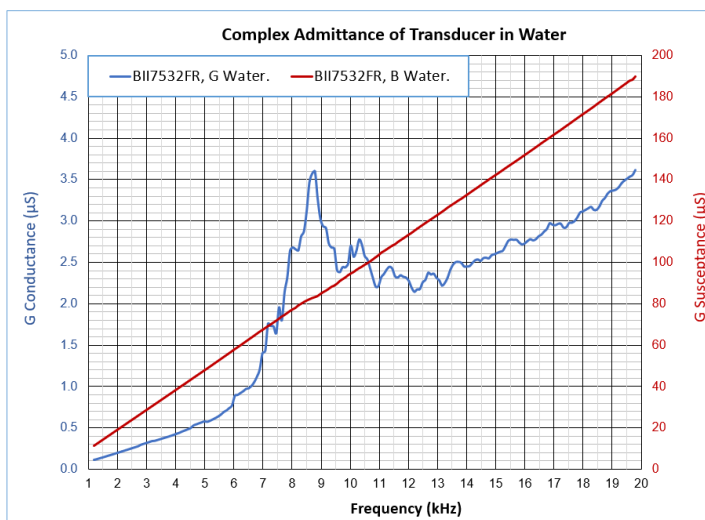
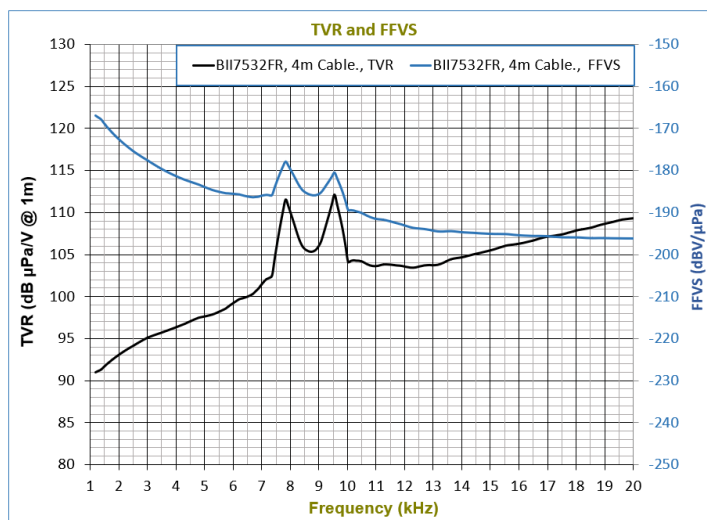
FFVS of BII7530 Series Transducers with Built-in LNR

Pressure Noise Density of BII7530 Series Transducers with Built-in LNR

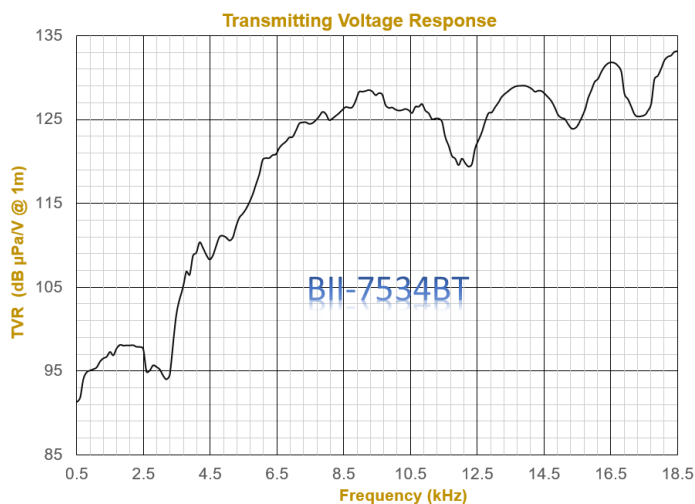


BII7532FR Transmitting Voltage Response (TVR)

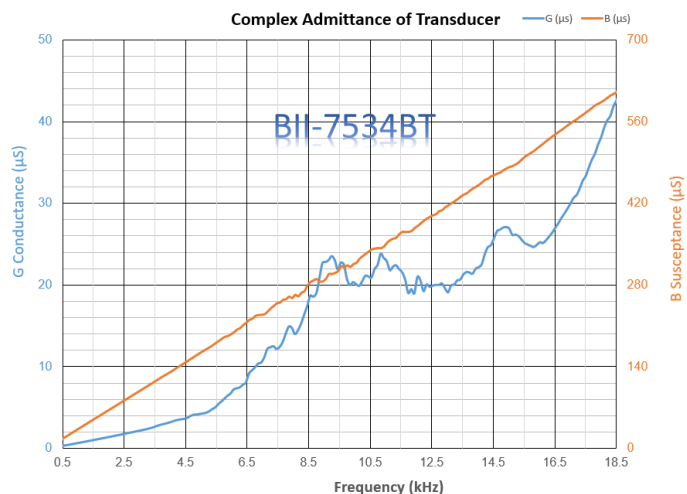
BII7532FR Admittance G-B



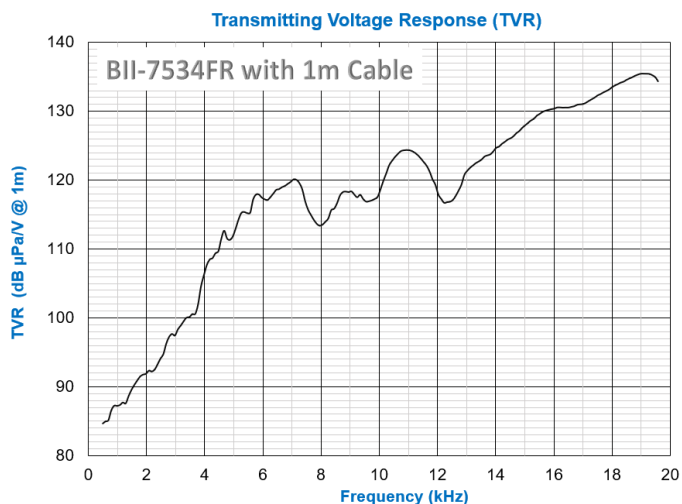
BII7534BT Transmitting Voltage Response (TVR)



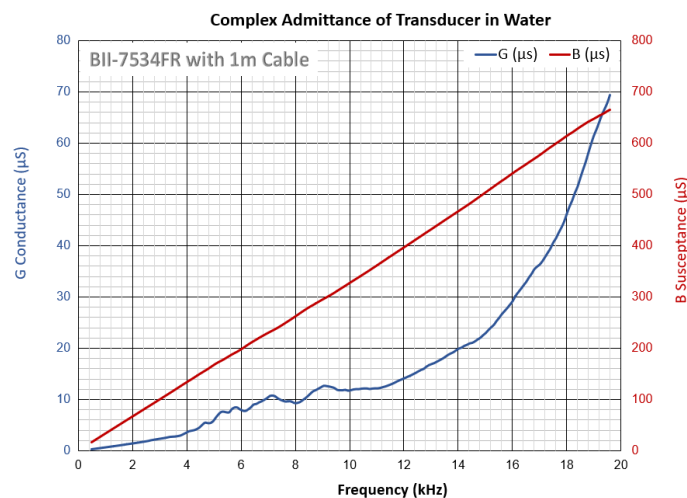
BII7534BT Admittance (Transducer with 1m Cable)



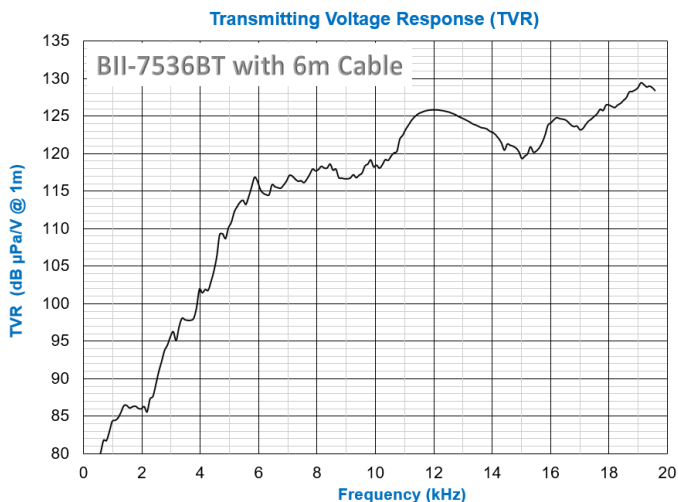
BII7534FR Transmitting Voltage Response (TVR)



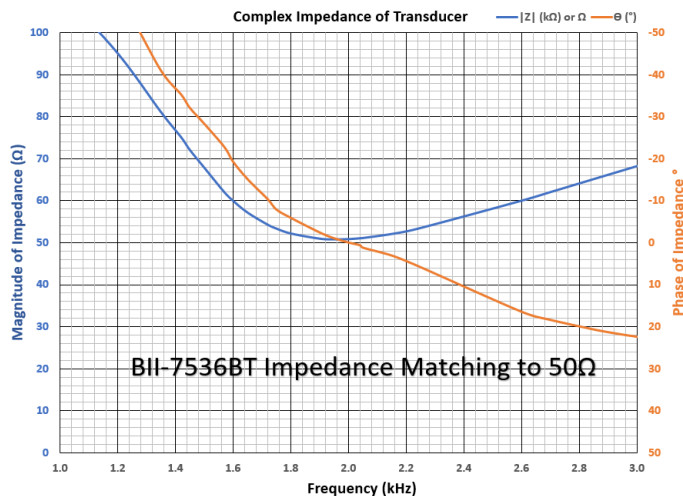
BII7534FR Admittance (Transducer with 1m Cable)



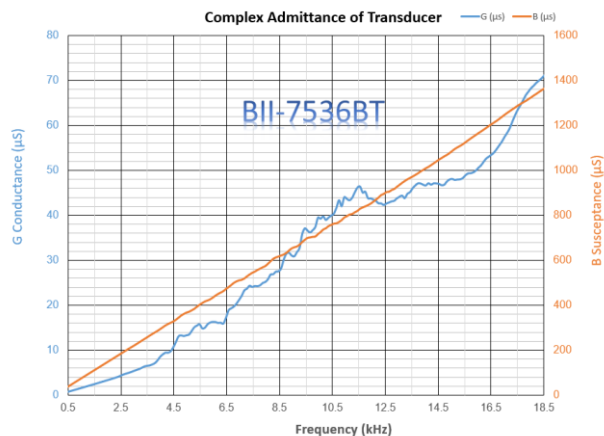
BII7536BT Transmitting Voltage Response (TVR)



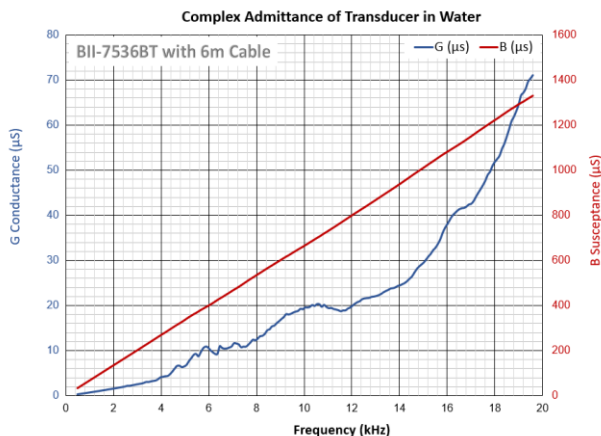
BII7536BT Customized Impedance Matching to 50Ω at 2 kHz



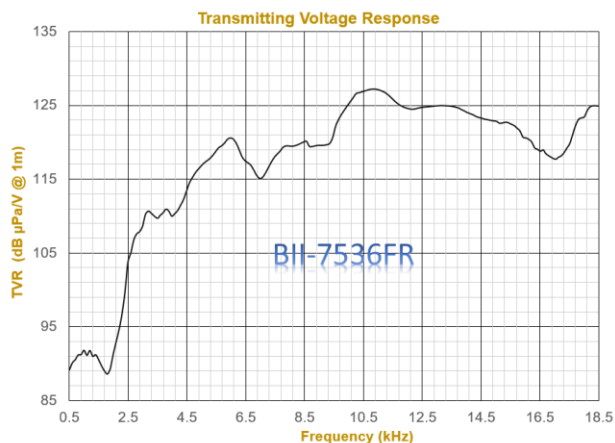
BII7536BT Admittance (Transducer with 1 m Cable)



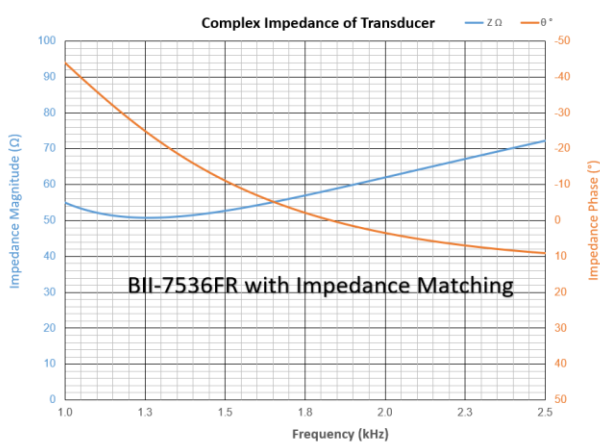
BII7536BT Admittance (Transducer with 6 m Cable)



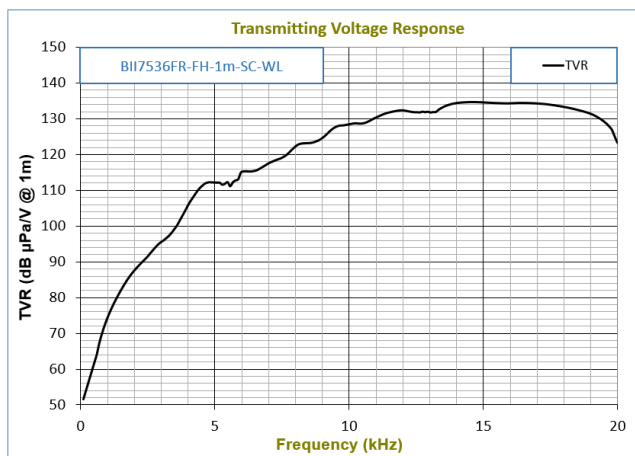
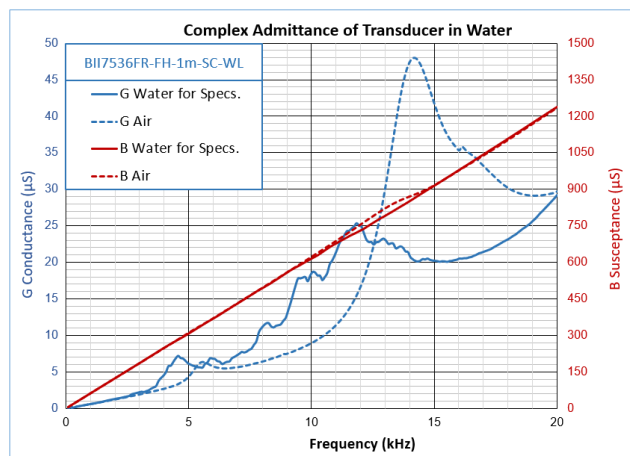
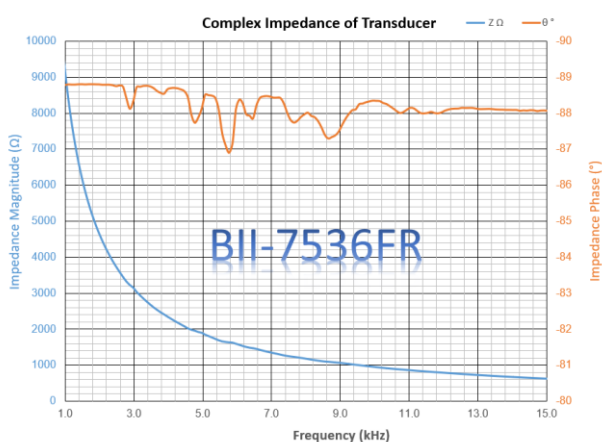
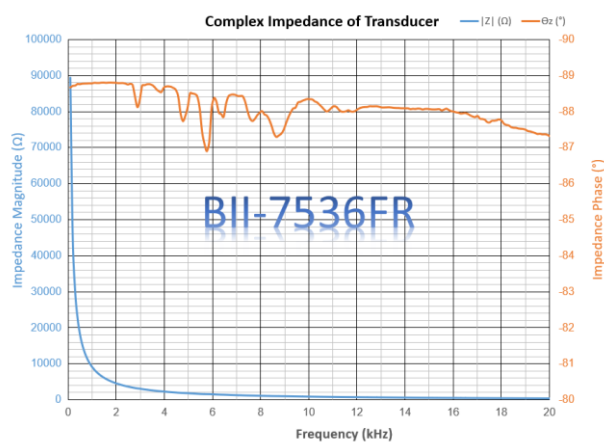
BII7536FR Transmitting Voltage Response (TVR)



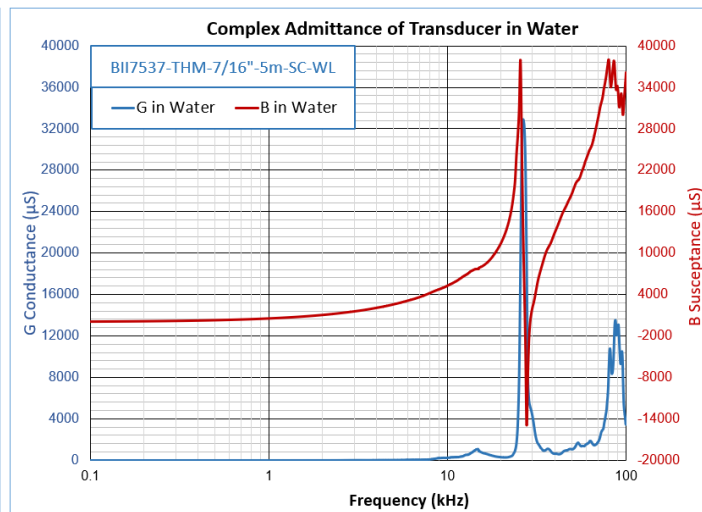
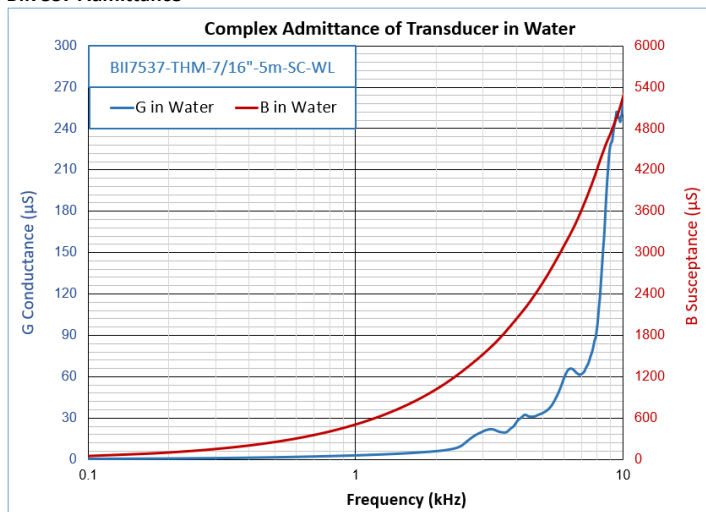
BII7536FR Customized Impedance Matching to 50Ω at 1.5kHz



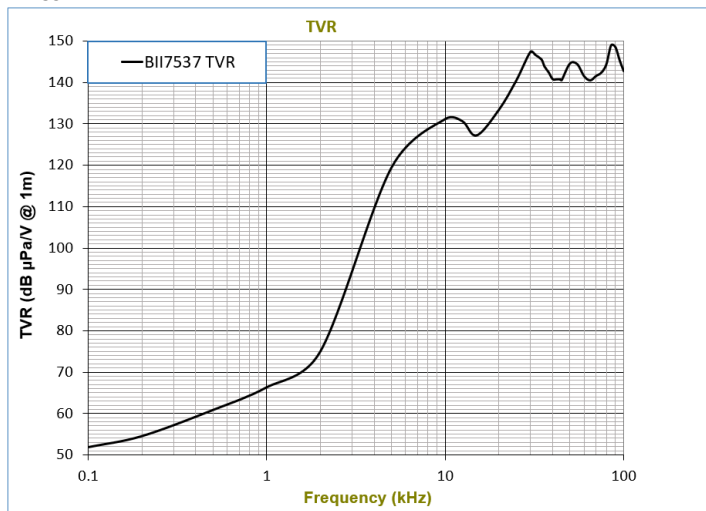
BII7536FR Impedance (Transducer with 50m Cable)



BII7537 Admittance



BII7537 TVR



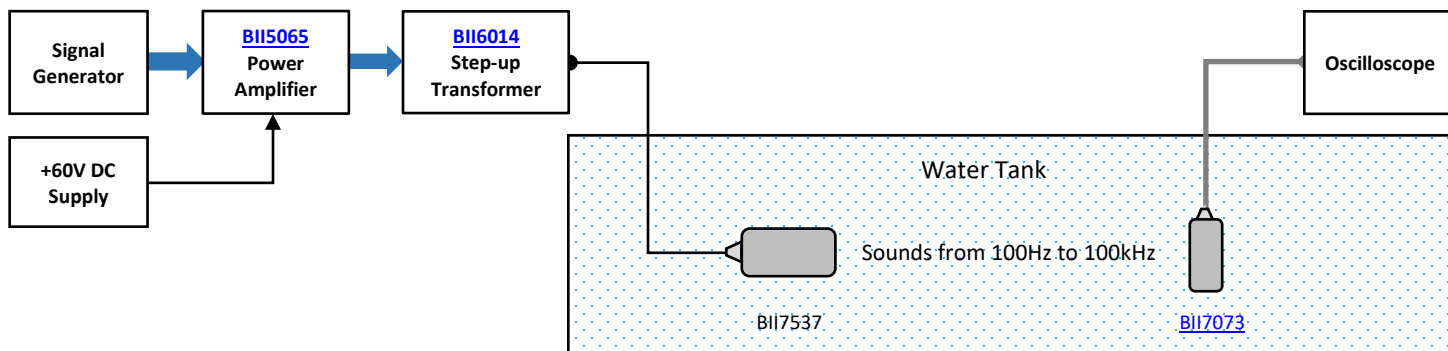
Application Notes

BII7537 generate sound in water from 100Hz to 100kHz.

Setup at BII Laboratory

Warning: Dangerous High Voltage exists on cables and devices between BII5065 power amplifier and BII7537 transducer. An End User MUST observe electrical codes of End User's country to ensure electrical safety for operators and devices, for example, Install both BII5065 and BII6014 in a firmly grounded instrument enclosure, and all exposed bare wires, metal wires, wire leads, solders, and joints shall be insulated with insulation material such as heat shrink tubing, fully insulated wire splicing connectors, etc. The insulation voltage must be greater than twice the maximum voltage of the device.

BII does NOT take any liability/responsibility for the setup's electrical safety.



Physical Size (Dimensional Unit: mm), Please contact BII for other bespoke installations.

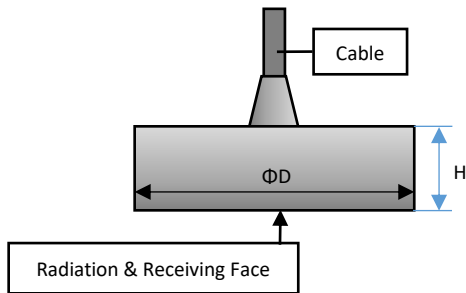
Note: physical size of BII753xBT-LNR and BII753xFR-LNR are same to BII753xBT and BII753xFR respectively except two cables of BII753xBT-LNR and BII753xFR-LNR.

Two-Conductor shielded cables: High Voltage Transmit Signal to the Transducer.

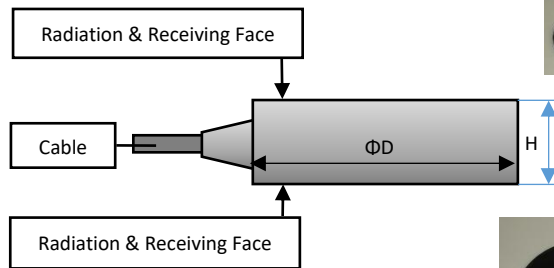
Four-Conductor shielded cables: ONLY for BII753xBT-LNR and BII753xFR-LNR, Received Signal from the Transducer.

1. Free Hanging FH

BII7532BT, BII7534BT, BII7536BT

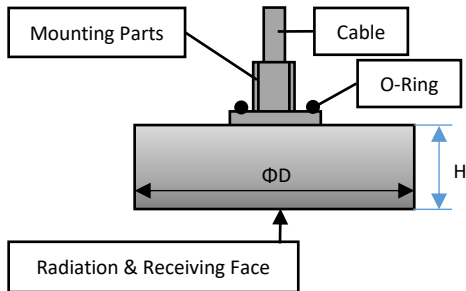


BII7532FR, BII7534FR, BII7536FR

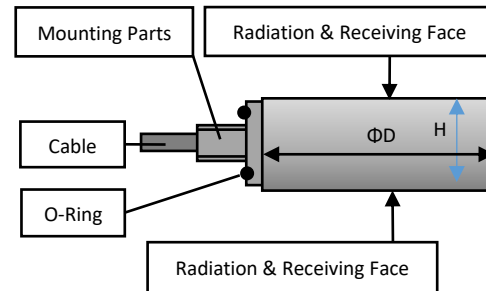


2. Thru-hole Mounting (Stainless Steel): THM-7/16", THM-5/8".

BII7532BT, BII7534BT, BII7536BT

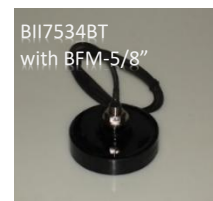
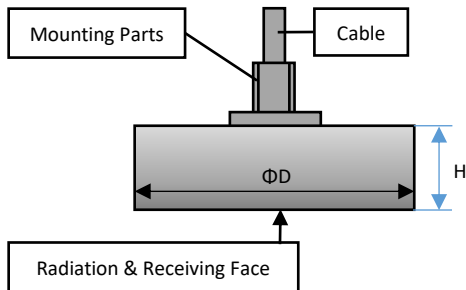


BII7532FR, BII7534FR, BII7536FR

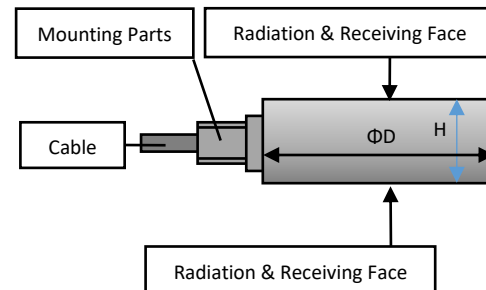


3. Bolt Fastening Mounting (Stainless Steel): BFM-7/16", BFM-5/8".

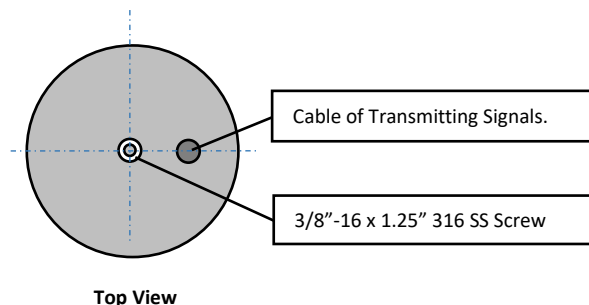
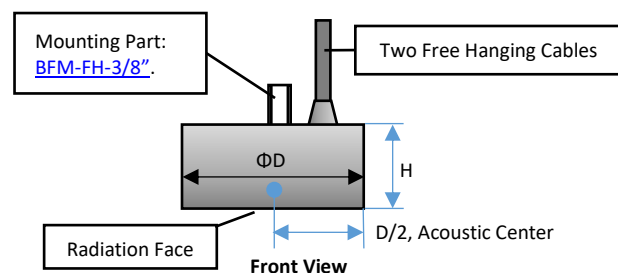
BII7532BT, BII7534BT, BII7536BT



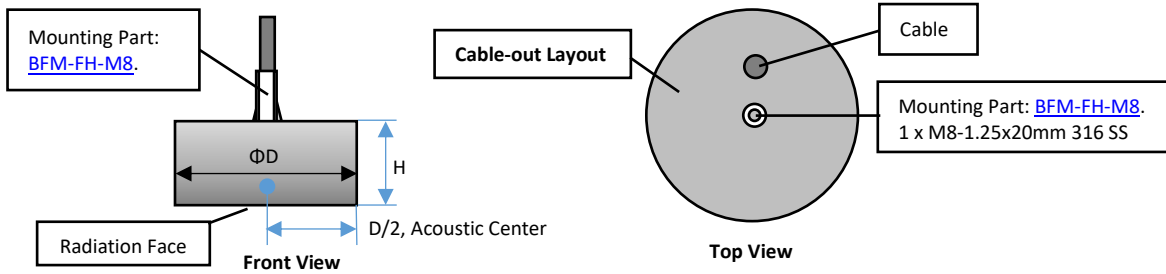
BII7532FR, BII7534FR, BII7536FR



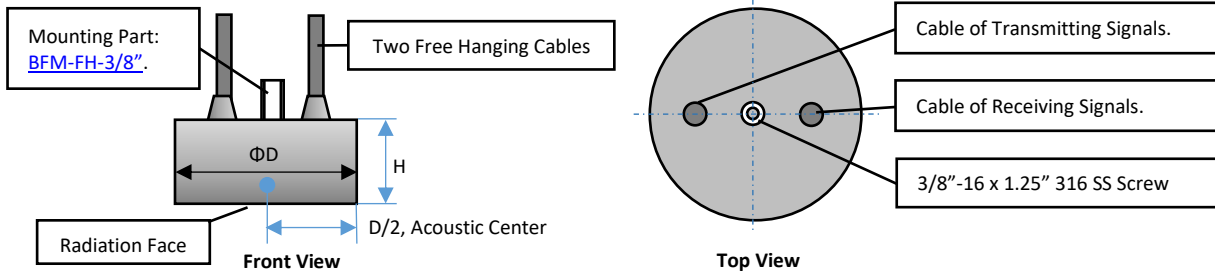
4. BII753xBT Cable-out Layout for Bolt Fastening Mount with Free Hanging Cable ([BFM-FH-3/8"](#), 3/8"-16 x 1.25" 316 SS Screw. Nut is included).



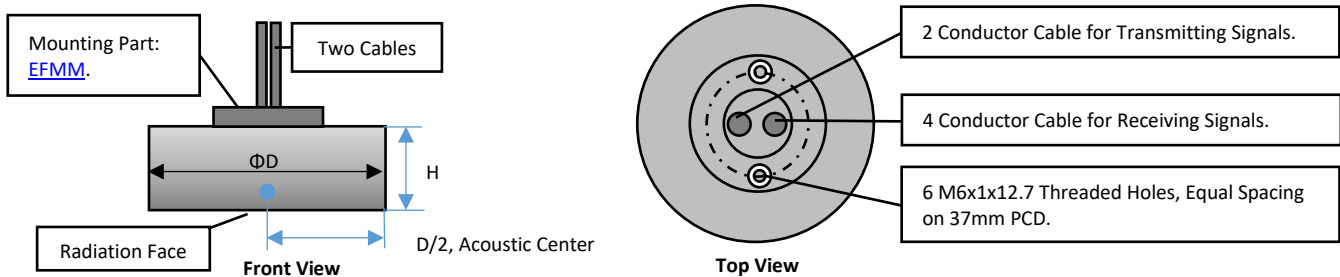
5. BII7532BT Bolt Fastening Mount with Free Hanging Cable ([BFM-FH-M8](#), M8-1.25x20mm).



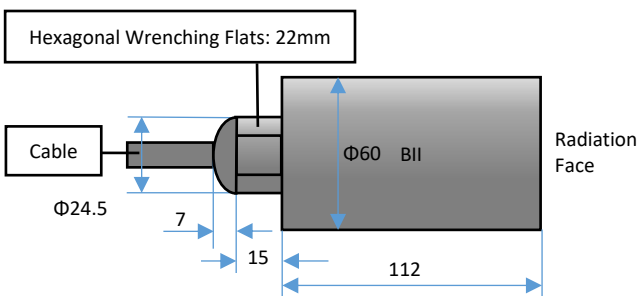
6. BII753xBT-LNR Cable-out Layout for Bolt Fastening Mount with Free Hanging Cable ([BFM-FH-3/8"](#), Nut is included).



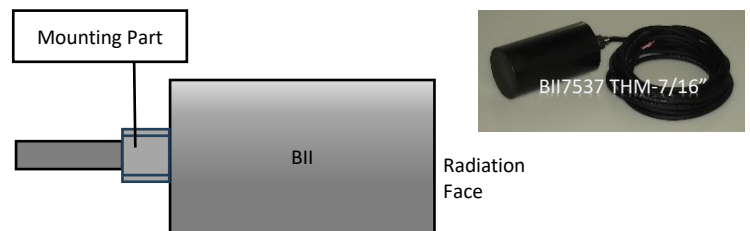
7. BII753xBT-LNR Cable-out Layout for End-face Mounting for Multi-Channel ([EFMM](#)).



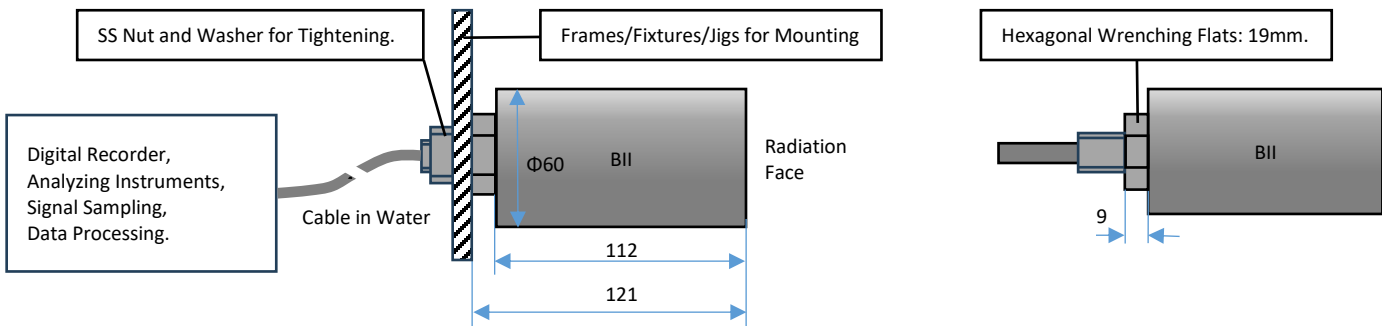
8a. BII7537 Size information of Free Hanging.



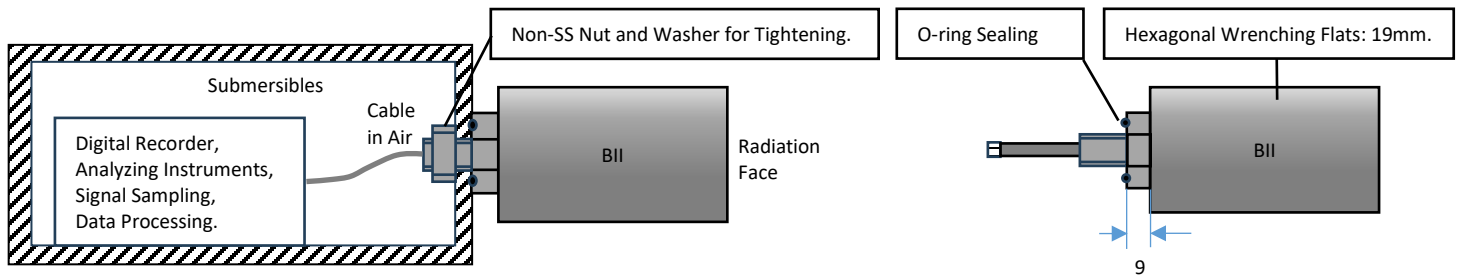
8b. BII7537 General Size information.



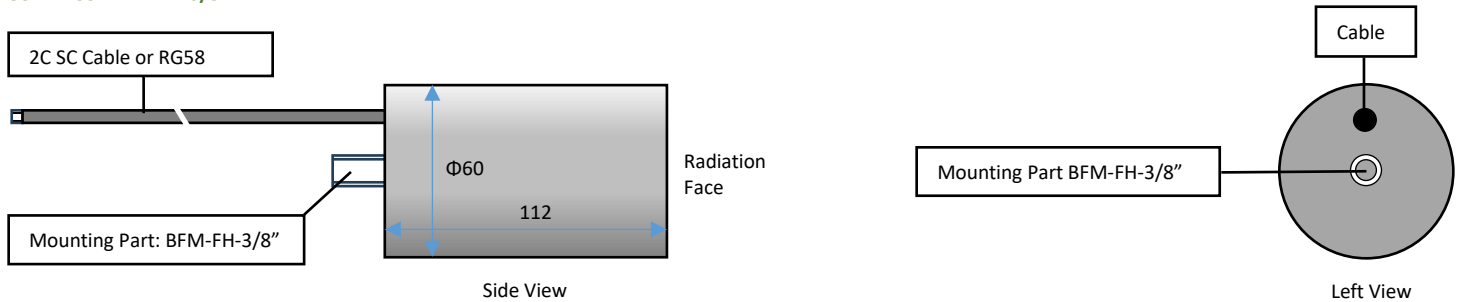
8c. BII7537 Bolt-Fastening Mounting THM-7/16" (7/16"-20x22 UNF-2A), or BFM-5/8" (5/8"-18x22 UNF).



8d. BII7537 Thru-hole Mounting with Single O-ring Sealing THM-7/16" (7/16"-20x22 UNF-2A), or THM-5/8" (5/8"-18x22 UNF).

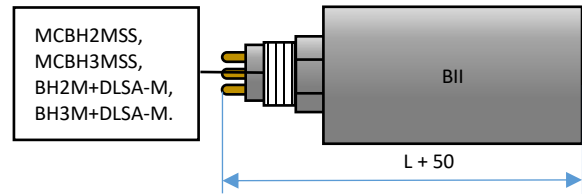
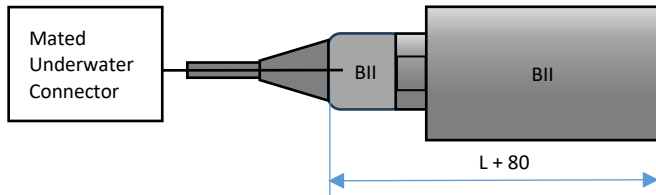


8e. BII7537 BFM-FH-3/8"



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

Mating Connector and Cable	UWC-Cable Length-Connector: Underwater Connector with Socket insert and Internal-Thread Mating Parts, customized-length shielded cable, a Connector (WL, XLR, TRS, DIN, MIL, UMC, etc.) to DAQ devices or Digital Recorders.
	How to order cable with mating underwater connector? for example: UMC3S-20m-BNC: 20 m cable with Underwater Mateable Connector 3 Sockets (UMC3S) on one end and BNC Male (BNC) on other end. UMC3S-20m-MIL5015: 20 m cable with and Underwater Mateable Connector 3 Sockets (UMC3S) on one end and MIL-5015 Receptacle with 3 Male Pins on other end.



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