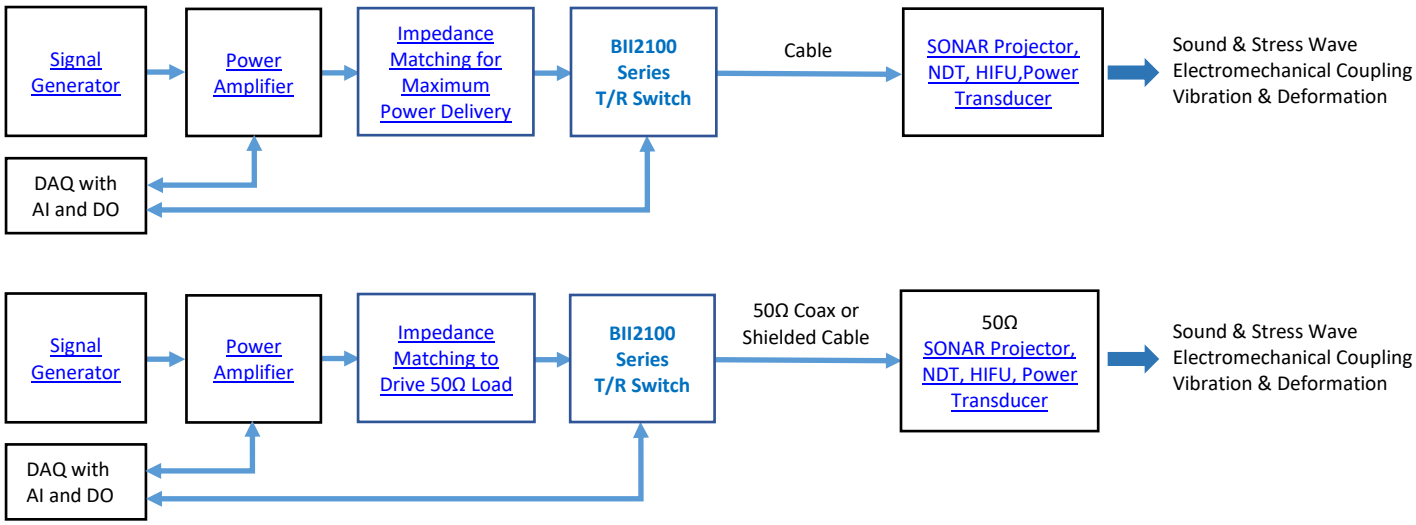
BII2100 Series T/R (Transmitting and Receiving) Switch Modules

A BII2100 Series T/R Switching Modules provides an integrated solution for a wide range of acoustic applications based on Emitting and Listening Timing Techniques. The device works at active mode (Transmitting Sounds) and passive mode (Listening Sounds). It integrates a T/R switch, a bandpass filter, and a low noise DPGA preamplifier (Digitally Programmable Gain Amplifier) into one compact housing. Gain-selection is accomplished by a two-bit or one-bit digital word (TTL/CMOS level compatible).

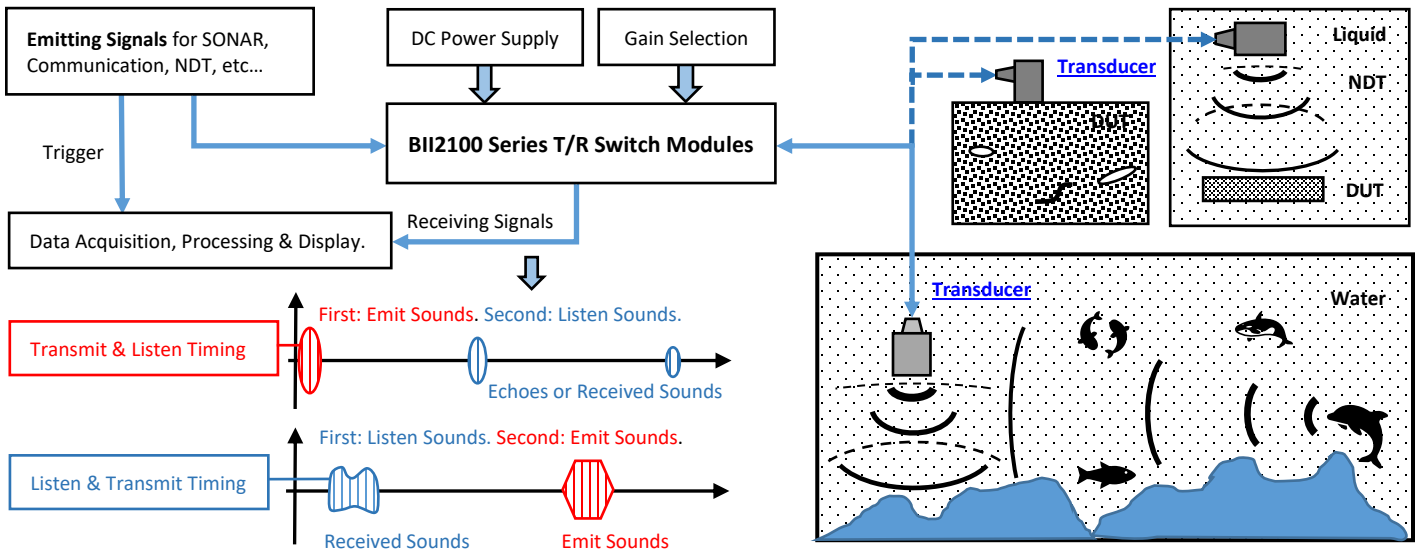
Typical Applications

Echo Sounder (Navigation/Object Avoidance, Depth/Distance Sounder, Wave-height Sensor), Target Strength Measurement, Sub-bottom Profilers, Side-scan SONAR, Fishery SONAR, Transponders, Positioning, Beacon, Communication and Telemetry, Artificial Acoustic Target, Acoustic Speedometers (Doppler SONAR), Sound Velocity Profiler, Marine Bioacoustics, Acoustic Deterrent Devices, Ocean Current Profiling, Flow Meter, NDT (Non-destructive Test), Diagnostic Ultrasounds, Ultrasonic Test and Analysis, Material Study.

Transmitting and Receiving System Configuration



System Block Diagram



Specifications

Part Number	BII2101WR	BII2101BNC	BII2102MIL	BII2103BNC	BII2104BNC
	ACTIVE		**ACTIVE**	**ACTIVE**	**ACTIVE**
	WR: Wire/Cable Bundles; **BNC:** Panel Mount BNC; **MIL**: Panel Mount MIL-5015 Connector.				
	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. **OBSOLETE**: BII has discontinued the production of the device.				
Applications:	Embedded Component		Standalone Device	Standalone Device	Standalone Device
	Half-duplex Acoustic System: transmitting sounds and receiving sounds occur at separate timing.				
Frequency Range:	2 to 350 kHz		2 to 350 kHz	20 kHz to 5 MHz	20 kHz to 10 MHz
Power Capacity:	Refer to Cable and Connector Information.				
Signal Type:	Spike, SINE Pulse, Chirp, PSK, FSK; Pulse, Square Waveform; Continuous Waveform, etc…				
Echo Sounding Distance:	≥ 0.3 m		≥ 0.3 m	≥ 0.03m at 20 to 100 kHz. ≥ 3mm at f > 100 kHz.	≥ 0.03m at 20 to 100 kHz. ≥ 3mm at f > 100 kHz.
	Dependent on the **near-field distance**, bandwidth, and operating frequency of a transducer.				
Transducers:	Transducer which can transmit and receive sounds.				
	For general-purpose applications, all kinds of piezoelectric transducers work with BII2100 series T/R Switch.				
	For better receiving performance such as lower threshold or larger dynamic range, following transducers are recommended.				
	Transduces with neither impedance matching nor tuning			50Ω Transducer	
Supply Voltage Vs:	+8.5 to +32 VDC.				
Current (Quiescent):	10 mA		22 mA	15 mA	17 mA
Fuse:	None		Panel Mount	Panel Mount	Panel Mount
	BII2101WR: BII does not supply fuse. End user shall install fuse in end user's system.				
	Panel Mount Fuse: 0.3A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".				
Power Supply Cable:	DC-PCWL-24		DC-PPBP-24	DC-PPBP-24	DC-PPBP-24
Suggested DC Supply:	9V Battery, Marine Battery, Automobile Battery, Battery Pack, Subsea Battery, or DC Power Supply with Grounded Output and Protection of Output Current Limit.				
Grounding:	N/A	GWL18	GWL18	GWL18	GWL18
	BII2101WR: End user grounds end user's system for safety.				
Housing:	Aluminum Housing.				
Weight:	150 grams	0.7 kg	0.7 kg	0.7 kg	0.7 kg
Size LxWxH (mm):	95x59x35	146.9x91.7x67	146.9x91.7x67	146.9x91.7x67	146.9x91.7x67
Mounting:	Four holes and/or slots for installing the device to a firm base. Refer to the respective drawings for the size.				
	Fasteners (Screws, Washers, Nuts, etc.) for installing or mounting the devices: **not included.**				
Operation Temperature:	-10 to +60 °C, or 14 to 140 °F.				
Storage Temperature:	-20 to +60 °C, or -4 to 140 °F.				
Sound Transmitting					
Operating Frequency fs:	2 to 350 kHz		2 to 350 kHz	20 kHz to 5 MHz	20 kHz to 8 MHz
	One BII's T/R Switch ONLY support one fs. Specify only one fs when ordering BII TR Switch.				
	fs is resonant frequency of a transducer at which maximum TVR exists.				
Impedance Matching:	No, not included.				
Driving Voltage V_{drive}:	1. Refer to cable options. 2. A shorter pulse width PW and a lower duty cycle D allow a BII TR switch to handle a higher power without damage.				
Transmitting Voltage Gain:	20*log((V_{drive} in Vpp – 1.2 Vpp)/V_{drive}), in dB.				
Maximum Power:	Limited by the transducer, cable, and duty cycle and pulse length of the signal, whichever is less.				
Duty Cycle D and Pulse Length (or Pulse Duration) PW vs. Driving Current and Voltage. Applicable to all models of BII2100 series.					
Duty Cycle D:	*D ≤ 15%*	*15% < D ≤ 20%*	*20% < D ≤ 38%*	*38% < D ≤ 70%*	*70% < D ≤ 90%*	*90% < D ≤ 100%*
Maximum Pulse Width:	*40 mS*	*50 mS*	*150 mS*	*290 mS*	*400 mS*	*Continuous*
Maximum Driving Current:	*10 Arms*	*8 Arms*	*5 Arms*	*3 Arms*	*2 Arms*	*1 Arms*
Max. Driving Voltage V_{drive}:	*Depending on the impedance of a specific transducer. Enclosed in datasheet emailed to buyers after T/R SW manufacturing.*					
Cable Length:	0.3 m.	N/A	N/A	N/A	N/A	
Cable:	Wires	N/A	N/A	N/A	N/A	
Connector:	Wire Leads	Panel-Mount BNC Jack	Panel-Mount MIL-5015 Connector	Panel-Mount BNC Jack	Panel Mount BNC Jack	

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

Cable Options:	**Wire and Cable Types**	**Ratings of Voltage, Current or Power, and Temperature.**
	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 Options:	**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. Used for 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. Underwater Mateable Connector (**UMC**), Thread Fastening.	600Vrms, 10A. Waterproof, IP68.

	Panel Mount or In-line. Input uses Pin, output uses Socket.		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.				
Please contact us for bespoke wirings of differential transducers such as dipole, quadrupole, multimode rings, and flextensional sources.				
Sound Receiving				
Receiving Gain (dB):	0, 20, 40, 60	20, 40, 60, 80.	40, 80.	50.
Frequency Range:	2 to 350 kHz	2 to 350 kHz	20 kHz to 5 MHz	20 kHz to 10 MHz
Gain Vs. Frequency:	Frequency Response of Receiving Gain.			
Band Pass Filter:	-3 dB bandwidth of receiving signal processing. Built-in, 2nd order, 40 dB/Decade Roll-off.			
	0.1 kHz to 3*fs (or 350 kHz) whichever is less.		20 kHz to 3*fs (or 10 MHz) whichever is less.	
	Note: The narrower the pass band of the filter is, the lower the ambient and electronic noises are.			
Input Referred Noise: (at f ≥ 1 kHz)	12 nV/√Hz. 1.0 fA/√Hz.	5.2 nV/√Hz. 3.1 fA/√Hz.	1.0 nV/√Hz. 1.6 pA/√Hz.	1.0 nV/√Hz. 1.6 pA/√Hz.
	Roughly electronic noise density at input, RTI, $V_n^2 = e_n^2 + [\ i_n$ * impedance of a transducer (or hydrophone)$]^2$. RTI: Reference to Input.			
Input Dynamic Range:	90 dB at 10 kHz Bandwidth			
Settling Time, 0.01%:	2 µs	2 µs	0.4 µs	0.4 µs
Received Signal				
Output Impedance:	50 Ω			
Cable Drive Capability:	50 m			
Output Signal:	Waveform, AC Coupled.			
Output Signal Type:	Single Ended	Differential	Single Ended	Single Ended
Output Signal Range:	Supply Voltage Vs - 4, in Vpp			
Cable Length:	0.3 m	N/A	N/A	N/A	N/A
Cable:	Coax RG174	N/A	N/A	N/A	N/A
Connector:	Wire Leads	Panel Mount BNC Jack	Panel Mount TRS Jack	Panel Mount BNC Jack	Panel Mount BNC Jack
Receiving Gain Selection:					
Cable Length:	0.3 m	N/A	N/A	N/A	N/A
Gain Selection Cable:	Shielded Cable	N/A	N/A	N/A	N/A
Connector:	Wire Leads	Panel Mount TRS Jack	Panel Mount TRS Jack	Panel Mount TRS Jack	N/A
Gain Selection:	A 2-bit digital output word. Shield wire: Digital Common.		A 2-bit digital output word. Shield wire: Digital Common.	A 1-bit digital output word. Shield wire: Digital Common.	N/A
	TTL/CMOS Compatible. Logic Low 0: 0 to +0.8 VDC from digital outputs, or Gain Selection Wire is short to Digital COMMON. Logic High 1: +2.4 VDC to +Vs from digital outputs, or Gain Selection Wire Opens. Vs: Power Supply Voltage.				
Truth Table:	A1 A0 Gain(dB) Bandwidth 0 0 0 1 MHz 0 1 20 1 MHz 1 0 40 1 MHz 1 1 60 350 kHz		A1 A0 Gain(dB) Bandwidth 0 0 20 1 MHz 0 1 40 1 MHz 1 0 60 1 MHz 1 1 80 350 kHz	A0 Gain(dB) 0 40 1 80	N/A

WARNING: The buyer observes the National Electrical Code or other related codes of buyer's country to assemble and integrate this device into buyer's product or system and follow the code to ground and insulate this device. It is buyer's sole responsibility to make sure the proper insulation and grounding for operating safety before putting the device into service.

Dangerous voltages, capable of causing injury or death, are present in this device. DO NOT TOUCH THE DEVICE, ITS WIRES, CABLES, AND CONNECTORS BEFORE THE POWER SUPPLIES AND SIGNAL SOURCES ARE SHUT DOWN.

1. All exposed bare wires, metal wires, wire leads, and solders shall be insulated with insulation material such as heat shrink tubing, electric/insulating tape, etc. The insulation voltage must be greater than twice the maximum voltage of the device.
2. This device MUST be firmly grounded for operation safety.
3. Metal chassis and/or metal housing of the device MUST be grounded for operation safety.
4. Cable shield MUST be grounded for operation safety.
5. Coax with BNC is not intended for hand-held use at voltages above 30VAC/60VDC. It is buyer's sole responsibility to make sure that the BNC shield of the signal source is firmly grounded for operation safety before hooking up the device to the signal source.

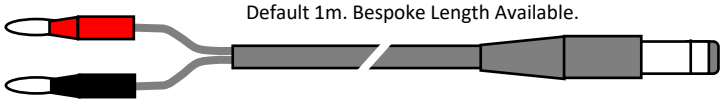
Accessories:

1. DC Supply Cable

Red Banana Plug or Red Wire Lead: +VDC.	**Black Banana Plug or Black Wire Lead:** Common.	**Cable Shield, if any**: Shielding.

a. Part Number: DC-PPBP-24.

To Terminals of DC Supply:
a. One Red 4mm Banana Plug.
b. One Black 4mm Banana Plug.



One 1m DC supply cable. One end of the cable is with DC Power Plug, another end is Red and Black Banana Plugs. Depending on output terminals of buyer's DC Supply, buyer may assemble other type of connectors to DC supply cable at buyer's cost.

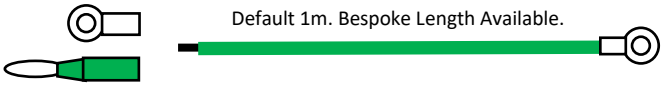
b. Part Number: DC-PCWL-24.

To Terminals of DC Supply:
Wire Leads.

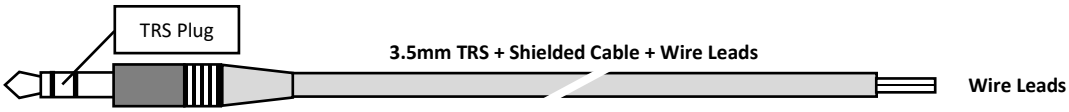
2. Grounding Cable and Terminals

Grounding Cable, Part Number: GWL18 or GWL16, Support Single-Point Grounding with Multiple Devices.
One 1m AWG 18 or AWG 16 Green Wire with #10 Ring Terminal and Wire Lead. One #10 Ring Terminal and one 4mm Banana Plug (Green) are included.
Depending on buyer's grounding terminal type, buyer assembles #10 Ring Terminal, 4mm Banana Plug, or other type connector to grounding cable at buyer's cost.

Terminal to buyer's Grounding Terminal:
a. Default: Wire Lead
b. One #10 Ring Terminal
c. One 4mm Banana Plug



3. Gain Selection Cable and Received Signal Cable for BII2102MIL
Part Number: TRS-P-WL-1m, Bespoke length cable with 3.5mm TRS Plug to Wire Leads. Default: 1m.



Questions

How do I assemble #10 Ring Terminal or 4mm Banana Plug to Grounding Cable?
1. for #10 Ring Terminal, crimp or solder is acceptable. Please choose a suitable crimp tool for crimping connector and cable, or a suitable solder station for soldering.
2. for 4mm Banana Plug, solder is acceptable. Please choose a suitable solder station for soldering.

What if the connector of my transducer/projector is SMA or SMC Connector?
Buyer may order a BNC to SMA (or SMC) adaptor from local electronic distributors in buyer's country. BII may ship the adaptor as accessory of the device. Please discuss with BII for customizations.

What if connectors of my transducers and/or power amplifiers are NOT MIL-5015 type connectors?
The custom-made adaptors are recommended such as MIL-5015 to BNC, MIL-5015 to Underwater connectors, MIL-5015 to XLR, etc. BII can manufacture these adaptors which bridge your devices and BII devices. Please discuss with BII for customizations.

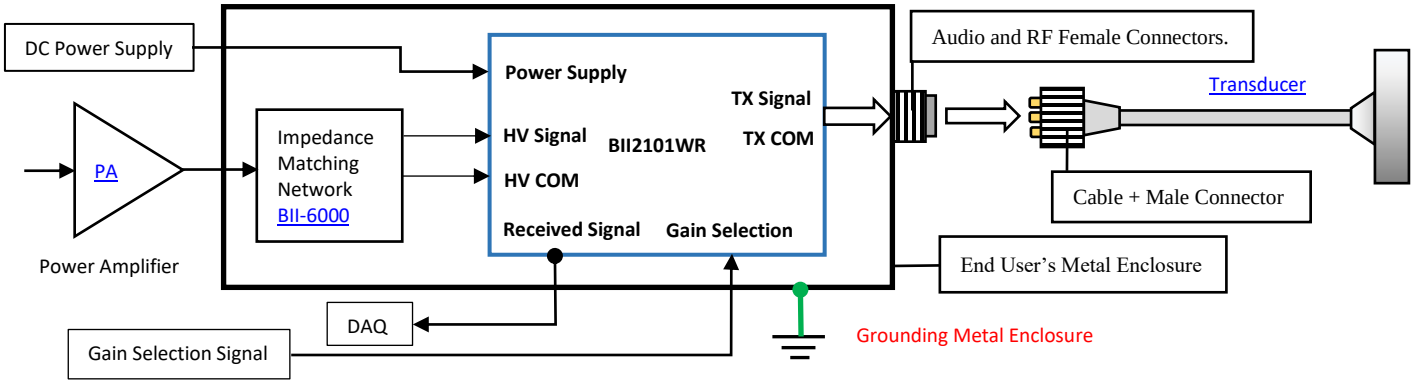
How do I wire BII devices to audio connectors (XLR or TRS) of my recording devices?
BII devices has panel-mount TRS or BNC jack as output connector. The custom-made adaptors are recommended such as BNC to XLR, BNC to TRS, etc. BII can manufacture these adaptors which bridge your devices and BII devices. Please discuss with BII for customizations.

What if my data acquisition device does not have Digital Output for Gain Selection?
Besides Digital Output, the gain selection can be implemented with two switches connecting and disconnecting from A1 to Digital COMMON, and from A0 and Digital COMMON. Please refer to Gain Selection.

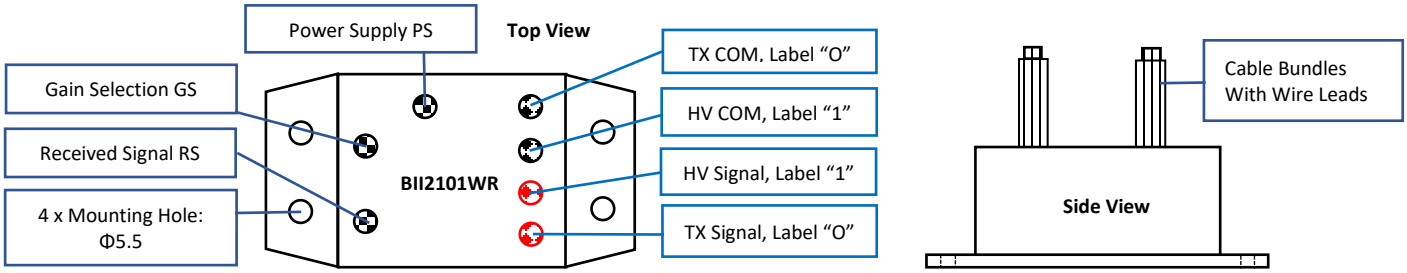
My acoustic applications are in MHz range, are TRS connectors of BII devices suitable for my applications?
Our test shows the TRS connectors (Plug and Jack) of BII preamps can be used up to 20 MHz. Test Conditions: TRS Jack with 0.2m cable and TRS plug with 1m cable. Oscilloscope: 1MΩ||30pF, Signal Source: DDS Signal Generator.

Ordering Information of BII2100 Series.
Power: RMS or Peak Power delivered to Transducer from PA, in RMS Watt (Sine/Chirp Pulses, etc.) or Peak Watt (Spike or Single Pulse for NDT). The POWER can be ignored with blank if RMS power of the transducer and/or the amplifier is known. In these cases, BII will use RMS power of the transducer and/or the amplifier to design the power capacity of the device; $\mathbf{V_{drive}}$: Maximum Driving Voltage to transducer, in Vrms; **PW**: Maximum Pulse Width in µS, mS, or S; **D:** Maximum Duty Cycle in %; **fs:** Transducer Resonance, in kHz or MHz; $\mathbf{Z_{TX}}$**:** Transducer Impedance at fs, in Ω; **θ:** Transducer Phase in °; $\boldsymbol{Z_{IM}}$**:** Impedance for Optimum Power Transfer from the PA to the Transducer, in Ω; **PA**: Power Amplifier; **TX**: Transducer; **PN:** Part Number. **HPF**: -3dB High Pass Filter of Receiving, **LPF**: -3dB Low Pass Filter of Receiving.
Refer to Power Amplifier for available options and wirings. Refer to Transducer for available options and wirings.

1. BII2101WR. T/R Switch Modules as Embedded Components.
System Block Diagram:



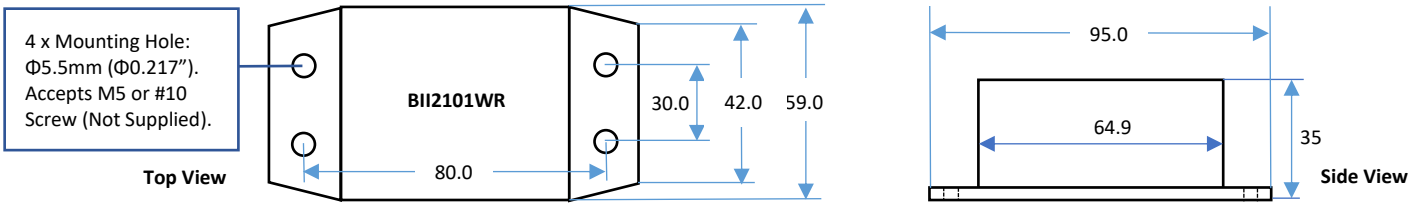
Metal Housing with Cable/Wire Bundles and Wire Leads.



Wirings:

Signals	BII2101WR
HV Signals:	AWG18 Wires + Wire Leads Red Wire, To Signal of High Voltage Source, Label "1". **Black Wire**, To Common of High Voltage Source, Label "1".
TX Signals:	AWG18 Wires + Wire Leads Red Wire, To Signal of Transducer, Label "0". **Black Wire**, To Common of Transducer, Label "0".
Received Signal:	**Single-ended Signal:** RG174/U Coax. **Signal**: Coax Center Wire. **Common**: Coax Shield.
Gain Selection:	**Two Conductor Shielded Cable:** **Digital A1**: White Wire. **Digital A0**: Black Wire. **Digital Common**: Shield.
Power Supply:	DC-PCWL-24. **Two Conductor Shielded Cable**: **+VDC**: Red Wire; **Common**: Black Wire; **Shielding**: Shield.
Install the device into End User's metal enclosure, and grounding metal enclosure for Operating Safety. **All exposed bare wires, metal wires, wire leads, and solders shall be insulated with insulation material such as heat shrink tubing, electric/insulating tape, etc.** **The insulation voltage must be greater than at least TWO TIMES the source voltage.**	

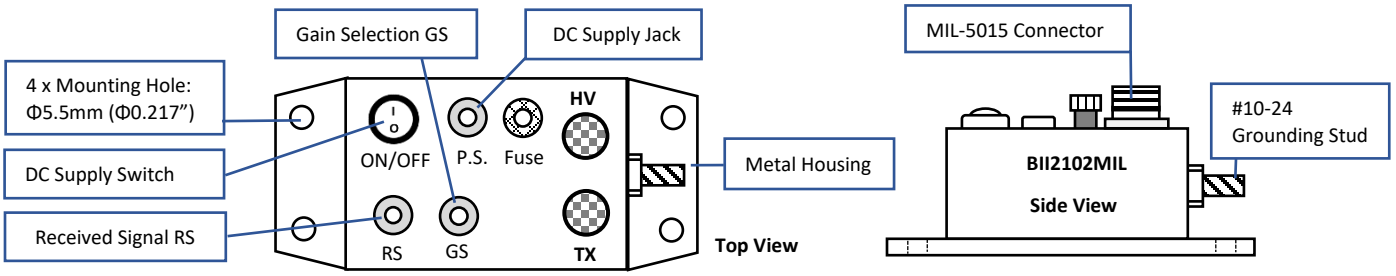
Metal Housings, Outline Dimensions (mm), Illustration only, the scale is not 1:1. LxWxH = 95x59x35 mm.



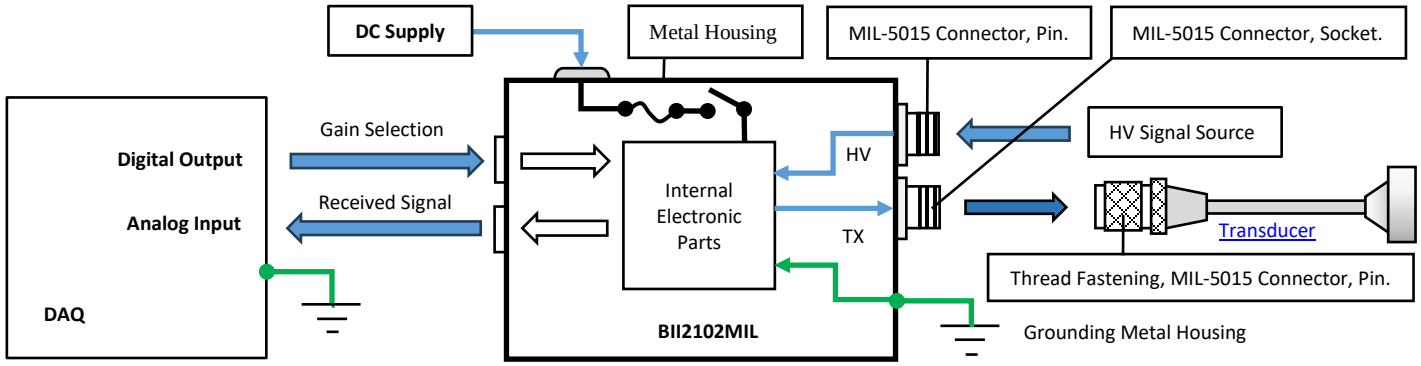
How to Order, refer to Ordering Information of BII2100 Series for explanations of the terms or initials.

BII2101WR, BII2104WR.	-fs	-Z_{TX}	-V_{drive} or BII Power Amplifier	-PW	-D	-HPF/LPF
Example of Part Number:			**Description**			
BII2101WR-30kHz-300Ω-500Vrms-10mS-5%-10kHz/60kHz			BII2101WR, T/R Switch Module, Transducer: 30kHz, 300Ω; Driving Signal to Transducer: 500Vrms, Maximum Pulse Width 10mS, Maximum Duty Cycle 5%; Receiving Bandpass filter: 10kHz to 60kHz.			
Warning: T/R Switch Module will be damaged if the driving signal exceeds Maximum Driving Voltage, Maximum Pulse Width, or Maximum Duty Cycle.						

2. BII2102MIL: Standalone T/R Switch Modules.
HV Connector to High Voltage Source: Panel Mount MIL-5015 Pin. **TX Connector to Transducer:** Panel Mount MIL-5015, Socket.
Metal Enclosure, Overall Size: LxWxH = 146.9x91.7x67 mm. Mounting Hole Φ5.5mm (Φ0.217") accepts M5 or #10 screw. Screws are not supplied.



System Block Diagram and Wirings



Wirings:

Signals	BII2102MIL Standalone T/R Switch Modules		
HV Signals:	**MIL-5015 Style Connector, Panel Mount, 3-Contact Mating Connector, Pin.**		
	Signal of High Voltage Source	Contact C	
	Signal Common of High Voltage Source	Contact B	
	Shielding and Grounding	Contact A	
TX Signals:	**MIL-5015 Style Connector, Panel Mount, 3-Contact Mating Connector, Socket.**		
	Signal of Transducer	Contact C	
	Signal Common of Transducer	Contact B	
	Shielding and Grounding	Contact A	
Received Signal:	**Panel Mount TRS Jack and Inline TRS Plug with 0.6m Two Conductor Shielded Cable.**		
	Signal+	TRS Tip	White Wire
	Signal-	TRS Ring	Red or Black Wire
	Signal Common, Shielding, Grounding.	TRS Sleeve	Shield
Gain Selection:	**Panel Mount TRS Jack and Inline TRS Plug with 0.6m Two Conductor Shielded Cable.**		
	A1	TRS Tip	White Wire
	A0	TRS Ring	Red or Black Wire
	Digital Common, Shielding, Grounding.	TRS Sleeve	Shield
Power Supply:	**Panel Mount Power Jack and DC Supply Cable Pair**: Part Number DC-PPBP-24.		
	+VDC	Center Contact	Red Wire
	Common	Metal Shell Contact	Black Wire
	Shielding and Grounding.	Metal Shell	Shield
DC Supply Switch: Turn ON and Turn OFF DC Supply. **"I" -> ON; "O" -> OFF.**			
Fuse: 0.3A, 250VAC, Slow-Blow, 3AB, 3AG, ¼" x 1-1/4".			
Accessories included: 1. One DC supply cable **DC-PPBP-24.** 2. One Grounding Cable **GWL18**. 3. Two TRS Cables for Gain Selection and Receive Signal **TRS-P-WL-1m.**			
Grounding Metal Case for operating safety. **Grounding Stud:** #10-24 Screw 316SS. Nut and Washer are included.			
When A1 and A0 are open, their TTL/CMOS logic level is High or 1. Receiving Gain is maximum gain 80dB by default.			
1. Install the device to a safe solid object to avoid sliding. An air free-flowing area and good thermal conducting object allow the device to cool down. 2. Never use the device in the event of slide happening, otherwise, loss of the device into water, property damage, and person injury may occur.			

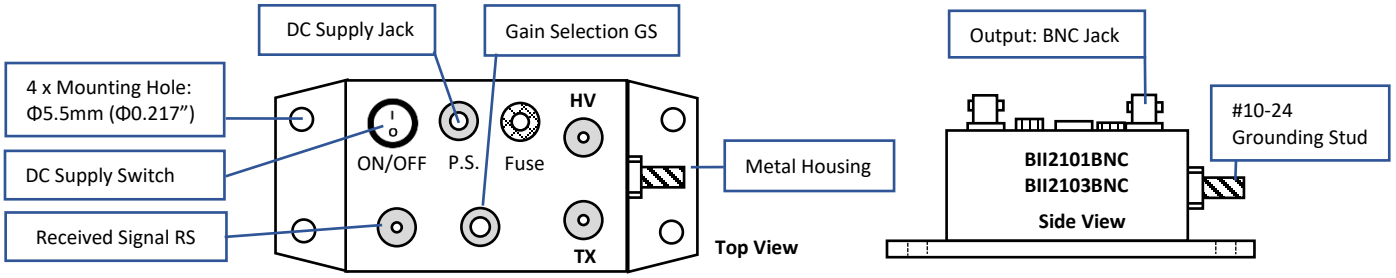
How to Order, refer to Ordering Information of BII2100 Series for explanations of the terms or initials.

BII2102MIL	**-fs**	**-Z_{TX}**	**-V_{drive} or BII Power Amplifier**	**-PW**	**-D**	**-HPF/LPF**
Example of Part Number:			**Description**			
BII2102MIL-30kHz-300Ω-BII5068MIL-100mS-20%-1kHz/100kHz			BII2102MIL, Transducer: 30kHz, 300Ω; Driving Signal to Transducer: BII5068MIL Power Amplifier, Maximum Pulse Width 100mS, Maximum Duty Cycle 20%; Receiving Bandpass filter: 1kHz to 100kHz.			
Warning: The TR Switch will be damaged if the driving signal exceeds Maximum Driving Voltage, Maximum Pulse Width, or Maximum Duty Cycle.						

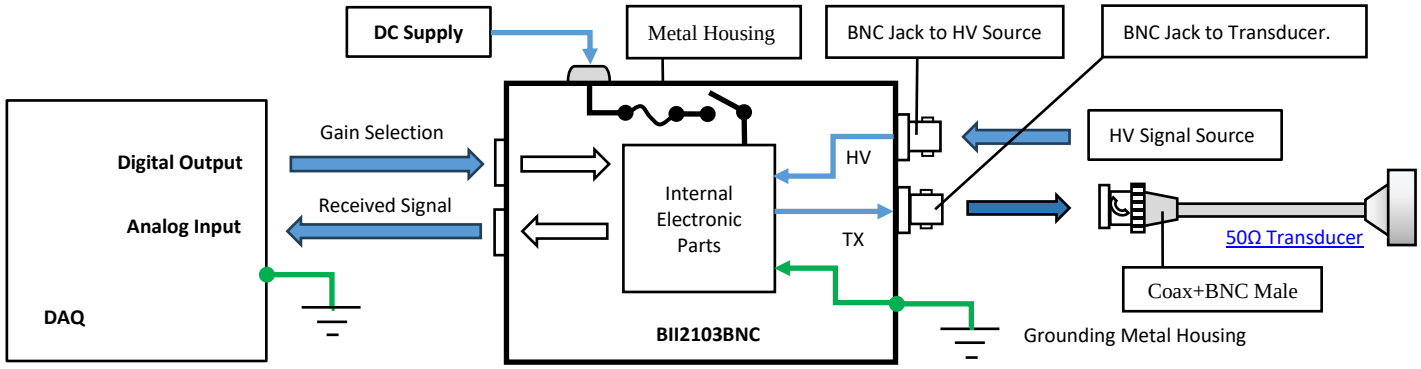
3. BII2101BNC and BII2103BNC: Standalone T/R Switch Modules.

HV Connector to High Voltage Source: Panel Mount BNC Jack. **TX Connector to Transducer**: Panel Mount BNC Jack. **BNC Jack Rating: 500Vrms, 316W.**

Metal Enclosure, Overall Size: LxWxH = 146.9x91.7x67 mm. Mounting Hole Φ5.5mm (Φ0.217") accepts M5 or #10 screw. Screws are not supplied.



System Block Diagram and Wirings



Wirings:

Signals	BII2101BNC and BII2103BNC: Standalone T/R Switch Modules		
HV Signals:	**50Ω BNC Connector, Panel Mount, Jack.**		
	Signal of High Voltage Source	Center Conductor	
	Signal Common of High Voltage Source	Body Metal Shell.	
	Shielding and Grounding	Body Metal Shell.	
TX Signals:	**50Ω BNC Connector, Panel Mount, Jack.**		
	Signal of Transducer	Center Conductor	
	Signal Common of Transducer	Body Metal Shell.	
	Shielding and Grounding	Body Metal Shell.	
Received Signal:	**Panel Mount BNC Jack.**		
	Signal	Center Conductor	
	Signal Common, Shielding, and Grounding	Body Metal Shell.	
Gain Selection:	**Panel Mount TRS Jack and Inline TRS Plug with 0.6m Two Conductor Shielded Cable.**		
	Reserved	TRS Tip	White Wire
	A0	TRS Ring	Red or Black Wire
	Digital Common, Shielding, Grounding.	TRS Sleeve	Shield
Power Supply:	**Panel Mount Power Jack and DC Supply Cable Pair**: Part Number DC-PPBP-24.		
	+VDC	Center Contact	Red Wire
	Common	Metal Shell Contact	Black Wire
	Shielding	Metal Shell	Shield
DC Supply Switch: Turn ON and Turn OFF DC Supply. **"I" -> ON; "O" -> OFF.**			
Fuse: 0.3A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".			
Accessories included: 1. One DC supply cable **DC-PPBP-24.** 2. One Grounding Cable **GWL18**. 3. One TRS Cable for Gain Selection **TRS-P-WL-1m.**			
Grounding Metal Case for operating safety. **Grounding Stud:** #10-24 Screw 316SS. Nut and Washer are included.			
When A1 and A0 are open, their TTL/CMOS logic level is High or 1. Receiving Gain is maximum gain 80dB by default.			
1. Install the device to a safe solid object to avoid sliding. An air free-flowing area and good thermal conducting object allow the device to cool down. 2. Never use the device in the event of slide happening, otherwise, loss of the device into water, property damage, and person injury may occur.			

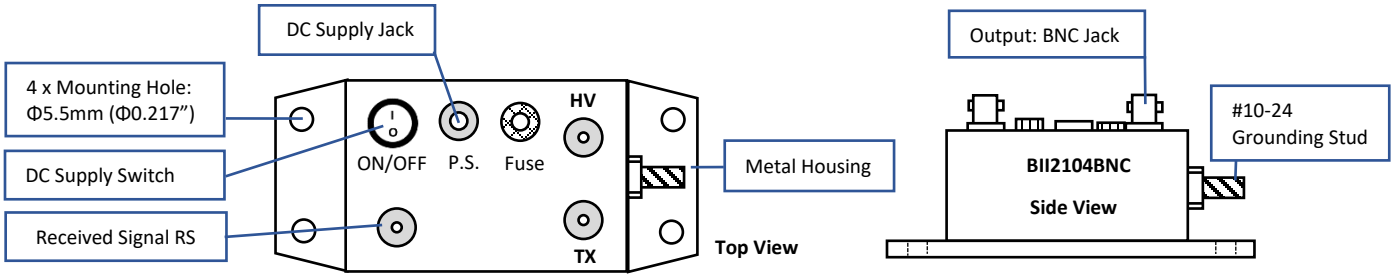
How to Order, refer to Ordering Information of BII2100 Series for explanations of the terms or initials.

BII2101BNC BII2103BNC	**-fs**	**-Z_{TX}**	**-V_{drive} or BII Power Amplifier**	**-PW**	**-D**	**-HPF/LPF**

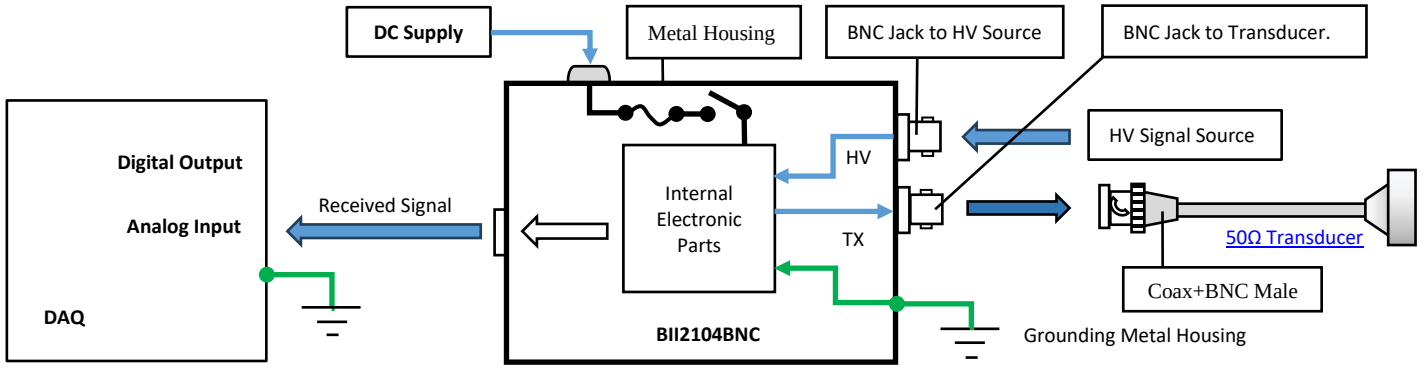
Example of Part Number:	**Description**
BII2101BNC-70kHz-200Ω-200Vrms-100μS-1%-10kHz/200kHz	BII2101BNC, Transducer: 70Hz, Transducer Impedance: 200Ω; Driving Signal to Transducer: 200Vrms, Maximum Pulse Width 100μS, Maximum Duty Cycle 1%; Receiving Bandpass filter: 10kHz to 200kHz.
BII2103BNC-3.5MHz-20Ω-150Vrms-10μS-1%-0.5MHz/10MHz	BII2103BNC, Transducer: 3.5MHz, Transducer Impedance: 20Ω; Driving Signal to Transducer: 150Vrms, Maximum Pulse Width 10μS, Maximum Duty Cycle 1%; Receiving Bandpass filter: 0.5MHz to 10MHz.
Warning: The TR Switch will be damaged if the driving signal exceeds Maximum Driving Voltage, Maximum Pulse Width, or Maximum Duty Cycle.	

4. BII2104BNC: Standalone T/R Switch Modules.

HV Connector to High Voltage Source: Panel Mount BNC Jack. **TX Connector to Transducer**: Panel Mount BNC Jack. **BNC Jack Rating: 500Vrms, 316W.**
Metal Enclosure, Overall Size: LxWxH = 146.9x91.7x67 mm. Mounting Hole Φ5.5mm (Φ0.217") accepts M5 or #10 screw. Screws are not supplied.



System Block Diagram and Wirings



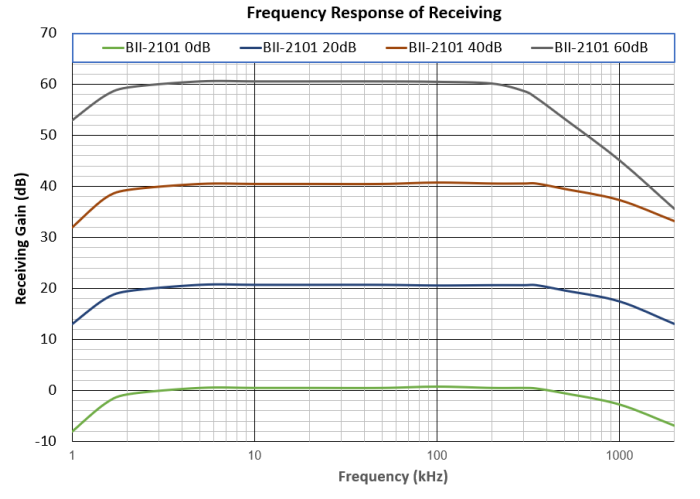
Wirings:

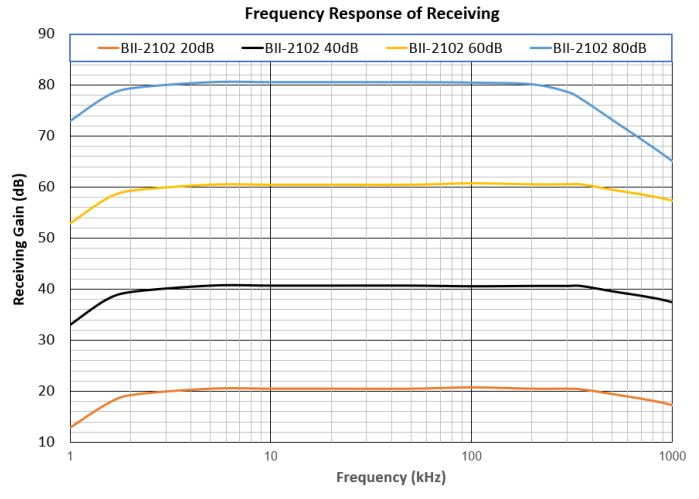
Signals	BII2104BNC Standalone T/R Switch Modules		
HV Signals:	**50Ω BNC Connector, Panel Mount, Jack.**		
	Signal of High Voltage Source	Center Conductor	
	Signal Common of High Voltage Source	Body Metal Shell.	
	Shielding and Grounding	Body Metal Shell.	
TX Signals:	**50Ω BNC Connector, Panel Mount, Jack.**		
	Signal of Transducer	Center Conductor	
	Signal Common of Transducer	Body Metal Shell.	
	Shielding and Grounding	Body Metal Shell.	
Received Signal:	**Panel Mount BNC Jack.**		
	Signal	Center Conductor	
	Signal Common, Shielding, and Grounding	Body Metal Shell.	
Power Supply:	**Panel Mount Power Jack and DC Supply Cable Pair**: Part Number DC-PPBP-24.		
	+VDC	Center Contact	Red Wire
	Common	Metal Shell Contact	Black Wire
	Shielding	Metal Shell	Shield
DC Supply Switch: Turn ON and Turn OFF DC Supply. **"I" -> ON; "O" -> OFF.**			
Fuse: 0.3A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".			
Accessories included: 1. One DC supply cable **DC-PPBP-24.** 2. One Grounding Cable **GWL18**.			
Grounding Metal Case for operating safety. **Grounding Stud:** #10-24 Screw 316SS. Nut and Washer are included.			
When A1 and A0 are open, their TTL/CMOS logic level is High or 1. Receiving Gain is maximum gain 80dB by default.			
1. Install the device to a safe solid object to avoid sliding. An air free-flowing area and good thermal conducting object allow the device to cool down. 2. Never use the device in the event of slide happening, otherwise, loss of the device into water, property damage, and person injury may occur.			

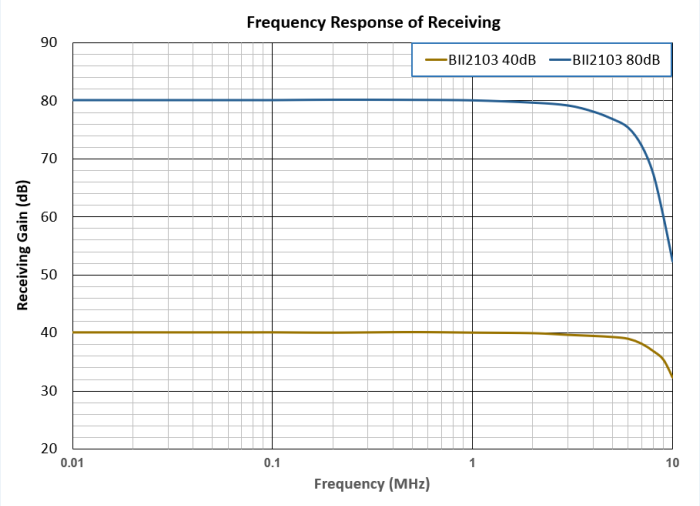
How to Order, refer to Ordering Information of BII2100 Series for explanations of the terms or initials.

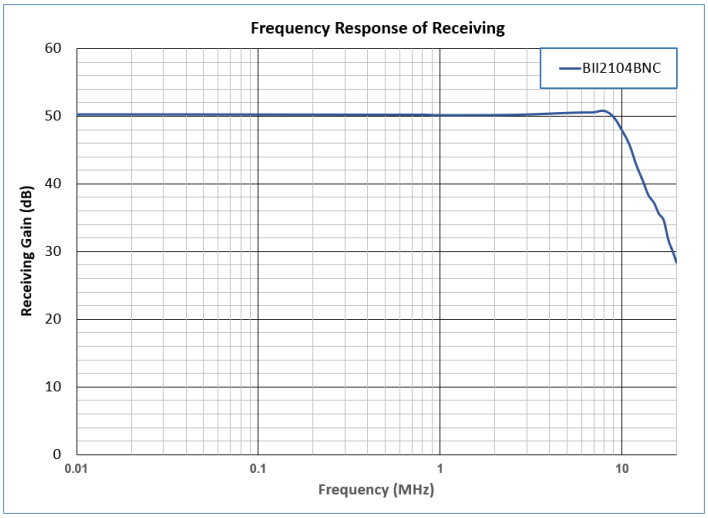
BII2104BNC	-fs	-Z_{TX}	-V_{drive} or BII Power Amplifier	-PW	-D	-HPF/LPF
Example of Part Number:			**Description**			
BII2103BNC-3.5MHz-20Ω-150Vrms-100μS-1%-0.5MHz/10MHz			BII2103BNC, Transducer: 3.5MHz, 20Ω; Driving Signal to Transducer: 150Vrms, Maximum Pulse Width 100μS, Maximum Duty Cycle 1%; Receiving Bandpass filter: 0.5MHz to 10MHz.			
Warning: The TR Switch will be damaged if the driving signal exceeds Maximum Driving Voltage, Maximum Pulse Width, or Maximum Duty Cycle.						

Frequency Response of Receiving Gain









Metal Housings, Outline Dimensions (mm), Illustration only, the scale is not 1:1.