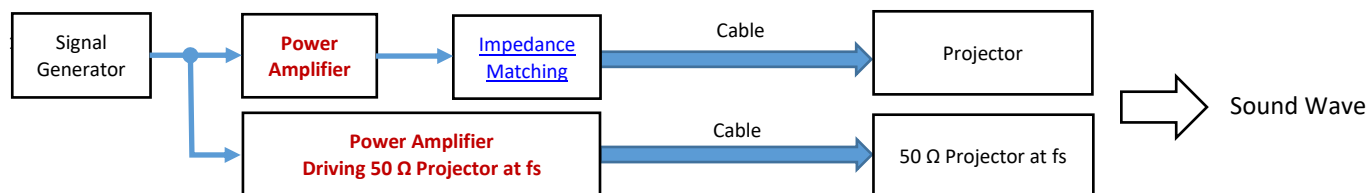


BII5120 Series Power Amplifier

DESCRIPTION

BII5120 series 2 MHz linear power amplifiers drive acoustic transducers to generate sounds (acoustic waves) in water, air, and solids.

SYSTEM CONFIGURATION




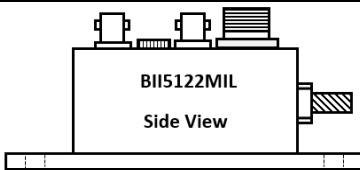
TYPICAL APPLICATIONS

Image Sonar, NDT, HIFU Transducer	Communication, Modem, Beacon, Positioning, Chirp, FSK, PSK and Spread Spectrum System
Underwater Sound Velocimeter/Sound Velocity Probe	Phantom Echo Generation, Phantom Clicks, Sound Playback, Bioacoustics, Acoustic Deterrent
Distance Gage, Echo Sounding	Navigation, Obstacle Avoidance/Tracking, Inspection and Survey

ABSOLUTE MAXIMUM RATINGS

DC Supply Voltage:	+36 VDC
Output Peak Current:	12 A at Pulse Width ≤ 6 mS, Duty Cycle ≤ 50%
Shut-down Control Voltage:	-20 to +20 VDC
Input Voltage:	20 Vpp

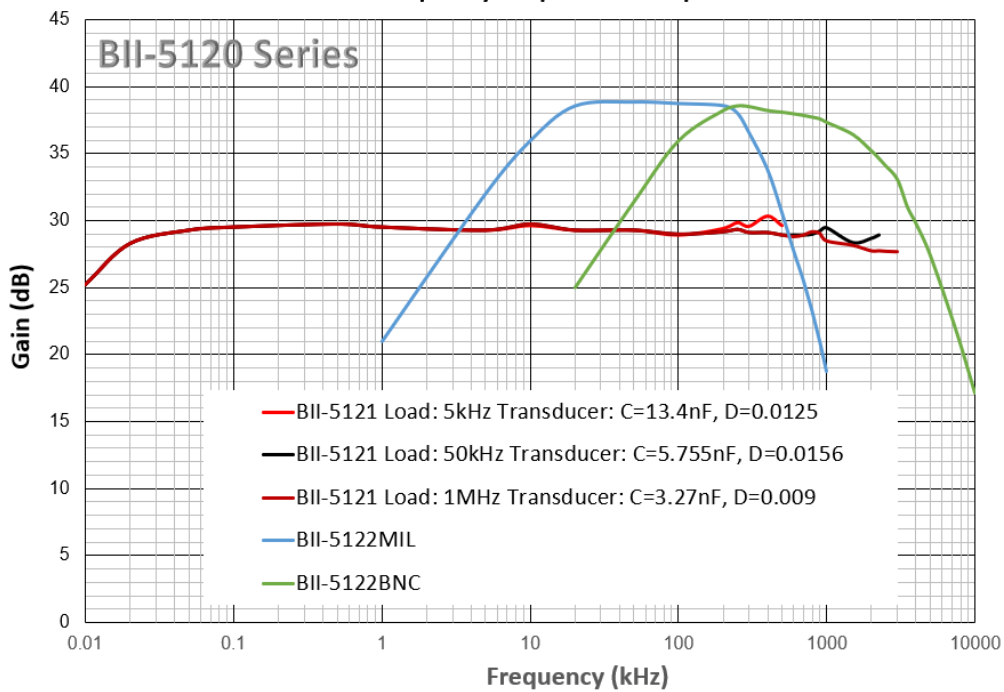
SPECIFICATIONS

	BII5121	BII5122MIL	BII5122BNC
Power Amplifier			
Status:	ACTIVE	ACTIVE	
Waterproof:	Not waterproof. Always use the device in Dry Air for electrical safety.		
Signal Type:	Voltage Spikes, SINE Pulse/Burst, Chirp/FM, FSK and PSK, Arbitrary Waveform, Spread Spectrum, Marine Animal Sound, Continuous Signals, etc.	Pulse Signal Only: Duty Cycle D ≤ 25%, Pulse Duration PD ≤ 10 Seconds.	
Source Level Capability:	189.2 + DI, in dB re μPa at 1m, in Water. DI: Directivity Index, in dB.		
Gain:	29.5 dB or 30	38.8 dB or 87	
Input Type:	Single ended		
Input Impedance:	1 kΩ 6 pF		
Maximum Input Level:	Maximum Output Level/Gain, or 2Vpp, whichever is less.		
Output Type:	Differential	Single Ended	
Voltage Output:	Maximum $V_{Omax} = (Vs - 4) \text{ in } Vp, \text{ or } (2 * Vs - 8) \text{ in } Vpp.$		Input Level * Gain, or 174 Vpp.
Current Output:	$I_{Omax} = 10 \text{ A peak, maximum.}$		$I_{Omax} = 3.46 \text{ A peak, maximum.}$
Load:	Minimum Load: $R_{min} = (V_{Omax} \text{ in } Vp) / (I_{Omax} \text{ in } Ap).$		50Ω Transducers
Shut-down Switch:	OFF Position: Output Enabled. Operates normally. DIO Position: TTL/CMOS Logic High: Output Enabled. TTL/CMOS Logic Low: Output Disabled.		N/A
Stand-by Control Voltage: (Shutdown)	TTL/CMOS Compatible. Logic Low "0": Output Disabled. Logic Low "0": 0 to +0.8 VDC. Logic High "1": Output enabled. Logic High "1": +0.8 to +5 VDC. Warning: Control voltage higher than +20VDC or lower than -20VDC will damage the device.		
Output Disable Time:	1 μS		
Output Enable Time:	1 μS		
Power Bandwidth (-3dB):	20 Hz to 2 MHz, Refer to Gain-Frequency Response .	20 to 200 kHz	100 kHz to 2 MHz
RMS Power Capability:	18 W@+12 VDC Power Supply. 78 W@+24 VDC Power Supply. 133 W@+35 VDC Power Supply.		
Power Efficiency:	Driving Tuned Transducers (Resistive load). At max. output current: 49% at +12 VDC. 64% at +24 VDC. 67% at +32 VDC. Driving Untuned Transducers: Power Efficiency of driving tuned transducers*cosθ. θ: Impedance Phase of Untuned Transducers.		
Grounding Terminal:	ONLY for Standalone Device BII5122MIL and BII5122BNC: Grounding Stud, Two #10-24 nuts and Two #10 washers are included. Support Single-Point Grounding with Multiple Devices. Grounding Cable GWL18, 0.6m AWG18 Green Wire with #10 Ring Terminal and Wire Lead. One #10 washer and one 4mm Banana Plug (Green) included.		
Supply Voltage Vs:	+8 to +35 VDC.		
Suggested DC Supply	Marine Battery, Automobile Battery, or DC Power Supply with Grounded Output and Protection of Output Current Limit.		

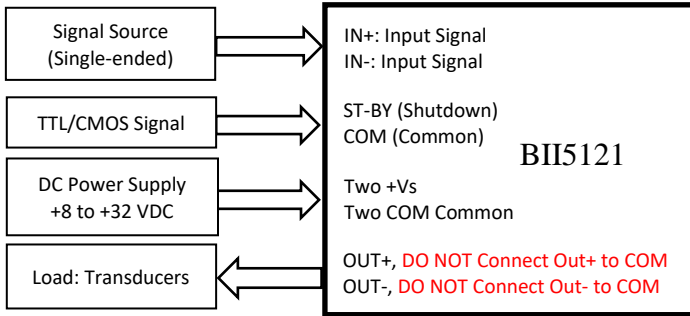
	Fully charged 12V Automobile or Marine Battery are from 12.6 to 14.4 VDC. Ensure that voltage of battery pack is less than maximum DC supply voltage.	
Quiescent Current:	Active: 65 mA. Stand-by (Shut-down): 6 mA.	
Fuse:	None	Installed.
Cable:	6" or 0.15m wires, AWG16.	1. DC Power Supply Cables: DCBP18 . 2. Grounding Cable: GWL18 .
Connector:	Wire Leads	Panel Mount
Mounting Holes:	4 x Φ 4.87 mm through-holes	4 x Φ 5.5mm (Φ 0.217")
Package:	PCB	Metal Enclosure
Size:	Round PCB, Φ DxH = Φ 101.6x48 mm	LxWxH=180.5x110.3x75 mm
Weight in Air:	230 grams	0.8 kg 0.7 kg
Operating Temperature:	-20 to 70°C or -4 to 158°F	
Storage Temperature:	-20 to 70°C or -4 to 158°F	
Note: Forced-air cooling by a fan is recommended to cool down the amplifier (PCB Package) during service of full power and continuous waveform.		
WARNING: The buyer should observe 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.		

Gain-Frequency Response

Frequency Response of Amplifier



BI15121 SUGGESTED WIRING:



Configurations of ST-BY SWITCH (Shutdown SWITCH)		
OFF Position	DIO Position	
Output Enabled. Operates normally.	TTL/CMOS Logic High: Output Enabled.	TTL/CMOS Logic Low: Output Disabled.
	When the Switch is open, the logic = "0" or low.	

WARNING:

Outputs of the Power amplifier are differential, DO NOT Connect Out + or Out - to COM.

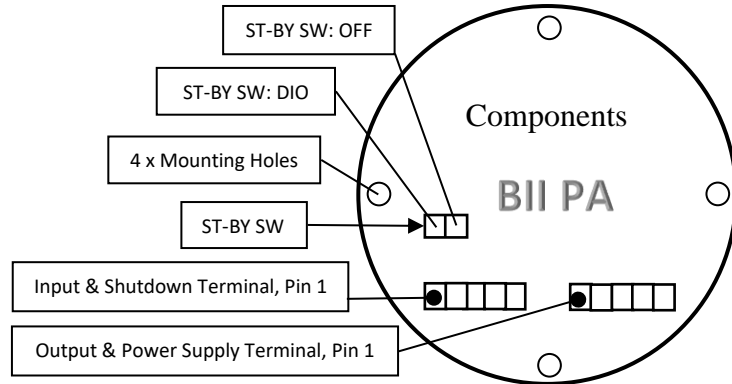
BI15121 TERMINALS and WIRINGS

Input and ST-by (Shutdown) Terminal

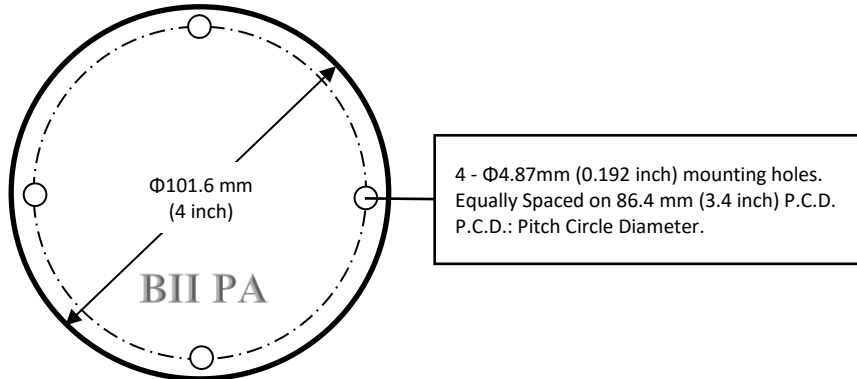
Pin 1: ST-BY (Shutdown)	White,	6" Wire
Pin 2: COM (Common)	Black,	6" Wire
Pin 3: IN+ (Input Signal)	Blue,	6" Wire
Pin 4: IN- (Input Common)	Yellow,	6" Wire
Pin 5: COM (Common)	Black,	6" Wire

Output and Power Supply Terminal

Pin 1: +Vs	Red,	6" Wire
Pin 2: +Vs	Red,	6" Wire
Pin 3: COM (Common)	Black,	6" Wire
Pin 4: OUT+	Blue,	6" Wire
Pin 5: OUT-	Yellow,	6" Wire



BI15121 Physical Size (unit mm): $\Phi D \times H = \Phi 101.6 \times 48 \text{mm}$



BI15121 SHIPMENT:

- | | |
|---|---------|
| 1. Assembled board | Qty.: 1 |
| 2. Input and ST-BY Plug with 6" wires | Qty.: 1 |
| 3. Output and Power Supply plug with 6" wires | Qty.: 1 |

How to Extend Input and Output Wires of BII Power Amplifiers (PCB Package for Embedded Applications.)?

Input and output wires of BII PA (PCB Package) are 0.15m (6") **AWG16** wires with wire leads.

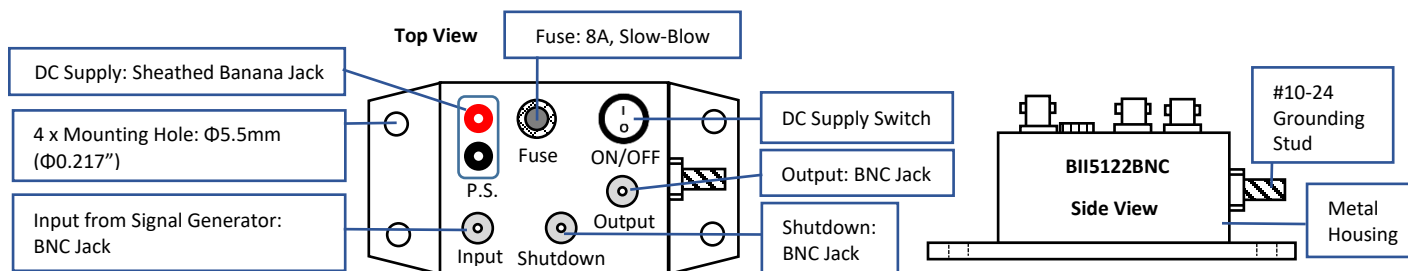
- Butt Splice Connectors, Fully Insulated.** Buyers shall refer to the instructions of the manufacturer to strip proper wire leads and crimp the connector for secure connection. If possible, **heat shrink tube** is recommended to sheath the splice and function as strain relief.
- Banana Jack and Plug, Fully Insulated, Free Hanging (In-Line).** Crimp or Solder. Crimp is recommended.

Note:

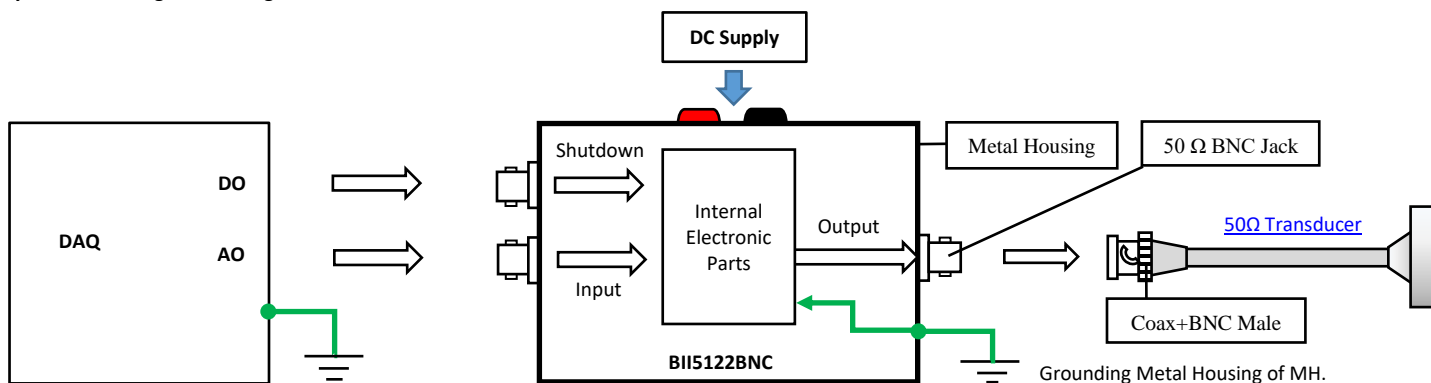
- by default, BII does NOT provide these connectors. If buyer needs connectors, please specify when ordering.
- When wiring, please ensure insulation (avoid short circuit to damage the devices) and safety of operation.**

BI15122BNC: Output Connector: BNC Jack.

Metal Enclosure, Overall Size: LxWxH = 180.5x110.3x75mm. Mounting Hole Φ 5.5mm (Φ 0.217") accepts M5 or #10 screw. Screws are not supplied.



System Block Diagram: Driving 50 Ω Transducer with BNC Male.



DAQ	BI15122BNC			50 Ω Transducer
Unknown Connector	Shutdown: BNC Jack	Input: BNC Jack	Output: BNC Jack	Coax + In-line BNC (Male)
Digital Output	Center Contact	---	---	---
Digital Common	Body	---	---	---
Analog Output	---	Signal: Center Contact	Output Signal: Center Socket.	Signal: Center Pin.
Analog Common	---	Grounded Common: Body	Grounded Common: Body.	Grounded Common: Body.

DC Power Supply: **Red Sheathed Banana Jack: +VDC. Black Sheathed Banana Jack: Common of the DC Power Supply.**

DC Supply Switch: Turn ON and Turn OFF DC Supply.

Fuse: 8A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".

Accessories: 1. Included: Two DC supply cables, Part Number: **DCBP18**. 2. Included: One Grounding Cable, Part Number: **GWL18**. 3. Not included: MIL-5015 Connector with Pins. Order Separately.

Grounding Metal Case for operating safety. Grounding Stud: #10-24 Screw 316SS. Nut and Washer are included.

When "Shutdown" BNC jack is open, its TTL/CMOS logic level is LOW or 0, and the output is disabled.

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.

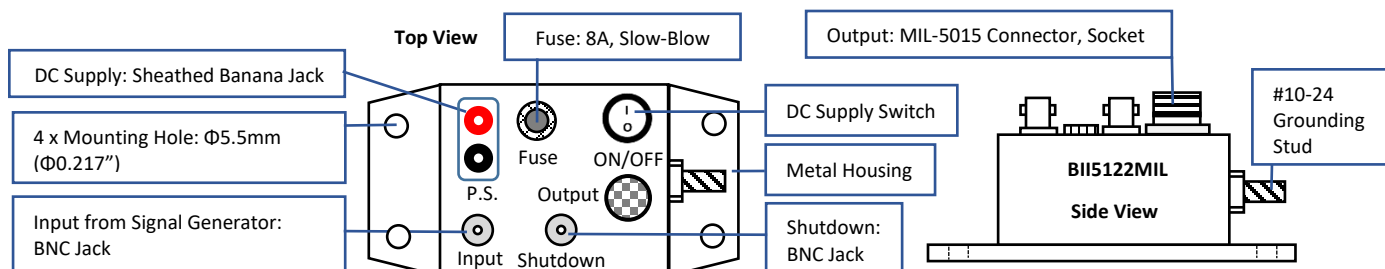
2. Never use the device in the event of slide happening, otherwise, loss of the device into water, property damage, and person injury may occur.

Customer's Question: What if the connector of my transducer/projector is SMA or SMC Connector?

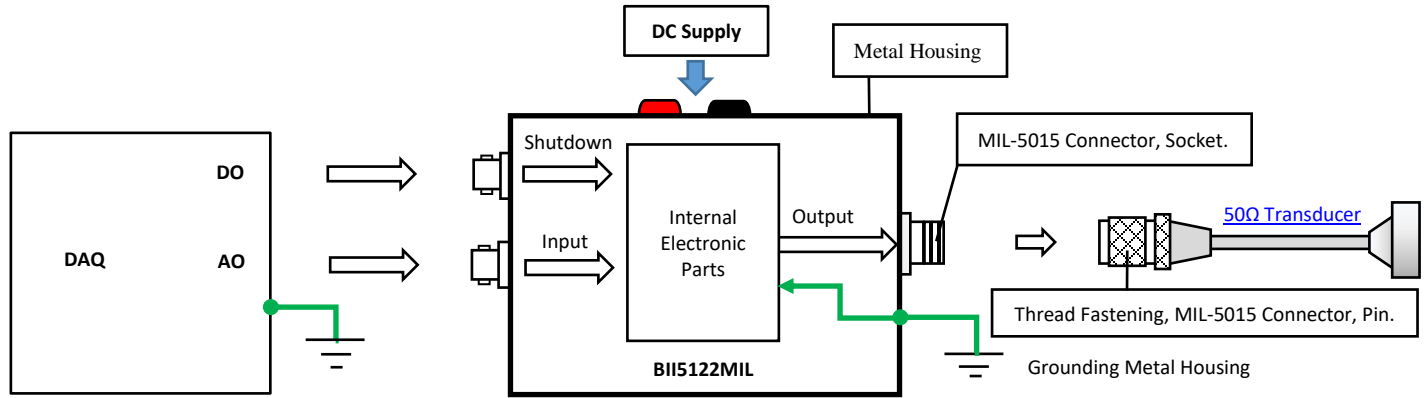
BII Answers: Buyer may order a BNC to SMA (or SMC) adaptor from local electronic distributors in buyer's country. BII may ship the adaptor as accessory of the device. Please discuss with BII for customizations.

BI15122MIL: Output Connector: MIL-5015 Connector, Socket.

Metal Enclosure, Overall Size: LxWxH = 180.5x110.3x75mm. Mounting Hole Φ 5.5mm (Φ 0.217") accepts M5 or #10 screw. Screws are not supplied.



System Block Diagram and Wirings: Driving 50Ω Transducer with MIL-5015 Connector, Pin.



Buyer's DAQ	BII5122MIL			Buyer's 50 Ω Transducer
Unknown Connector	Shutdown: BNC Jack	Input: BNC Jack	Output: MIL-5015 Connector, Socket.	Cable + In-line MIL-5015 (Pin)
Digital Output	Center Contact	---	---	---
Digital Common	Body	---	---	---
Analog Output	---	Signal: Center Contact	Output Signal: Socket C Common: Socket B	Signal: Pin C Common: Pin B
Analog Common	---	Grounded Common: Body	Grounding: Socket A	Grounding: Pin A
DC Power Supply: Red Sheathed Banana Jack: +VDC. Black Sheathed Banana Jack: Common of the DC Power Supply.				
DC Supply Switch: Turn ON and Turn OFF DC Supply. "I" -> ON; "O" -> OFF.				
Fuse: 10A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".				
Accessories: 1. Included: Two DC supply cables, Part Number: DCBP18 . 2. Included: One Grounding Cable, Part Number: GWL18 . 3. Not included: MIL-5015 Connector with Pins. Order Separately.				
Grounding Metal Case for operating safety. Grounding Stud: #10-24 Screw 316SS. Nut and Washer are included.				
When "Shutdown" BNC jack is open, its TTL/CMOS logic level is LOW or 0, and the output is disabled.				
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.				

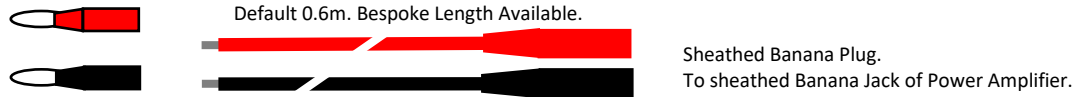
Customer's Question: What if the connector of my transducer/projector is NOT MIL-5015 Connector with Pins?

BII Answers: Buyer may order a MIL-5015 Connector (Pins) from BII to replace original transducer connector or use it as a component of the connector adaptor. MIL-5015 Connector has solder contacts. Buyer may also order the connector from local electronic distributors in buyer's country. For example, if you have a transducer with Underwater connector (pin), you may make a connector adaptor from MIL-5015 (pin) to Underwater connector (Socket). BII may make this connector adaptor as accessory of the device. Please discuss with BII for customizations.

DC Supply Cable Pair: Part Number DCBP18.

To Terminals of DC Supply:

- a. Default: Wire Lead
- b. One Red 4mm Banana Plug.
- c. One Black 4mm Banana Plug.

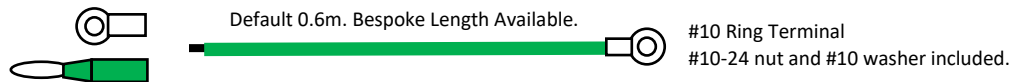


Two 0.6m DC supply cables. Red and Black. One end of the cable is wire-lead, another end is Sheathed Banana Plug. One pair banana plugs (Red and Black) are included. Depending on output terminals of buyer's DC Supply, buyer assembles Banana Plugs, or other type of connectors to DC supply cable at buyer's cost.

Grounding Cable and Terminals

Terminal to buyer's Grounding Terminal:

- a. Default: Wire Lead
- b. One #10 Ring Terminal
- c. One 4mm Banana Plug



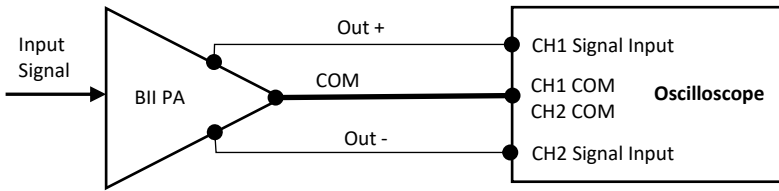
Grounding Cable, Part Number: GWL18, Support Single-Point Grounding with Multiple Devices.

One 0.6m AWG 18 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 of connectors to grounding cable at buyer's cost.

How to Order

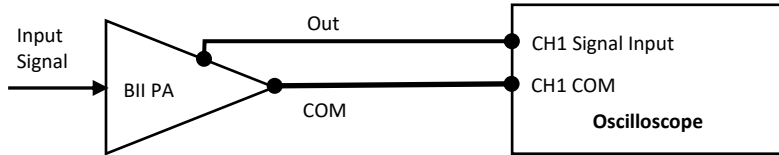
BII5122MIL, BII5122BNC	-fs: frequency of a 50Ω Transducer. the transducer is 50Ω at fs, and generally its TVR is maximum at fs.
Example of Part Number:	Description
BII5122MIL-100kHz	BII5122MIL, Linear Power Amplifier, operating frequency fs of 50Ω Transducer: 100kHz.

Measure Differential Output of BII Power Amplifiers



Warning: Outputs of the Power amplifier are differential, DO NOT Connect Out + or Out - to any COM.

Measure Single Ended Output of BII Power Amplifiers



Warning:

1. Outputs of the power amplifier is high voltage, choose suitable oscilloscope probe with correct attenuation and voltage rating.
2. for operating safety, ensure proper grounding, and shut down power supply of the device before handing the cables, wiring and hookup, etc.

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

