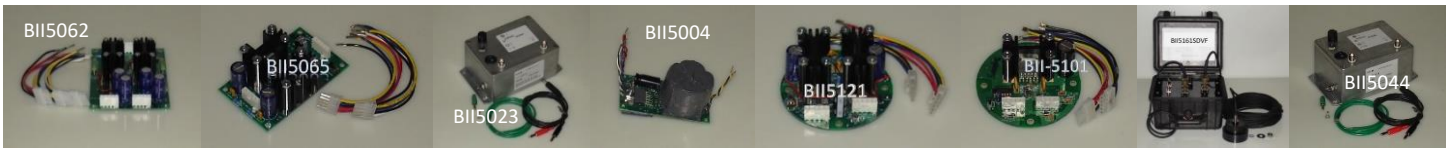


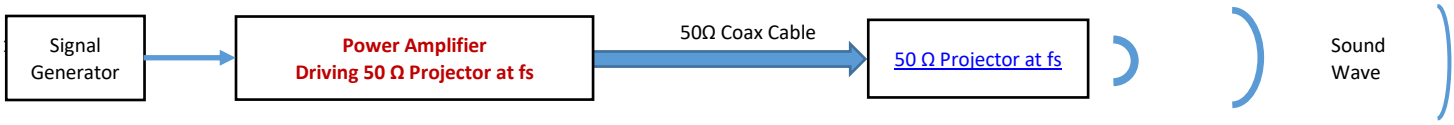
BII5040 Series Power Amplifier

DESCRIPTION

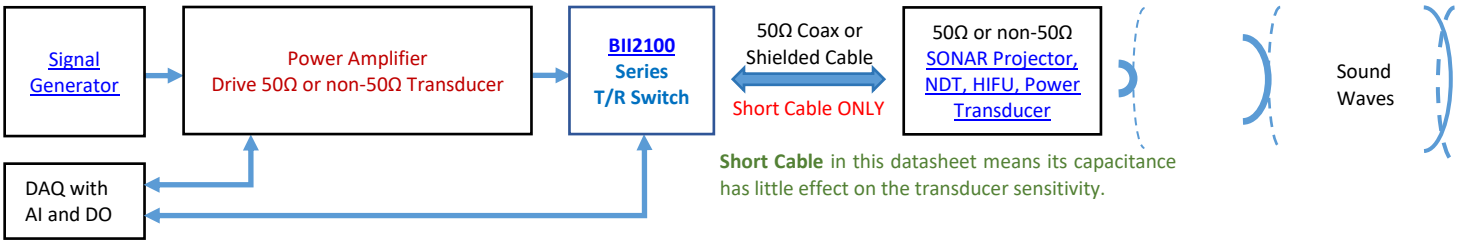
BII5040 series linear power amplifiers are ideal to drive 0.1 to 10MHz piezoelectric transducers for acoustic pulsing systems of underwater, air, and ultrasonics (solids).

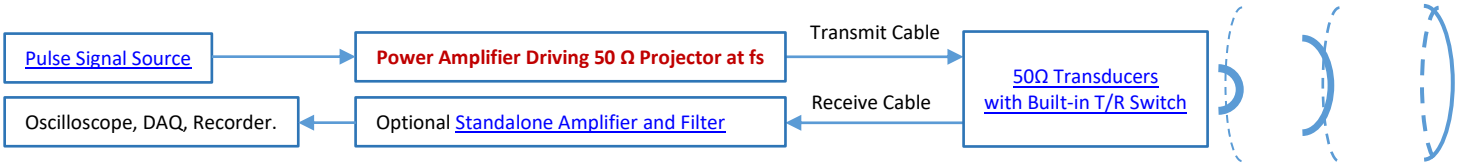
SYSTEM CONFIGURATION

(a) Transmitting Sounds.



(b) Transmitting and Receiving Sounds.





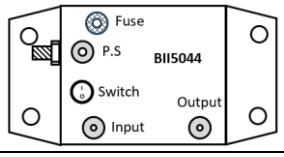
APPLICATIONS

Driving Ultrasonic Transducers: SONAR, NDT, and HIFU.	Short Range Echosounding/Navigation, Sound Velocity Probe, Distance Gage, Altimeter.

ABSOLUTE MAXIMUM RATINGS

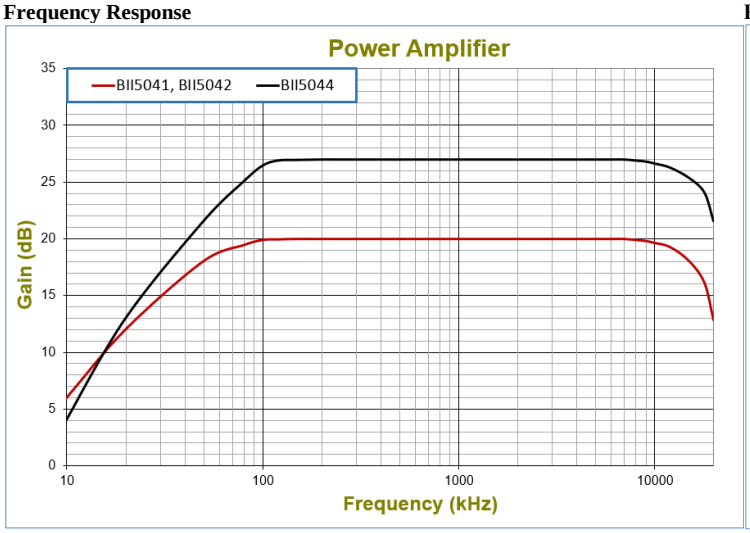
DC Supply Voltage:	+36 VDC
Input Voltage:	10 Vpp
Output Peak Current:	2 A
Shut-down Control Voltage:	-0.2 to +12 VDC

SPECIFICATIONS

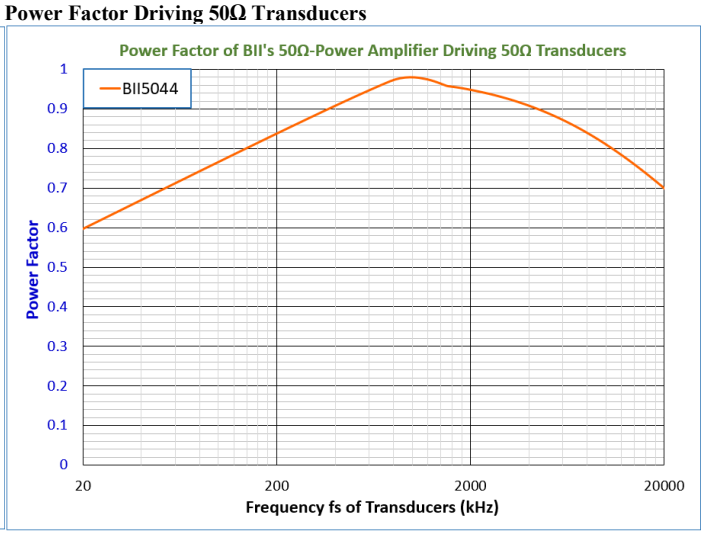
	BII5042	BII5041	BII5044
Power Amplifier			
Status:	**ACTIVE**	**ACTIVE**	**ACTIVE**
	ACTIVE: Product device recommended for new designs. **LIFEBUY**: BII has announced that the device will be discontinued, and a lifetime-buy period is in effect. **OBSOLETE**: BII has discontinued the production of the device.		
Waterproof:	Not waterproof. **Always use the device in Dry Air for electrical safety.**		
Operating Frequency: (Small Signal)	50 kHz to 15 MHz		50 kHz to 10 MHz
	Small Signal: Load ≥ 100Ω, Output Voltage ≤ Half V_{omax}, Output Current ≤ Half I_{omax}.		
	Warning: the device performance degrades if operating frequency less than Minimum Operating Frequency.		
Signal Type:	Voltage Spikes, Sine Pulse/Burst, Chirp/FM Pulse, Spread Spectrum, FSK and PSK Signals, Continuous Signal CW, etc.	**Pulsed Signals** ONLY to avoid overheat and damage. **Pulse Width PW** ≤ 100 mS, and **Duty Cycle D** ≤ 25%.	Voltage Spikes, Sine Pulse/Burst, Chirp/FM Pulse, Spread Spectrum, FSK and PSK Signals, Continuous Signal CW, etc.
Source Level Capability: (in Water)	182.7 + DI		
	in dB re µPa at 1m. **DI**: Directivity Index (dB) of the transducer.		
Operating Mode:	Linear		
Impedance Matching:	No Built-in Impedance Matching.		Built-in Impedance Matching.
Gain:	20 dB or x10	20 dB or x10	27dB or x22.4
Input Type:	Single ended	Single ended	Single ended

Input Connector:	On-board	None, Wire Bundles.	BNC Jack
Input Impedance:	200 Ω || 4pF	200 Ω || 4pF	200 Ω || 4pF
Maximum Input Voltage:	Max. Output Voltage Vomax/Gain, in Vpp, or 5Vpp, whichever is less.		
Output Type:	Differential	Differential	Single ended
Output Connector:	On-board	None, Wire Bundles.	BNC Jack
Output Voltage:	V_{omax}=(Supply Voltage V_s – 7), in Vp.		112 Vpp@+32 VDC. 76.2 Vpp@+24 VDC.
Output Current:	Io ≤ 2.0 A		Io ≤ 0.9 A
Load:	≥ Vo/Io or 10 Ω, whichever is greater.		Driving 50 Ω Transducers.
Shut-down Control:	On-board ON/OFF Switch: Manually or Digitally	Digital Output or Not Used	Not used
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	Not used
Shut-down Voltage:	TTL/CMOS Compatible: **Shut-down**: Logic Low or 0 to +0.4 VDC. **Active**: Logic High or +0.8 to +5 VDC.		Not Applicable
Output Disable Time:	1 µS		
Output Enable Time:	3 µS		
Power Bandwidth (-3 dB):	100 kHz to 10 MHz		
RMS Power Capability:	**SINE CW, SINE Pulse and Arbitrary Pulsing Waveform, etc.:** 14.5 W @ V_s = +24 VDC. 31.3 W @ V_s = +32 VDC.	**Voltage Spikes and Single Pulse:** 29 W @ V_s = +24 VDC. 62 W @ V_s = +32 VDC	
Power Efficiency: **(at max. output current)**	Driving Tuned Transducers (Resistive load): 50% at +24 VDC. 56% at +32 VDC.		
	Driving Untuned Transducers: Power Efficiency of driving tuned transducers*cosθ. θ: Impedance Phase of Untuned Transducers.		
Supply Voltage V_s:	+12 to +32 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:	**Shut-down**: 0.8 mA. **Active**: 53 mA.		53 mA
DC Supply Connector:	On-board	None, Wire Bundle.	DC Power Jack.
Fuse:	N/A		2.5A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".
Accessory Cable:	0.15m or 6" wires	60 mm wires	1. DC Power Supply Cables: **DCBP24**.
Cable Connector:	Wire Leads	Wire Leads	2. Grounding Cable: **GWL18**.
Package:	PCB	PCB	Metal Enclosure
Grounding Terminal:	N/A	N/A	Grounding Stud #10-24.
Mounting Holes:	4 x Φ4.87mm	4 x Φ3.2mm	4 x Φ5.5mm Mounting Holes. Accept M5 and #10 Screws.
Physical Size (mm):	Round PCB: ΦDxH = Φ101.6x50.8	Rectangular PCB: LxWxH = 68.6x36.1x36.3	Metal Enclosure: LxWxH = 180.5x110.3x75
Weight in Air:	53 grams	13 grams	1.2 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 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.			

Frequency Response

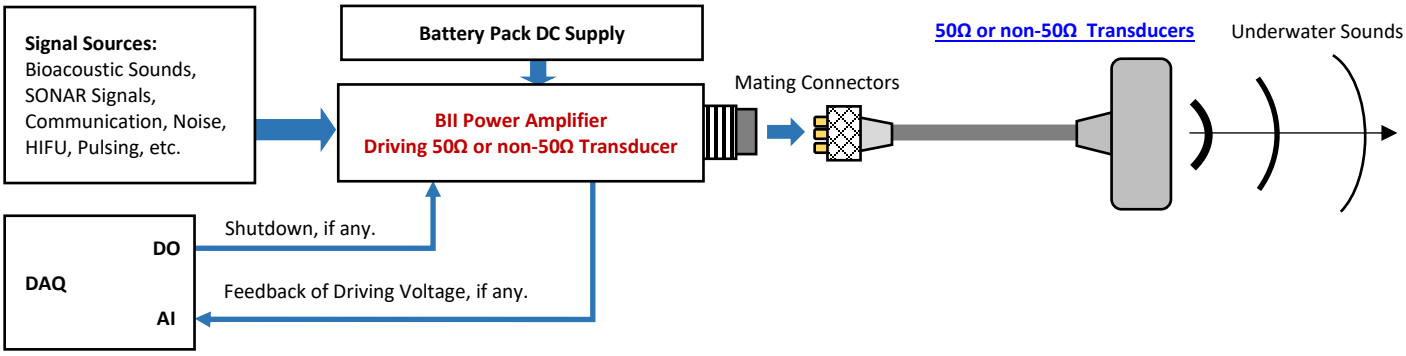


Power Factor Driving 50Ω Transducers

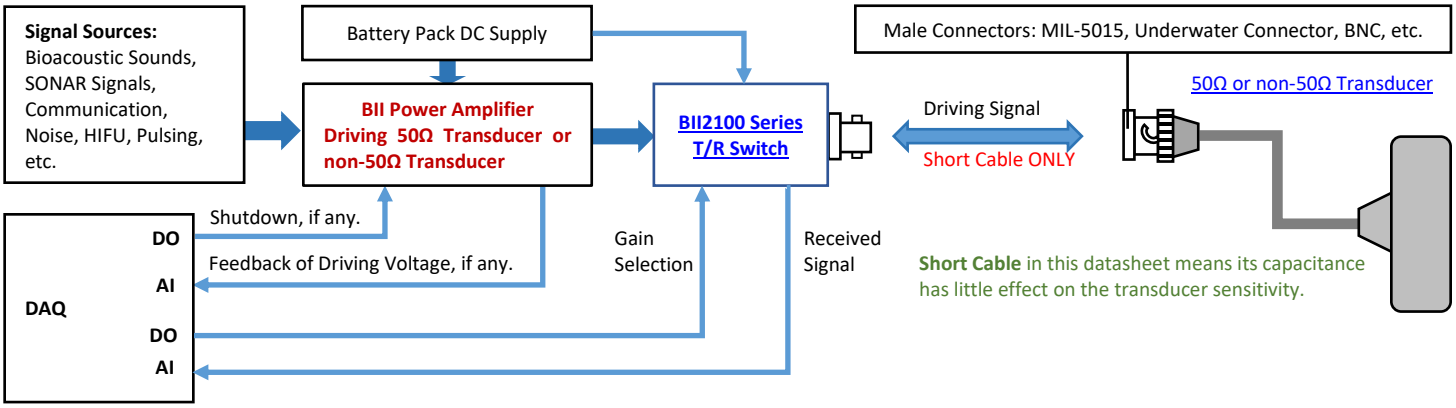


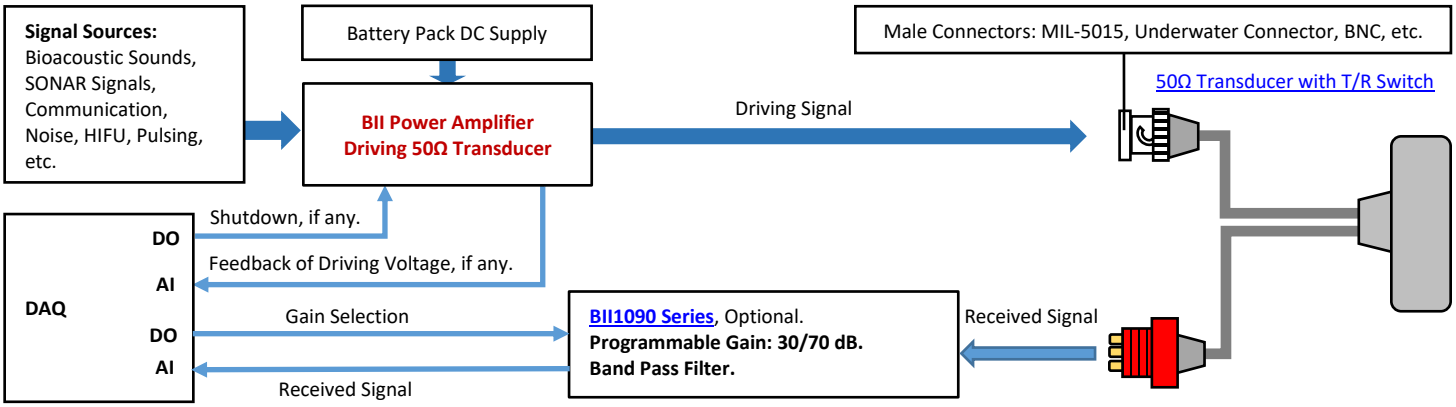
Acoustic System Block Diagram

1. Generate Sounds and Waves.



2. Transmitting and Receiving Sounds and Waves

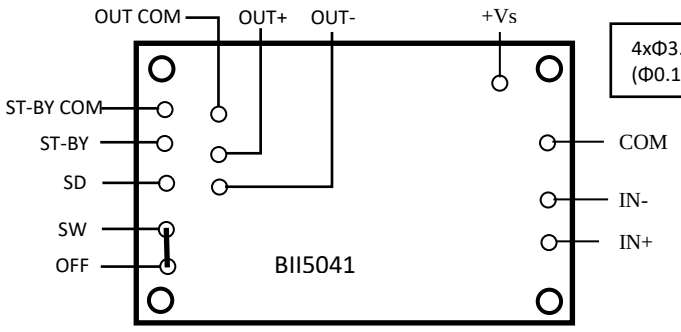




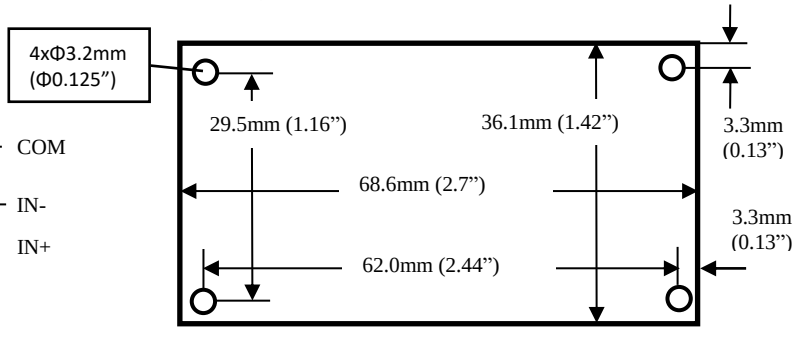
Question: Are 50Ω Power Amplifiers suitable to drive non-50Ω transducers?

Answers: if the impedance of a transducer is greater than 50 Ω at operating frequency, the 50Ω Power Amplifiers can drive this non-50Ω transducer, but the power delivered to non-50Ω transducer is reduced.

BII5041 CONTROLS and TERMINALS:

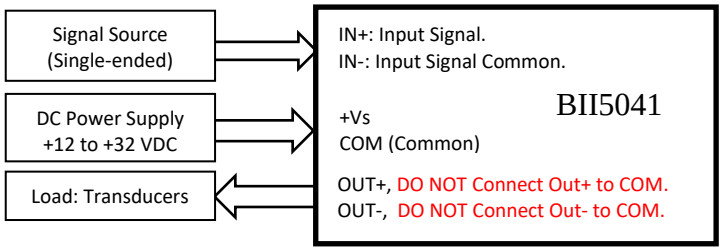


BII5041 Physical Size:



Wire Leads	Signal	Wires' Colour	Wire Leads	Signal	Wires' Colour
IN+	Input Signal	White	**ST-BY**	Shut Down Control	Default: PCB Via Pad, BII does not solder wire.
IN-	Input Signal common	Blue	**ST-BY COM**	Shut Down Control Common	Default: PCB Via Pad, BII does not solder wire.
COM	Power Supply Common	Black	**SD**	Shut-down pin	Default: PCB Via Pad, BII does not solder wire.
+Vs	Power Supply Voltage	Red	**SW**	Shut-down pin	Default: SW is wired to OFF
OUT-	Negative Output	Yellow	**OFF**	Shut-down OFF pin	Default: OFF is wired to SW
OUT+	Positive Output	Blue	**OUT COM**	Output Common	Default: PCB Via Pad, BII does not solder wire.
Default Factory-set: SW is wired to OFF, shut-down function is not available. To use shut-down function: 1. Cut off the wire between SW and OFF. 2. Solder a wire from SW to SD. 3. Solder wires to ST-BY and ST-BY COM respectively.					

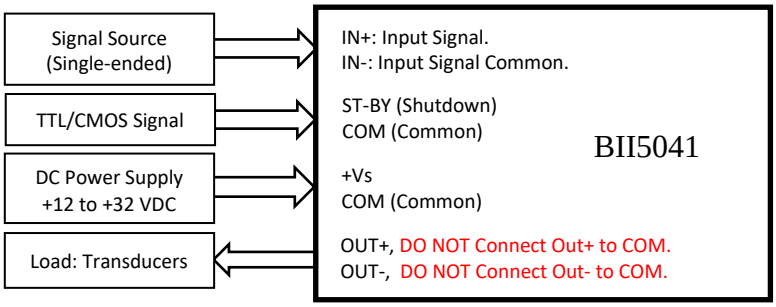
BII5041 SUGGESTED WIRING: Shut-down function is not used and SW is wired to OFF.



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

BII5041 SUGGESTED WIRING: Shut-down function is used.

To use shut-down function: Cut off the wire between SW and OFF; Solder a wire from SW to SD; Solder wires to ST-BY and ST-BY COM respectively.



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

BII5041 SHIPMENT: Assembled board, Qty.: 1

BII5042 ST-BY SWITCH (Shutdown SWITCH)

OFF Position:	Output Enabled.	**DIO Position:**	TTL/CMOS Logic High -> Output Enabled; TTL/CMOS Logic Low -> Output Disabled.

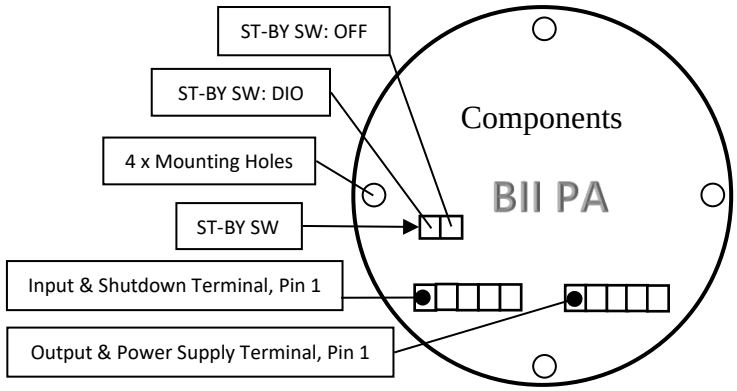
BII5042 TERMINALS and WIRINGS

Input and ST-by (Shutdown) Terminal

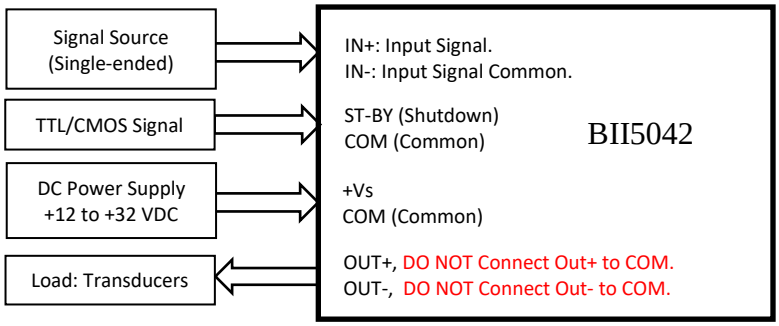
Pin 1: ST-BY (Shutdown)	White,	6" Wire
Pin 2: COM (Common)	Black,	6" Wire
Pin 3: IN+ (Input Signal)	Blue,	6" Wire
Pin 4: IN- (Input Common)	Yellow,	6" Wire
Pin 5: COM (Common)	Black,	6" Wire

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

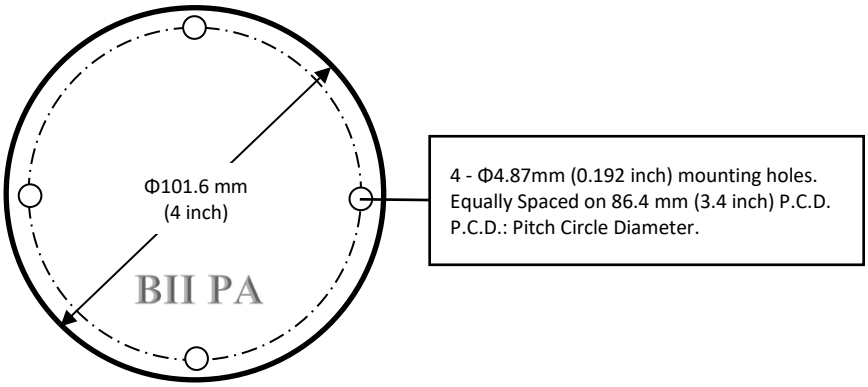


BII5042 SUGGESTED WIRING:



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

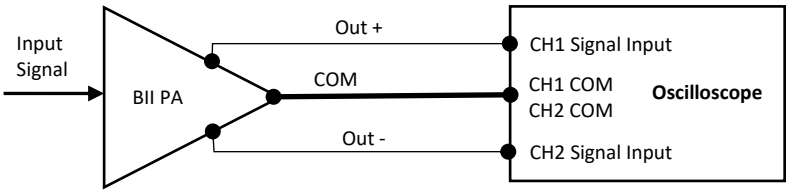
BII5042 Physical Size (unit mm): ΦDxH = Φ101.6x50.8mm



BII5042 SHIPMENT:

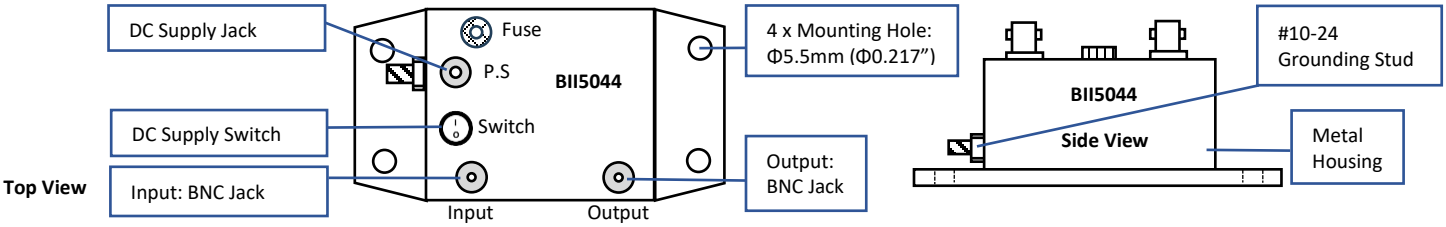
Assembled board, Qty.: 1	Input and ST-BY Plug with 6" wires, Qty.: 1.	Output and Power Supply plug with 6" wires, Qty.: 1.

Measure Differential Output of BII Power Amplifiers

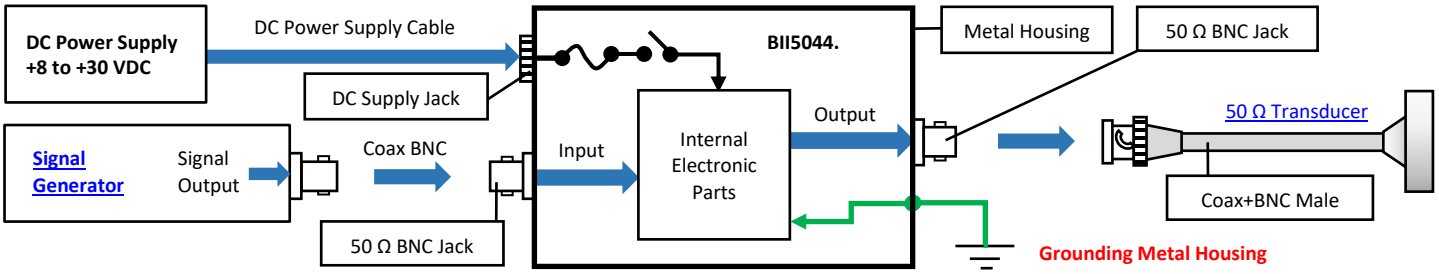


Warning: Outputs of the Power amplifier are differential,
DO NOT Connect Out + or Out - to any COM.

BII5044: Input and Output Connectors: BNC Jack. Metal Enclosure, Overall Size: LxWxH = 180.5x110.3x75mm. Mounting Hole Φ5.5mm (Φ0.217") accepts M5 or #10 screw. Screws are not supplied.



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



Signal Generator	BII5044		50 Ω Transducer
BNC Jack	**Input: BNC Jack**	**Output: BNC Jack**	**Coax + In-line BNC Plug (Male)**
Signal: Center Socket	Signal: Center Socket	Signal: Center Socket	Signal: Center Pin
Common: Body.	Grounded Common: Body.	Grounded Common: Body.	Common: Body.
DC Power Supply:	DC Power Jack. Center Contact: +VDC; Shell: Grounded Common.		
DC Supply Switch:	Turn ON and Turn OFF DC Supply. **"I" -> ON; "O" -> OFF.**		
Fuse:	2.5A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".		
Accessories:	1. One DC Power Supply Cables: DCBP24**.** 2. One Grounding Cable, Part Number: GWL18.		
Grounding Metal Case for operating safety.	**Grounding Stud:** #10-24 Screw 316SS. Nut and Washer are included. Support Single-Point Grounding with Multiple Devices. **Note: The body of Power Supply Jack is connected to metal case.**		

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.

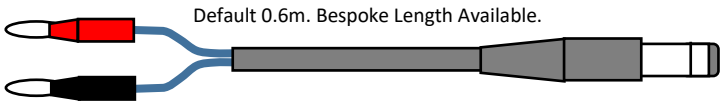
How to Order

Part Number:	Description
BII5044	BII5044, Linear Power Amplifier.

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.

DC Supply Cable Pair: Part Number DCBP24.

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

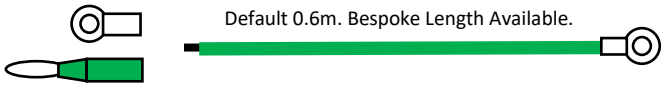


DC Power Plug.
To DC Power Jack of the Device.

Red Banana Plug: +VDC. **Black Banana Plug:** Common.
One 0.6m 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.

Grounding Cable and Terminals

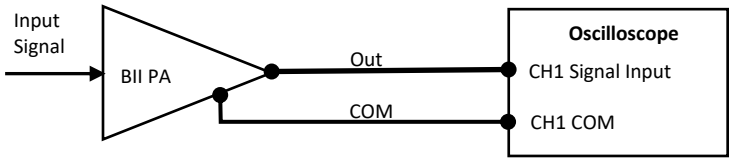
Terminal to buyer's Grounding Terminal:
a. Default: Wire Lead
b. One #10 Ring Terminal
c. One 4mm Banana Plug



#10 Ring Terminal
#10-24 nut and #10 washer included.

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.

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.

BII5044 Metal Housings, Outline Dimensions (mm), Illustration only, the scale is not 1:1.