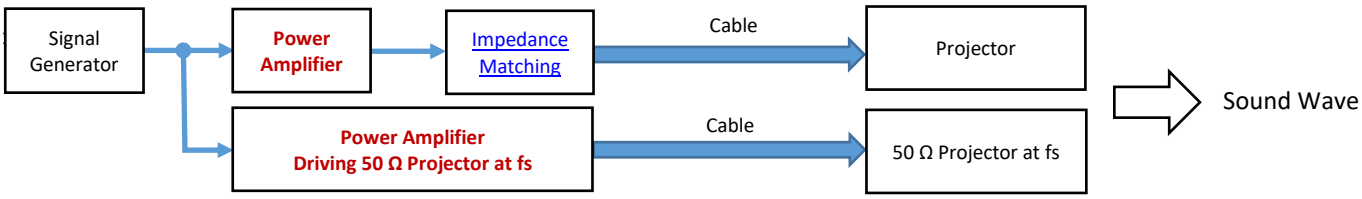
BII5020 Series Power Amplifier

DESCRIPTION

BII5020 series linear power amplifiers are ideal to drive piezoelectric transducers used in acoustic systems of underwater, air, and ultrasonics (solids).

SYSTEM CONFIGURATION



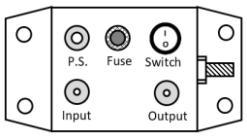
APPLICATIONS

Object Detection and Tracking, Bioacoustic and Biological Research.	Underwater Wireless Communication/Modem.
Distance Gage, Navigation, Obstacle Avoidance.	Acoustic Beacon & Positioning: Pinger and Transponders.
Phantom Echo Generation, Phantom Clicks, Sound Playback.	FSK, PSK and Spread Spectrum System.

ABSOLUTE MAXIMUM RATINGS

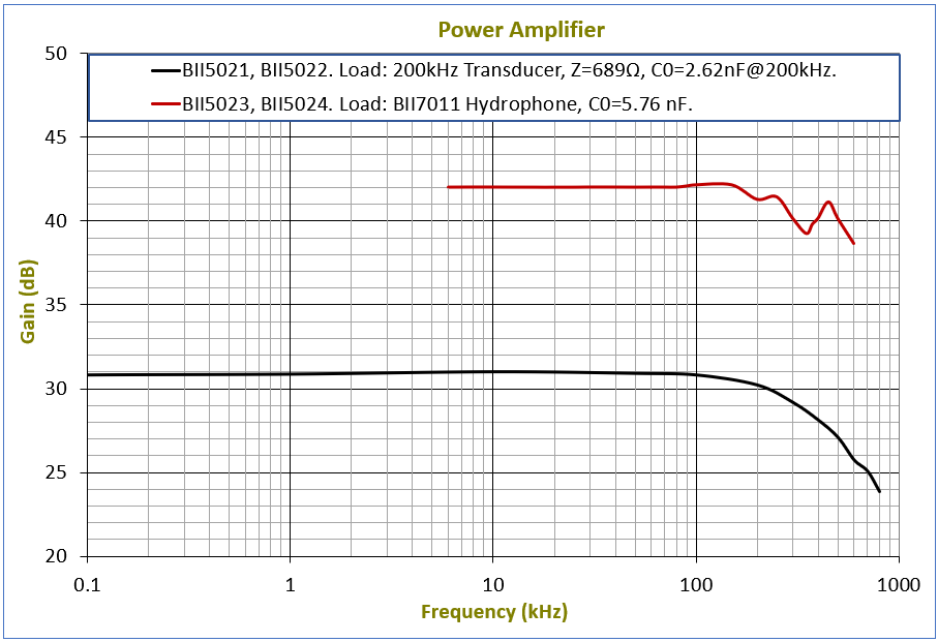
Power Amplifier	**BII5021, BII5022, BII5024**	**BII5023**
Supply Voltage:	+44 VDC	+32 VDC
Output Peak Current:	5 A	1.3 A
Input Voltage:	10 Vpp	10 Vpp

SPECIFICATIONS

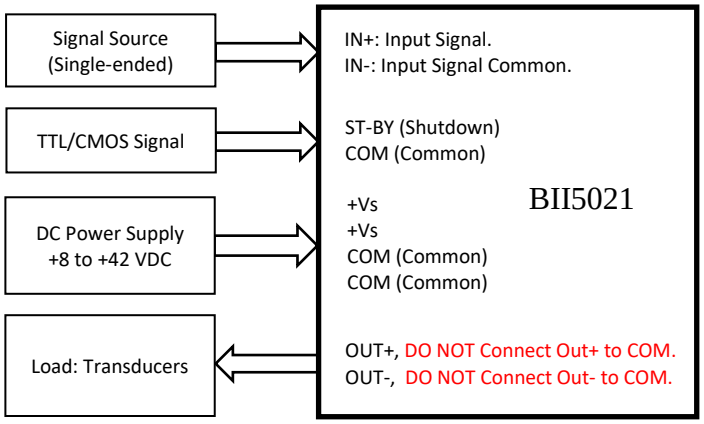
Power Amplifier	BII5021	BII5022	BII5023	BII5024
				
Status:	**ACTIVE**	**ACTIVE**	**Obsolete**	**ACTIVE**
	ACTIVE: Product device recommended for new designs. **LIFEBUY**: BII has announced that the device will be discontinued, and a lifetime-buy period is in effect. **OBSOLETE**: BII has discontinued the production of the device.			
Operating frequency:	150 Hz to 500 kHz	150 Hz to 500 kHz	6 to 500 kHz.	6 to 500 kHz.
	Warning: the device performance degrades if operating frequency less than Minimum Operating Frequency.			
Signal Type:	Pulsed Signals. Continuous Signals.	Pulsed Signals ONLY.	Pulsed Signals ONLY.	Pulsed Signals. Continuous Signals.
	Pulsed/Burst Signals: such as SINE Pulses/Burst, Voltage Spikes, etc. Pulse Width PW ≤ 100 mS, Duty Cycle D ≤ 25%. **Warning:** **Duty Cycle D > 25% may overheat and damage the amplifier.**			
Source Level Capability:	188.6 + DI.	188.6 + DI.	184.0 + DI	184.0 + 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 to drive 50 Ω load.	
Gain:	30.9 dB or x 35.		42 dB or x 125.6	
Input Type:	Single ended		Single ended	
Input Impedance:	20 KΩ || 7 pF			
Maximum Input Level:	Maximum Output Voltage Vo_{max} /Gain or 2Vpp whichever is less.		1 Vpp	
Output Type:	Differential		Single ended	
Voltage Output:	**4.2 Ap current output**: Maximum Vo_{max} = (Vs – 7), in Vp. **0.6 Ap current output**: Maximum Vo_{max} = (Vs – 3.1), in Vp.		Input Level * Gain, or 125.6 Vpp.	
Current Output:	Io_{max} = 4.2 Apeak, maximum.	Io_{max} = 5 Apeak, maximum.	Io_{max} = 1.32 A peak, maximum.	
Minimum Load R_{min}:	≥ Output Voltage/Io_{max}	≥ Output Voltage/Io_{max}	50 Ω	
Stand-by Control Voltage: (Shut-down)	TTL/CMOS Compatible. **Logic Low "0":** Output Disabled. Logic Low "0": 0 to +0.8 VDC. **Logic High "1":** Output enabled. Logic High "1": +2.4 VDC to Supply Voltage Level Vs.		Not Available.	
Output Disable Time:	1 µS		N/A	
Output Enable Time:	3 µS		N/A	
Full Power Bandwidth:	150Hz to 90kHz@+42VDC Supply. 150Hz to 100kHz@+36VDC Supply. 150Hz to 200kHz@+24VDC Supply. 150Hz to 500kHz@+12VDC Supply.		Refer to Frequency Response.	
RMS Power Capability:	86W@+42VDC Supply. 71W@+36VDC Supply. 41W@+24VDC Supply. 11W@+12VDC Supply.		41W@+24VDC Supply. 11W@+12VDC Supply.	
Power Efficiency: (Operating at Io_{max})	Driving Tuned Transducers (Resistive load): 30% at +12 VDC. 55% at +24 VDC. 62% at +36 VDC. 64% at +42 VDC.		Driving Tuned Transducers (Resistive load): 30% at +12 VDC. 55% at +24 VDC.	

	Driving Untuned Transducers: Power Efficiency of driving tuned transducers*cosθ. θ: Impedance Phase of Untuned Transducers.			
Supply Voltage Vs:	+8 to +42 VDC		+8 to +30 VDC	
Suggested DC Supply	Marine Battery and 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**: 36 mA. **Shutdown**: 16 mA.		36 mA	
Fuse:	N/A	N/A	2.5A, 250VAC, Slow-Blow, 3AB, 3AG, 1/4" x 1-1/4".	
Cable:	6" or 0.15 m wires	60 mm wires	1. DC Power Supply Cables: **DCBP24**. 2. Grounding Cable: **GWL18**.	
Connector:	Wire Leads	Wire Leads	Input BNC Jack, Output BNC Jack, and DC Power Jack.	
Grounding Terminal:	N/A	N/A	Grounding Stud #10-24.	
Size:	Round PCB: ΦDxH = Φ101.6x50.8 mm	Rectangular PCB: LxWxH = 68.6x36.1x36 mm	Metal Enclosure: LxWxH=147.2x67.2x67 mm.	Metal Enclosure: LxWxH=180.5x110.3x75 mm
Mounting:	4 x Φ4.87 mm through-holes	4 x Φ3.2 mm through-holes	4 x Φ5.5mm Mounting Holes. Accept M5 and #10 Screws.	
	Screws are not supplied.			
Weight in Air:	170 grams	46 grams	0.8 kg	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



BII5021 SUGGESTED WIRING:



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

BII5021 ST-BY SWITCH (Shutdown SWITCH)

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

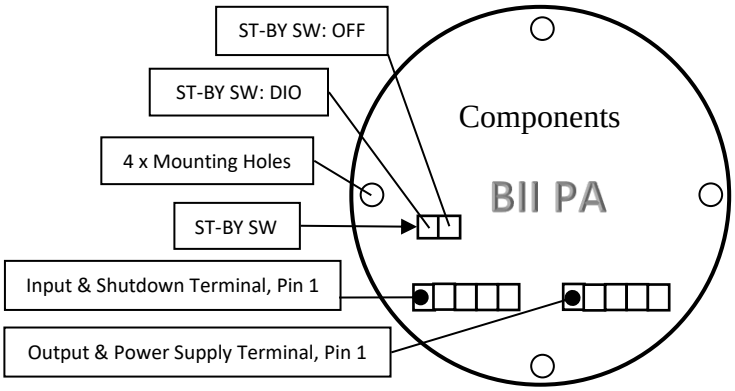
BII5021 TERMINALS and WIRINGS

Input and ST-by (Shutdown) Terminal

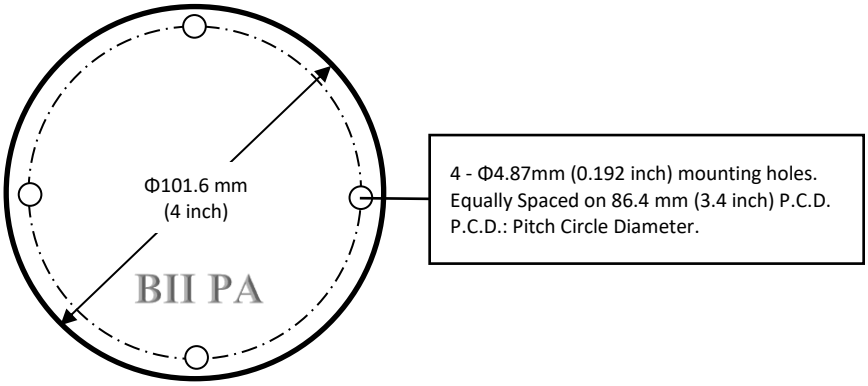
Pin 1: ST-BY (Shutdown)	White,	6" Wire
Pin 2: COM (Common)	Black,	6" Wire
Pin 3: IN+ (Input Signal)	Blue,	6" Wire
Pin 4: IN- (Input Common)	Yellow,	6" Wire
Pin 5: COM (Common)	Black,	6" Wire

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



BII5021 Physical Size (unit mm): ΦDxH = Φ101.6x50.8mm



How to Extend Input and Output Wires of BII5021Power Amplifiers (PCB Package for Embedded Applications.)?

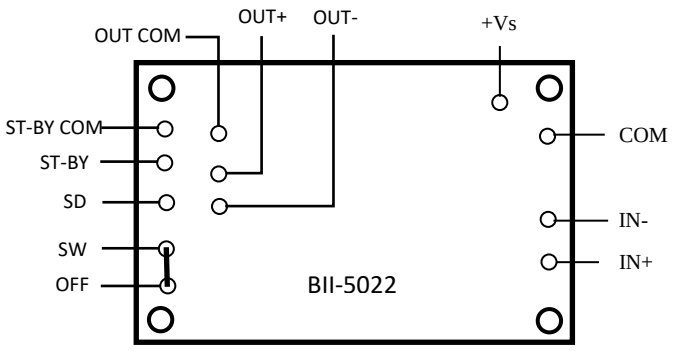
Input and output wires of BII5021 PA (PCB Package) are 0.15m (6") **AWG16 wires** with wire leads.

1. **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.
2. **Banana Jack and Plug, Fully Insulated, Free Hanging (In-Line)**. Crimp or Solder. Crimp is recommended.

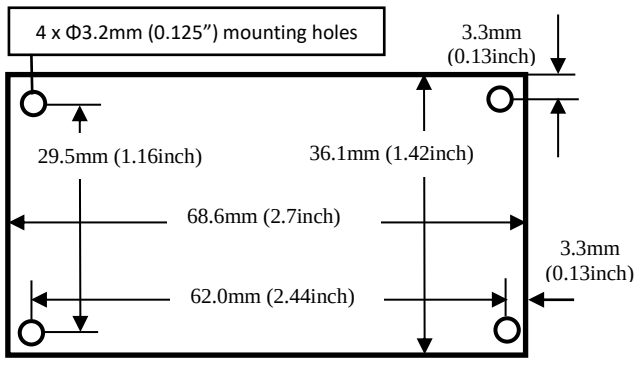
Note:

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

BII5022 CONTROLS and TERMINALS:



BII5022 Physical Size:

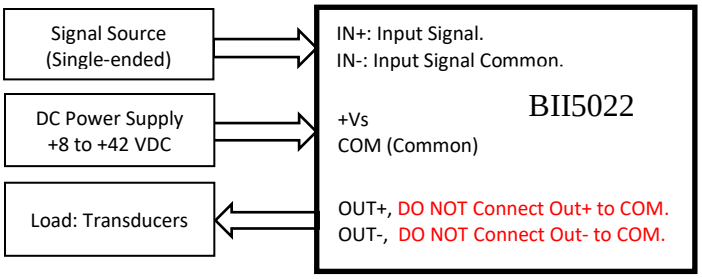


Wire Leads	Signal	Wires' Colour	Wire Leads	Signal	Wires' Colour
IN+	Input Signal	White	**ST-BY**	Shut Down Control	Default: PCB Via Pad, BII does not solder wire.
IN-	Input Signal common	Blue	**ST-BY COM**	Shut Down Control Common	Default: PCB Via Pad, BII does not solder wire.
COM	Power Supply Common	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.

BII5022 SUGGESTED WIRING:

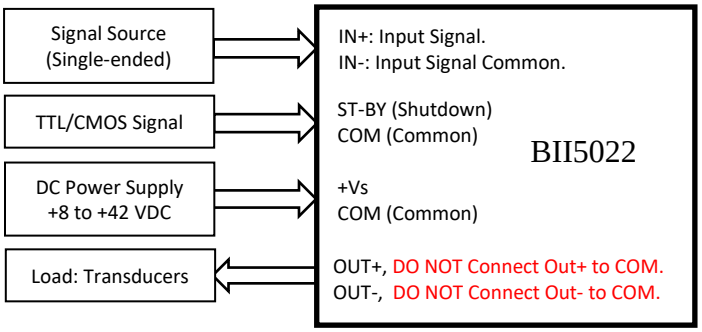
1. Shut-down function is not available. SW is wired to OFF.



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

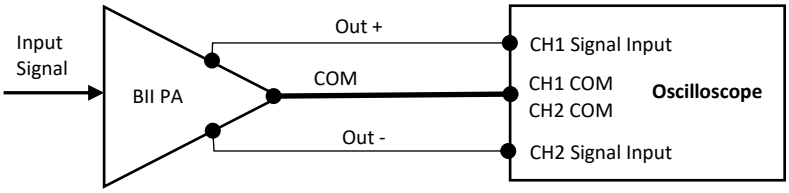
2. Shut-down function is available.

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.



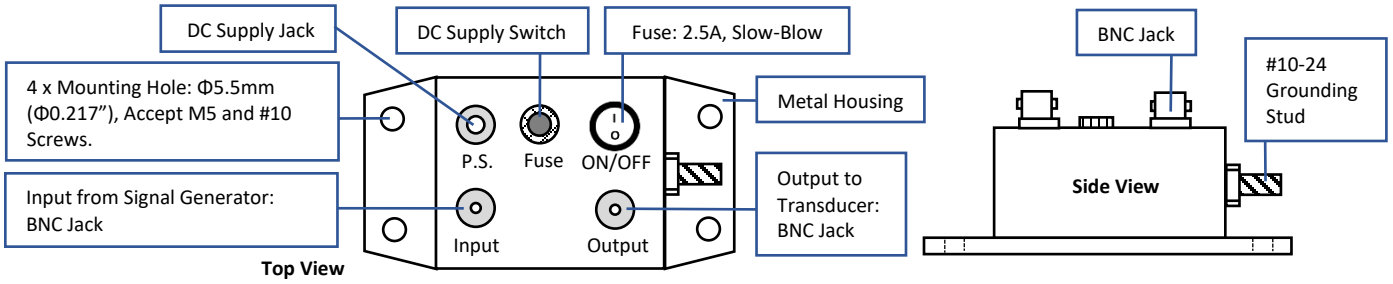
Warning: Outputs of the Power amplifier are differential, DO NOT Connect Out + or Out - to COM.

Measure Differential Output of BII Power Amplifiers

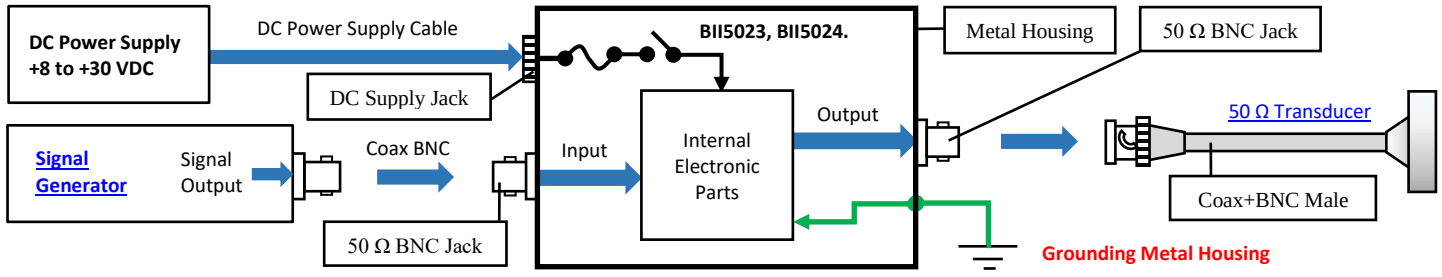


Warning: Outputs of the Power amplifier are differential, DO NOT Connect Out + or Out - to any COM.

BII5023 Metal Enclosure, Overall Size: LxWxH = 147.2x67.2x67mm. Mounting Hole Φ5.5mm (Φ0.217") accepts M5 or #10 screw. Screws are not supplied.
BII5024 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.

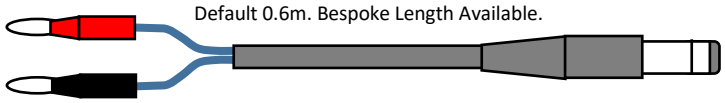


Signal Generator	BII5023, BII5024.		Transducer Cable and Connectors
BNC Jack	**Input: BNC Jack**	**Output: BNC Jack**	**Coax + In-line BNC Plug (Male)**
Signal: Center Socket	Signal: Center Socket	Signal: Center Socket	Signal: Center Pin
Common: Body.	Grounded Common: Body.	Grounded Common: Body.	Common: Body.
DC Power Supply Cable, Part Number: **DCBP24**: One 0.6 m DC supply cable with DC Power Plug and Banana Plugs. **Red Banana Plug**: +VDC, **Black Banana Plug**: 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: Included: 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.			

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.

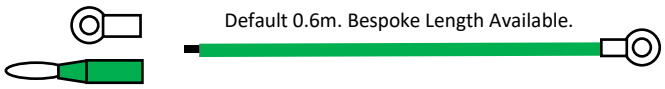
To Terminals of DC Supply:
a. One Red 4mm Banana Plug.
b. One Black 4mm Banana Plug.



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.

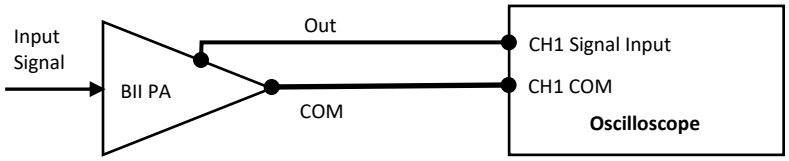
Grounding Cable and Terminals

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



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, wirings and hookup, etc.

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