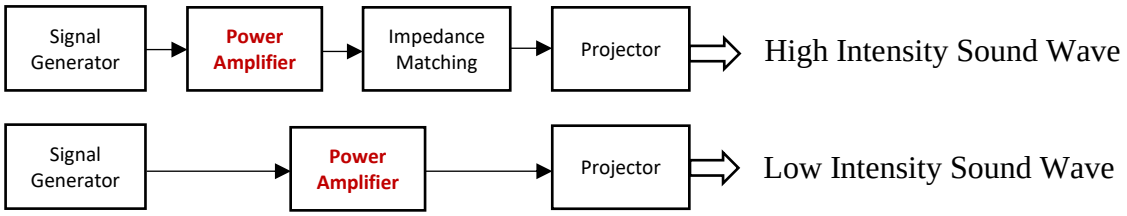
BII-5020 Series Power Amplifier

DESCRIPTION

BII-5020 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

BII-5021: 4" Round PCB with heatsink and four mounting holes. Pulsed signal and continuous signal.
BII-5022: Small Rectangular PCB with 4 mounting holes for embedded application. Pulsed signal ONLY such as SINE Pulse/Burst, etc.…
BII-5023: Aluminum Enclosure with 4 mounting hole. Pulsed signal ONLY such as SINE Pulse/Burst, etc.…

ABSOLUTE MAXIMUM RATINGS

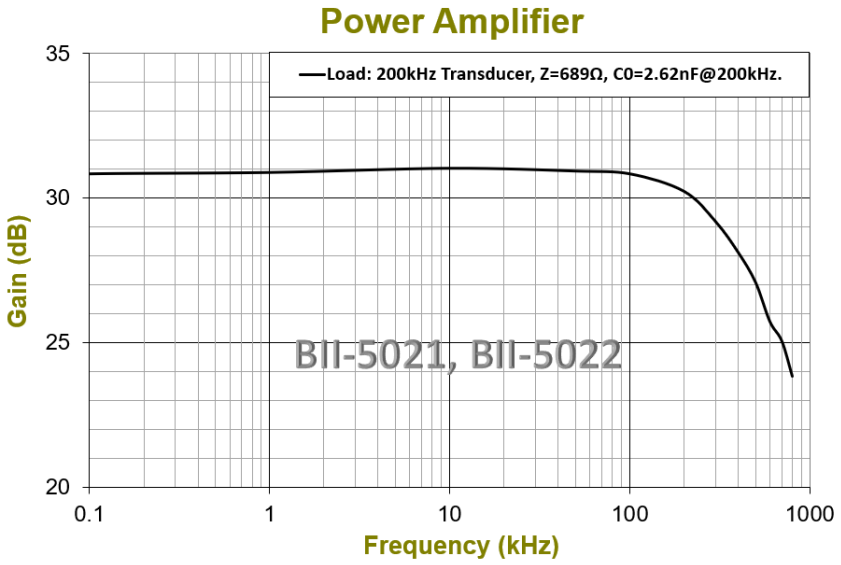
Power Amplifier	BII-5021, BII-5022
Supply Voltage:	+44 VDC
Output Peak Current:	5 A
Input Voltage:	10 Vpp

SPECIFICATIONS

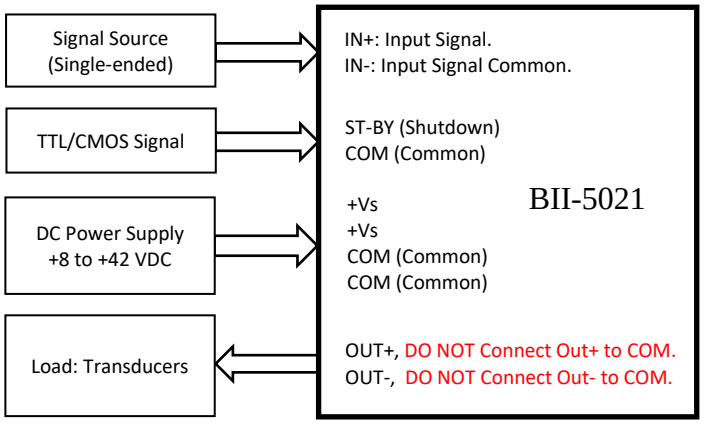
	BII-5021	**BII-5022**
Power Amplifier		
Status:	**ACTIVE**	**ACTIVE**
	ACTIVE: Product device recommended for new designs. **LIFEBUY**: BII has announced that the device will be discontinued, and a lifetime-buy period is in effect. **OBSOLETE**: BII has discontinued the production of the device.	
Signal Type:	1. Maximum Output Current ≤ 4 Ap: Pulsed and Continuous Signals. 2. Maximum Output Current = 4 Ap to 5 Ap: Pulsed Signal ONLY such as SINE Pulses/Burst, etc. Pulse Width ≤ 100 mS, Duty Cycle D ≤ 70%.	**Pulsed Signals ONLY** such as SINE Pulses/Burst, etc.: **Duty Cycle D * Pulse Width PW ≤ 100 (mS*%) and 1% ≤ D ≤ 25%.** For Example: If Duty Cycle D ≤ 1%, Pulse Width PW ≤ 100 mS. If Duty Cycle D = 10%, Pulse Width PW ≤ 10 mS. If Duty Cycle D = 25%, Pulse Width PW ≤ 4 mS. **Duty Cycle D > 25% may overheat and damage the amplifier.**
Source Level Capability:	188.6 + DI, in dB re µPa at 1m. DI: Directivity Index (dB) of the underwater transducer.	
Operating Mode:	Linear	
Impedance Matching:	No Built-in Impedance Matching.	
Gain:	30.9 dB or x 35.	
Input Type:	Single ended	
Input Impedance:	20 KΩ || 7 pF	
Maximum Input Level:	Maximum Output Voltage Vo_{max} /Gain, or 2Vpp, Whichever is less.	
Output Type:	Differential	
Voltage Output:	**5 Ap current output**: Maximum Vo_{max} = (Vs – 7), in Vp, or (2*Supply Voltage Vs – 14), in Vpp. **0.6 Ap current output**: Maximum Vo_{max} = (Vs – 3.1), in Vp, or (2*Supply Voltage Vs – 6.2), in Vpp.	
Current Output:	Io_{max} = 5 A peak, maximum.	
Minimum Load R_{min}:	R_{min} = (Maximum Voltage Output in Vp) / (Maximum Current Output in Ap). R_{min} is useful to design impedance matching network between power amplifiers and transducers.	
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.	
Output Disable Time:	1 µS	
Output Enable Time:	3 µS	
Full Power Bandwidth:	150Hz to 90kHz@+42VDC Supply. 150Hz to 100kHz@+36VDC Supply. 150Hz to 200kHz@+24VDC Supply.	

	150Hz to 500kHz@+12VDC Supply.	
RMS Power Capability:	86W@+42VDC Supply. 71W@+36VDC Supply. 41W@+24VDC Supply 11W@+12VDC Supply.	
Power Efficiency:	Driving Tuned Transducers (Resistive load) and Operating at Io_{max}: 30% at +12 VDC. 55% at +24 VDC. 62% at +36 VDC. 64% at +42 VDC.	
	Driving Untuned Transducers: Power Efficiency of driving tuned transducers*cosθ. θ: Impedance Phase of Untuned Transducers.	
Supply Voltage Vs:	+8 to +42 VDC	
Suggested DC Supply	Marine Battery and Automobile Battery	
Quiescent Current:	Active: 36 mA. Shutdown: 16 mA.	
Cable:	6" or 0.15 m wires	60 mm wires
Connector:	Wire Leads	
Size:	Round PCB: ΦDxH = Φ101.6x50.8 mm	Rectangular PCB: LxWxH = 68.6x36.1x36 mm
Mounting:	4 x Φ4.87 mm through-holes	4 x Φ3.2 mm through-holes
Weight in Air:	216 grams	46 grams
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



BII-5021 SUGGESTED WIRING:



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

BII-5021 ST-BY SWITCH (Shutdown SWITCH)

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

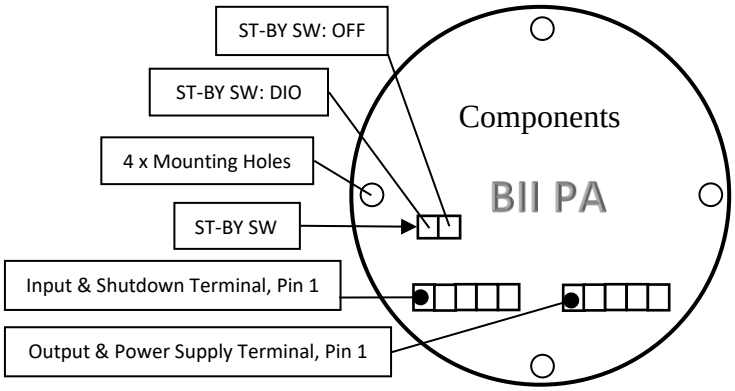
BII-5021 TERMINALS and WIRINGS

Input and ST-by (Shutdown) Terminal

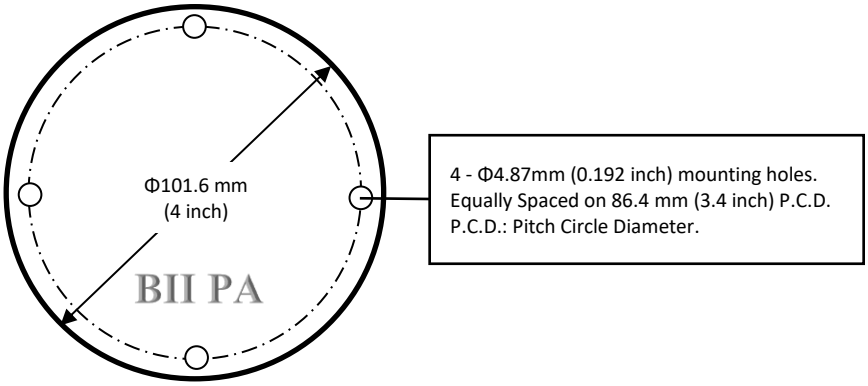
Pin 1: ST-BY (Shutdown)	White,	6" Wire
Pin 2: COM (Common)	Black,	6" Wire
Pin 3: IN+ (Input Signal)	Blue,	6" Wire
Pin 4: IN- (Input Common)	Yellow,	6" Wire
Pin 5: COM (Common)	Black,	6" Wire

Output and Power Supply Terminal

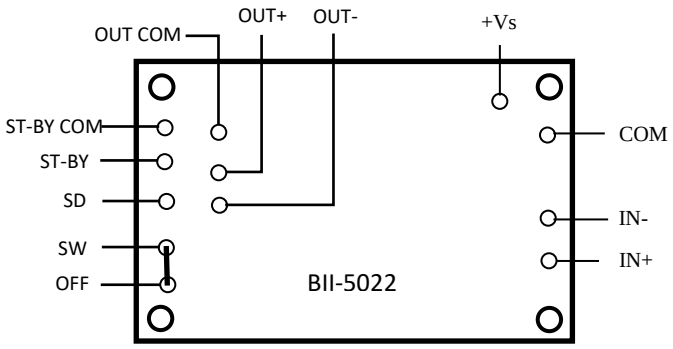
Pin 1: +Vs	Red,	6" Wire
Pin 2: +Vs	Red,	6" Wire
Pin 3: COM (Common)	Black,	6" Wire
Pin 4: OUT+	Blue,	6" Wire
Pin 5: OUT-	Yellow,	6" Wire



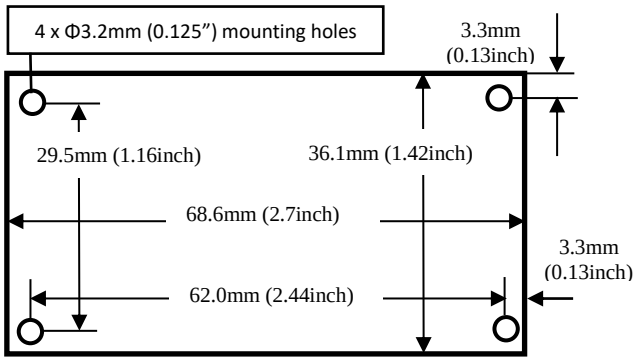
BII-5021 Physical Size (unit mm): ΦDxH = Φ101.6x50.8mm



BII-5022 CONTROLS and TERMINALS:

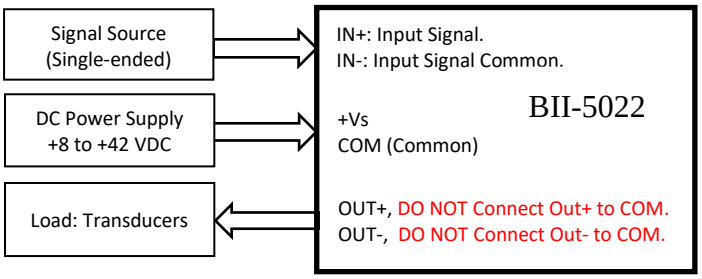


BII-5022 Physical Size:



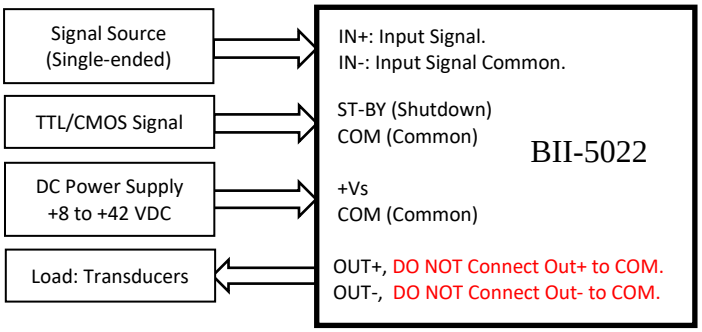
Wire Leads	Signal	Wires' Colour	Wire Leads	Signal	Wires' Colour
IN+	Input Signal	White	**ST-BY**	Shut Down Control	Default: PCB Via Pad, BII does not solder wire.
IN-	Input Signal common	Blue	**ST-BY COM**	Shut Down Control Common	Default: PCB Via Pad, BII does not solder wire.
COM	Power Supply Common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

BII-5022 SUGGESTED WIRING:
Shut-down function is not available. SW is wired to OFF.



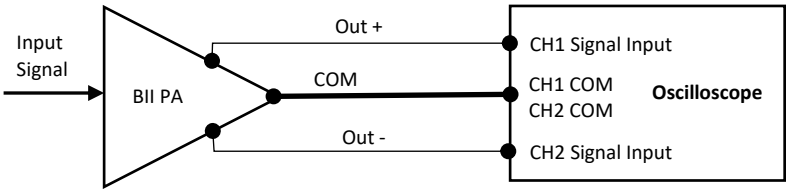
Warning: Outputs of the Power amplifier are differential,
DO NOT Connect Out + or Out - to COM.

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.

BII-5023 Series Power Amplifier

ABSOLUTE MAXIMUM RATINGS

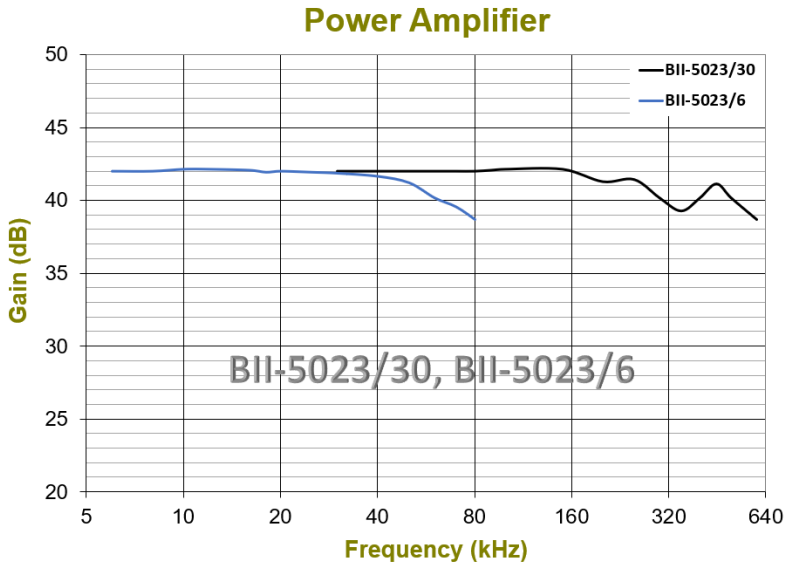
Power Amplifier	BII-5023/6, BII-5023/30
Supply Voltage:	+30 VDC
Output Peak Current:	1.3 A
Input Voltage:	10 Vpp

SPECIFICATIONS at T = +17 °C, Vs = +24 VDC, Load: BII-7011 hydrophone as low power projector, C_0 = 5.76 nF, unless otherwise noted.

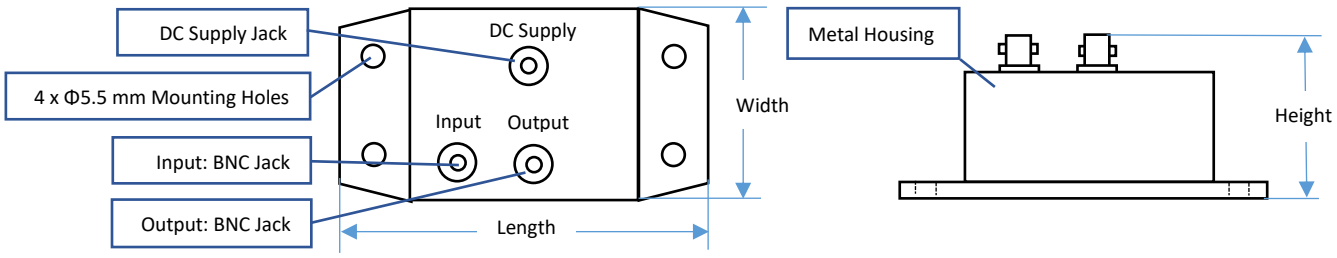
	BII-5023/30	**BII-5023/6**
Power Amplifier		
Status:	**ACTIVE**	**ACTIVE**
	ACTIVE: Product device recommended for new designs. **LIFEBUY**: BII has announced that the device will be discontinued, and a lifetime-buy period is in effect. **OBSOLETE**: BII has discontinued the production of the device.	
Signal Type:	Pulsing Signals ONLY: Voltage Spikes, SINE Pulses/Burst, etc., **Duty Cycle D * Pulse Width PW ≤ 100 (mS*%) and 1% ≤ D ≤ 25%.** For Example: If Duty Cycle D ≤ 1%, Pulse Width PW ≤ 100 mS. If Duty Cycle D = 10%, Pulse Width PW ≤ 10 mS. If Duty Cycle D = 25%, Pulse Width PW ≤ 4 mS. **Duty Cycle D > 25% may overheat and damage the amplifier.**	
Source Level Capability:	184.0 + DI, in dB re µPa at 1m. DI: Directivity Index (dB) of the transducer.	
Operating Mode:	Linear	
Gain:	42 dB or x 125.6	

Input Type:	Single ended	
Input Impedance:	20 KΩ || 7 pF	
Maximum Input Level:	1 Vpp	
Output Type:	Single ended	
Voltage Output:	Input Level * Gain, or 125.6 Vpp.	
Current Output:	Io_{max} = 1.32 A peak, maximum.	
Minimum Load R_{min}:	50 Ω.	50 Ω. Greater than 100 Ω is recommended.
Shut-down:	Not Available.	
Full Power Bandwidth:	Refer to **Frequency Response**.	
Operating frequency:	Minimum, 30 kHz.	Minimum, 6 kHz.
	Warning: the device performance degrades if operating frequency less than Minimum Operating Frequency.	
RMS Power Capability:	41W@+24VDC Supply. 11W@+12VDC Supply.	
Power Efficiency:	Driving Tuned Transducers (Resistive load) and Operating at Io_{max}: 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 +26 VDC	
Suggested DC Supply	Marine Battery and Automobile Battery	
Quiescent Current:	36 mA	
Cable:	1 m power supply cable with DC Power Plug. **Red Wire**: +VDC, **Black Wire**: Common, **Cable Shield**: Shielding.	
Connector:	Input BNC Jack, Output BNC Jack, and DC Power Jack	
Size:	Metal Enclosure, LxWxH = 147x67x55 mm.	
Mounting:	4 x Φ5.5mm Mounting Holes	
Weight in Air:	0.59 kg	
Operating Temperature:	-20 to 70°C or -4 to 158°F	
Storage Temperature:	-20 to 70°C or -4 to 158°F	
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



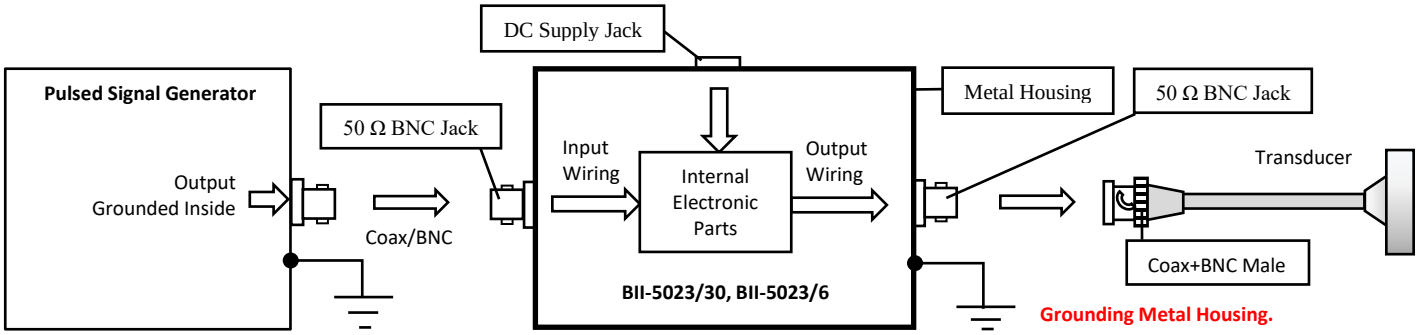
BII-5023 Physical Size (Metal Enclosure with four slots for mounting and grounding):



Top View **Side View**

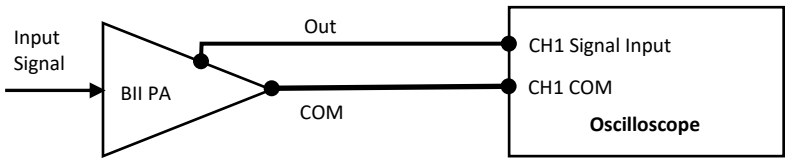
System Wiring Diagram

SMA and SMC connections are available. SMA and SMC wiring are same to BNC wiring.



Pulsed Signal Generator Such as SINE Pulses/Burst…	**BII-5023 Input**	**BII-5023 Output**	**Transducer Cable and Connectors**
	Input BNC Jack	**Output BNC Jack**	**Coax + BNC Plug (Male)**
Pulsed Signal	Signal: BNC Center Socket	Signal: BNC Center Socket	Signal: BNC Center Pin
Common	Common: BNC Body.	Grounded Common: BNC Body.	Common: BNC Body.
Warning: Grounding Metal Cases for operating safety. Note: The body of Power Supply Jack is connected to metal case.			
Common of DC Power Supply should be grounded. **Accessory**: Power Supply Plug with 1 m cable and wire leads. **Red Wire**: +VDC, **Black Wire**: Common, **Cable Shield**: Shielding.			

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.