

# HIGH SPEED BIPOLAR AMPLIFIER

HSA<sub>SERIES</sub>

BA<sub>SERIES</sub>

DC to 10 MHz, High Speed and Broad Range  
Maximum 300Vp-p high output voltage  
plus, minus, source and sink operation are available



NICHT mehr verfügbar

# Tough Bipolar Power Amplifier against High Speed, Broad Range, High Voltage, High Power and Various Loads.

HSA and BA series is a power amplifier which has high speed, broad band (HSA: DC to max.10 MHz, BA: DC to 2MHz) and the capability of supplying high voltage and high power. DC+/DC-signal is variable continuously with wide output range of maximum 300Vp-p without switching. Furthermore, as 4 dimensions output is possible, source mode (providing a power to load from a power amplifier in coincidence of voltage polarity and current polarity as normal amplifier) and sink mode (Sinking a power from load to power amplifier in reverse current) operation are available. Therefore, It is possible to drive smoothly a capacitive load and an inductive load like a piezo electric component, a solenoid and others. 6 difference models concerning frequency range, output voltage and output current are available as HSA series.

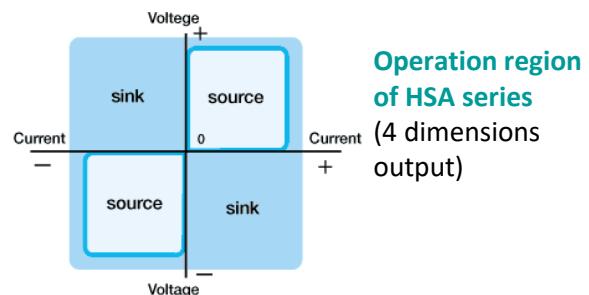
Selection Guide	HSA4051	HSA4052	HSA4101	HSA42011	BA 4825
Frequency band	DC to 500kHz		DC to 10MHz	DC to 1MHz	DC to 2MHz
Output voltage	300Vp-p		142Vp-p	150Vp-p	300Vp-p
Output current	2.83Ap-p	5.66Ap-p	2.8Ap-p	3Ap-p	0.5 Arms
Slew rate	450V/μs		5000V/μs	475V/μs	500V/μs

Nicht mehr verfügbar

More details on the following pages

## Step response

Slew rate which is important when large amplitude output is required, is maximum 5000V/μs (HSA 4101). Reproduce a signal in high fidelity by good response for high speed repetitive and high speed transient phenomenon signal.

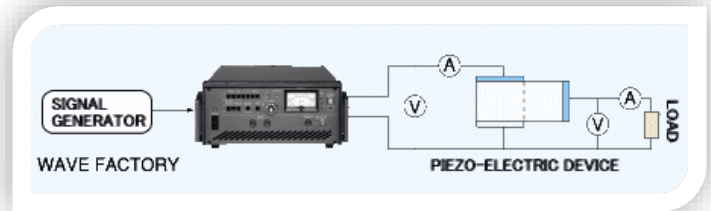


## Features

- **High speed, broad band and high slew rate** Frequency range is DC to max. 10MHz. Slew rate is max. 5000V/μs. A fast rise time pulse signal and a complicated waveform signal can be amplified with a high fidelity.
  - **Function of output range shift** Equipped with the range shift function which is able to change output range.
  - **High voltage output** Max. output voltage is 300Vp-p. Possible to drive piezo actuators and display devices by a big margin.
  - **4 dimensions output** (bipolar output) Available for output plus/minus of voltage and current freely. Changing of plus/minus polarity continuously without switching.
  - **Excellent step response** Possible to get a clean waveform of few overshoot and ringing.
  - **Two inputs are provided** Input is A and B of dual inputs. One touch operation for addition and input change.
  - **DC bias** Equipped with DC bias function enabling to add DC to the output.
  - **Low output impedance** Enable to get excellent response in capacitive and inductive load.
  - **Others** Equipped with DC offset adjustment function, protection circuit, monitor meter & monitor output, output ON/OFF switch and others.
- \*The above mentioned functions are not equipped with some model. Please refer to the specifications as below for the detail functions and the comparison of each model.

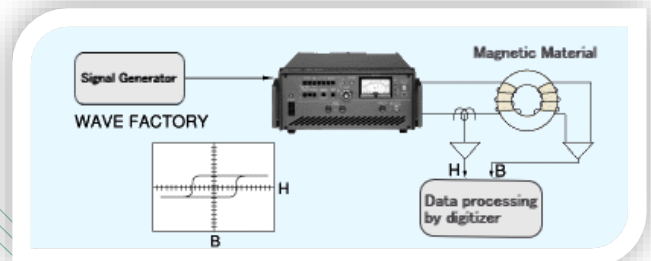
# Applications

## Driving of Piezo Electric Devices



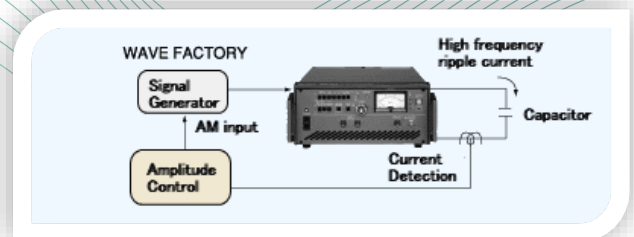
Example of a driving for piezo-electric devices which is used for piezo inverter, piezo actuator and etc. As HSA series have a very low output impedance, good step response is obtained against large capacitance of piezo-electric devices.

## Measurement of (B-H curve) for magnetized characteristics of magnetic material



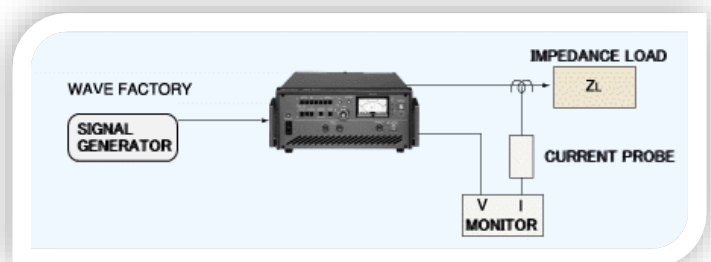
Example of magnetized devices for B-H curve measuring of high frequency magnetic materials. As HSA series have a flat and a wide frequency response and a high stability against inductive loads, high repeatability data is obtained with no influence of loads.

## High frequency ripple of capacitors



Example of a withstand ripple test for electric capacitors using a switching power supply. HSA series has not only bias function but also a stable operation against large capacitor loads. It is not caused a difference between a maximum charge current and a maximum discharge current for stable operation against large capacitor loads and symmetry of operation area.






## Power amplifiers of signal generators



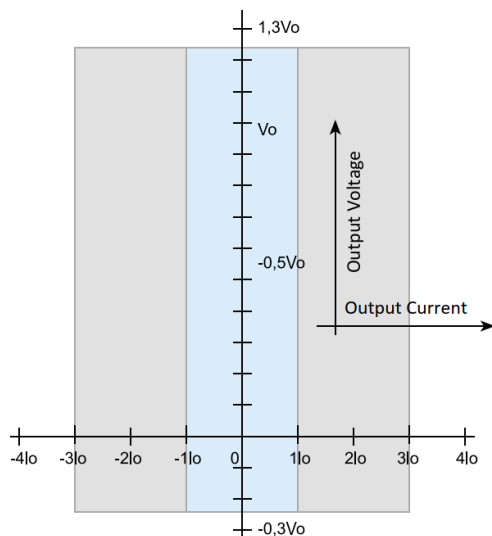
HSA series is suitable for a power amplifier of signal generators. It is possible to provide a stable power against inductive and capacitive loads with wide frequency range, high output voltage and low output impedance.

- Driving for ultra sonic motor
- Research of IC card
- Testing for semiconductor devices
- Bioelectronics
- Chemical electronics

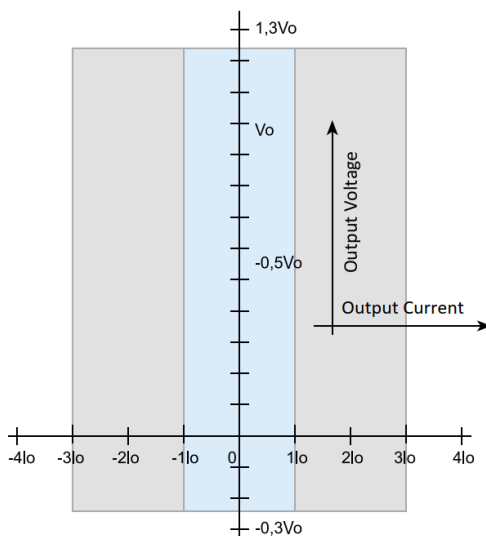
Specifications HSA series

Model		HSA 4051	HSA 4052	HSA 4101	HSA 42011	BA4825
Model						
Frequency range		DC to 500kHz		DC to 10MHz	DC to 1MHz	DC to 2MHz
Output	Maximum voltage	300Vp-p(±150V) <b>±150V range</b> RL=100Ω 100Vrms(40Hz to 200kHz) 40Vrms(20Hz to 500kHz) RL=300Ω ±150V(DC to 50kHz) ±55V(DC to 500kHz) <b>—50 to +250V range RL=500Ω</b> —50 to +250V(DC to 50kHz) +45 to +155V(DC to 500kHz) <b>—250 to +50V range RL=500Ω</b> —250 to +50V(DC to 50kHz) —155 to —45V(DC to 500kHz)	300Vp-p(±150V) <b>±150V range</b> RL=50Ω 100Vrms(40Hz to 200kHz) 40Vrms(20Hz to 500kHz) RL=150Ω ±150V(DC to 50kHz) ±55V(DC to 500kHz) <b>—50 to +250V range RL=250Ω</b> —50 to +250V(DC to 50kHz) +45 to +155V(DC to 500kHz) <b>—250 to +50V range RL=250Ω</b> —250 to +50V(DC to 50kHz) —155 to —45V(DC to 500kHz)	142Vp-p(±71V)  RL=50Ω 50Vrms(40Hz to 100kHz) 46Vrms(100kHz to 1MHz) 35Vrms(1MHz to 10MHz) 17Vrms(10MHz to 20MHz) RL=71Ω ±71V(DC to 40Hz)	150Vp-p  RL=50Ω 53 Vrms (40 Hz to 1 MHz) 45 Vrms (20 Hz to 40 Hz)  RL=75Ω ±75 V (DC to 1 MHz)	<b>±150V range (rated resistance load 200Ω)</b> 100Vrms or greater 40Hz to 500kHz 70Vrms or greater 500kHz to 1MHz 40Vrms or greater 1MHz to 2MHz <b>±150V range (rated resistance load 450Ω)</b> ±150V (300Vp-p) DC to 500kHz ±100V (200Vp-p) 500kHz to 1MHz ±56V (112Vp-p) 1MHz to 2MHz <b>+250V range (rated resistance load 1,250Ω)</b> -50V to +250V DC to 500kHz +40V to +240V 500kHz to 1MHz +80V to +200V 1MHz to 2MHz <b>-250V range (rated resistance load 1,250Ω)</b> -250V to +50V DC to 500kHz -240V to -40V 500kHz to 1MHz -200V to -80V 1MHz to 2MHz
	Maximum current	1 Arms, 2.83Ap-p(40Hz to 200kHz) ±0.5A(DC to 40Hz)	2 Arms, 5.66Ap-p(40Hz to 200kHz) ±1.0A(DC to 40Hz)	±1.4A(40Hz to 100kHz), ±1.3A(100kHz to 1MHz) ±1.0A(1MHz to 10MHz), ±1A(DC to 40Hz)	1.06 Arms, 3 Ap-p (40 Hz to 1 MHz) AC ±1 A DC	0.5Arms (±150V range, rated resistance load 200Ω)
	Slew rate	450V/μs typ.	450V/μs typ.	5000V/μs typ.	475V/μs typ.	500V/μs
	Impedance	1Ω + 3.2μH max.	0.5Ω + 1.6μH max.	1.5Ω + 0.5μH typ.	[0.19+0.0155 f (1+j)] Ω or less (typ.) f : frequency (Hz)	0.5Ω + 1.5μH or less (typ.)
	Preamplifier output	Opposite phase of input. (Available for 2 units BTL connection), Connector BNC-R on rear panel		—	—	—
	DC bias	±200V(by 10 turns potentiometer)		±70V(by 10 turns potentiometer)	±75 V or above on/off with switch on front panel	±200V or more Allows turning on/off by the front panel switch.
	Other functions	Monitor meter*1, Monitor output, DC offset adjustment, Output ON/OFF switch		—	Monitor meter*1, Monitor output, DC offset adjustment, Output ON/OFF switch, Protection function: Overload, Output overvoltage, Internal power supply error, Cooling fan error	Output polarity switching, output range shift, output monitoring, external output on/off control, DC bias addition, and DC offset adjustment
Input	Type	2 inputs of A and B(Enable to add), Same phase both of A and B input against output		one input(enable to change polarity)	Input A, Input B or addition of input A and input B (When two inputs are on, the maximum input voltage is within ±10 V in total)	2 (A input: Front panel, B input: Rear panel) (Input type may be A input, B input, or both A input and B input.)
	Impedance	50Ω/600Ω selectable		50Ω	50 Ω± 5%, 10 kΩ±5% switchable (Unbalanced, switch between two inputs A and B at once)	5Ω and 10kΩ, switchable
Gain		×20, ×40, ×100, ×200 and ×(1 to 3) variable continuously		×10, ×20, ×50, ×100 and ×(0.4 to 1) variable continuously	Fixed : ×1, ×10, ×20, ×50 Variable: ×1(CAL) to ×3 consecutive Gain Setting is (Fixed)×(Variable).	Fixed: ×1, ×10, ×20, ×50 Variable: ×1 (CAL) to ×3, consecutive The set gain equals to (Fixed × Variable).
Frequency response		500kHz( + 0.5 to —3dB, 20Vrms, ±150V range)		10MHz( + 0.5 to —3dB, 10Vrms) <sup>2</sup>	DC to 100 kHz : —1 dB to +1 dB 100 kHz to 1 MHz : —3 dB to +1 dB (Output Amplitude 10 Vrms, reference 400 Hz)	DC to 100kHz, ±0.5 dB 100kHz to 2MHz, +1, -3 dB Conditions: Output amplitude 20 Vrms, reference 1 kHz
Input voltage		AC100V (One of 120V/200V/220V/240V can be modified by factory option), 48Hz to 62Hz		AC85V to 138V, AC170V to 250V, 48Hz to 62Hz	AC100 V to 230 V±10% (Maximum voltage 250 V), Overvoltage category II 50 Hz ±2 Hz or 60 Hz ±2 Hz (Single-phase), Power factor 0.95 or mo	±10V
Power consumption		340W/500VA	700W/900VA	400W/700VA	290VA	350VA or less
Dimensions(mm)/Weight		290(W)×132.5 (H)×450(D)/approx.13kg	290(W)×177(H)×450(D)/approx.18kg	220(W)×177(H)×450(D)/approx.7.8kg	220(W)×132.5(H)×450(D)/approx.10kg	58(W)×132.5(H)×390(D) (not including protrusions)/ approx. 7kg
Reference		<sup>1</sup> Average value indication of DC+AC <sup>2</sup> DC mode :DC to 100kHz ,AC mode :40Hz cutoff frequency HPF is inserted.				

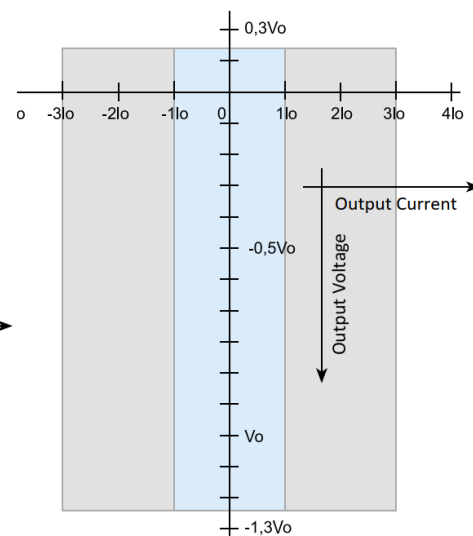
# HSA 4051, HSA 4052 and HSA 4101



For the +250V to -50V range of the **HSA4051** and **HSA4052**.



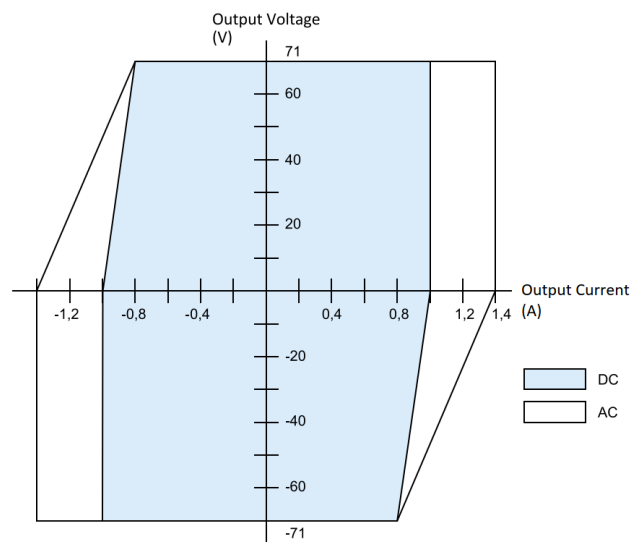
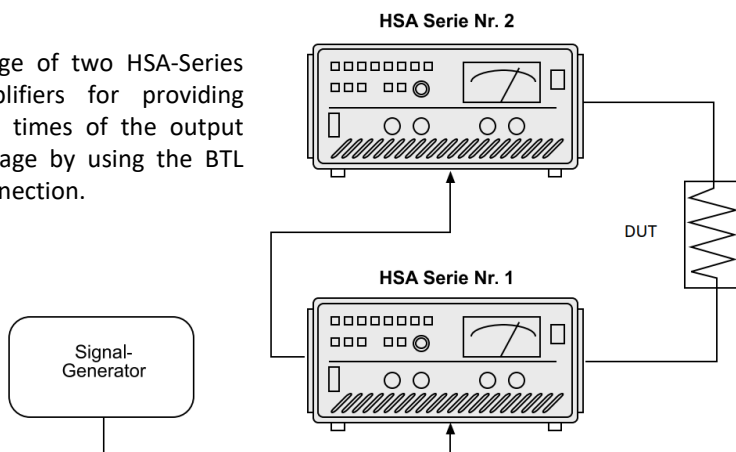
For the  $\pm 150V$  range of the **HSA4051** and **HSA4052**.



For the +50V to -250V range of the **HSA4051** and **HSA4052**.

- For DC (including AC at 1Hz or less) or the mean value of AC.
- For the peak value of AC at 40Hz or more.

Usage of two HSA-Series amplifiers for providing two times of the output voltage by using the BTL connection.



For **HSA 4101**

- DC
- AC



Unless otherwise noted, below setting and conditions are specified after 30 minute warm up period.

- Output Waveform: sine wave
- Output Polarity : In-phase
- Load: 50  $\Omega$  (Power Factor 1, nominal value)
- Input Impedance : 50  $\Omega$
- Gain Setting :  $\times 50$  (CAL)

The following values with accuracy represents warranted performance, values without accuracy are not warranted, they are typical values(typ.) or reference values. Reference values are only supplementary data to use for reference, they do not guarantee performance.

Protection function	
Overload	By detecting excessive output current or excessive internal power loss, the output current is clipped and the front panel overload LED lights up. Output turns off if the overload condition continues for 10 seconds or longer. If the overload continues for 60 seconds or longer, the mode switches to disabled mode.
Output overvoltage	Output turns off when an error is detected. If the error continues for 60 seconds or longer, the mode switches to disable mode.
Internal power supply error	The internal power error LED on the front panel flashes when an error is detected. Then output off ,the mode switches to disable mode.
Internal temperature error	The front panel overload LED lights up when an error is detected. Output turns off if the temperature error continues for 10 seconds or longer. If the overload continues for 60 seconds or longer, the mode switches to disable mode.
Cooling fan error	Output turns off when an error is detected. The mode switches to disable mode.

Output on/off control	
Output on/off	Controlled by front panel switch or external control input (When the external control input is valid, only output off is valid for front panel operation)

Power-on status setting	
Power input	AC100 V to 230 V $\pm$ 10% (Maximum voltage 250 V), Overvoltage category II 50 Hz $\pm$ 2 Hz or 60 Hz $\pm$ 2 Hz (Single-phase), Power consumption (Maximum) 290 VA Power factor 0.95 or more

\*Between power input vs. others and chassis in total



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