HIGH SPEED BIPOLAR AMPLIFIER

HSA SERIES

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

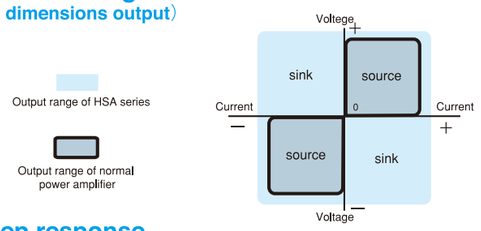
NF Corporation

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

HSA HIGH SPEED BIPOLAR AMPLIFIER

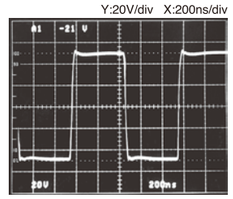
HSA series is a power amplifier which has high speed, broad band (DC to max.10MHz), and the capability of supplying high voltage and high power. DC+/DC− signal is variable continuously with wide output range of maximum 300Vp-p without switching. Furthermore, as 4 dimensions output is possible, source 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.

■ Operation region of HSA series
(4 dimensions output)



■ Step response

Slew rate which is important when large amplitude output is required, is maximum 5000V/μs.
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.
- **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.
- **Function of output range shift**
  Equipped with the range shift function which is able to change output range.
- **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

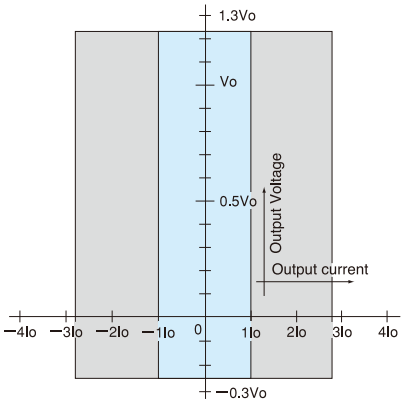
- Driving piezoelectric actuator, piezoelectric inverters and others.
- Measurement of B-H response of magnetic materials.
- High frequency ripple test of capacitors.
- Drive test of display panel for FED, EL, LCD and others.
- Power boosting of Signal generator.

⋮

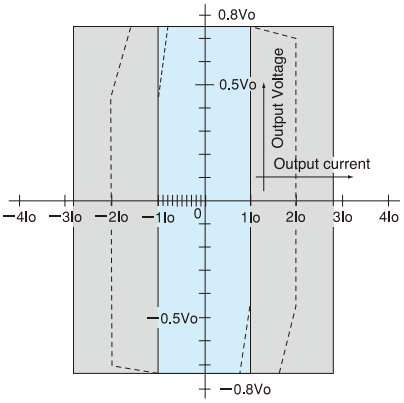
■ Specifications

Model	HSA4011	HSA4012	HSA4014	HSA4051	HSA4052	HSA4101
						
Frequency range	DC to 1MHz			DC to 500kHz		DC to 10MHz
Output **Maximum voltage**	**150Vp-p** (±75V) RL=50Ω 50Vrms (40Hz to 500kHz) 45Vrms (20Hz to 1MHz) RL=100Ω ±75V (DC to 100kHz) ±70V (DC to 500kHz) ±65V (DC to 1MHz)	**150Vp-p** (±75V) ●±75V range RL=25Ω 50Vrms (40Hz to 500kHz) 40Vrms (20Hz to 1MHz) RL=75Ω ±75V (DC to 100kHz) ±55V (DC to 1MHz) ●−25 to +125V range RL=125Ω −25 to +125V (DC to 100kHz) −5 to +105V (DC to 1MHz) ●−125 to +25V range RL=125Ω −125 to +25V (DC to 100kHz) −105 to +5V (DC to 1MHz)	**150Vp-p** (±75V) ●±75V range RL=12.5Ω 50Vrms (40Hz to 500kHz) 40Vrms (20Hz to 1MHz) RL=37.5Ω ±75V (DC to 100kHz) ±55V (DC to 1MHz) ●−25 to +125V range RL=62.5Ω −25 to +125V (DC to 100kHz) −5 to +105V (DC to 1MHz) ●−125 to +25V range RL=62.5Ω −125 to +25V (DC to 100kHz) −105 to +5V (DC to 1MHz)	**300Vp-p** (±150V) ●±150V range RL=100Ω 100Vrms (40Hz to 200kHz) 40Vrms (20Hz to 500kHz) RL=300Ω ±150V (DC to 50kHz) ±55V (DC to 500kHz) ●−50 to +250V range RL=500Ω −50 to +250V (DC to 50kHz) +45 to +155V (DC to 500kHz) ●−250 to +50V range RL=500Ω −250 to +50V (DC to 50kHz) −155 to −45V (DC to 500kHz)	**300Vp-p** (±150V) ●±150V range RL=50Ω 100Vrms (40Hz to 200kHz) 40Vrms (20Hz to 500kHz) RL=150Ω ±150V (DC to 50kHz) ±55V (DC to 500kHz) ●−50 to +250V range RL=250Ω −50 to +250V (DC to 50kHz) +45 to +155V (DC to 500kHz) ●−250 to +50V range RL=250Ω −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)
Output **Maximum current**	**1A**rms, 2.82Ap-p (40Hz to 1MHz) ±0.75A (DC to 40Hz)	**2A**rms, 5.66Ap-p (40Hz to 500kHz) ±1.0A (DC to 40Hz)	**4A**rms, 11.3Ap-p (40Hz to 500kHz) ±2.0A (DC to 40Hz)	**1A**rms, 2.83Ap-p (40Hz to 200kHz) ±0.5A (DC to 40Hz)	**2A**rms, 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)
Output **Slew rate**	600V/μs typ.	400V/μs typ.	400V/μs typ.	450V/μs typ.	450V/μs typ.	5000V/μs typ.
Output **Impedance**	0.5Ω+1.5μH max.	0.25Ω+0.8μH max.	0.125Ω+0.4μH max.	1Ω+3.2μH max.	0.5Ω+1.6μH max.	1.5Ω+0.5μH typ.
Output **Preamplifier output**	Inverted phase of input. (Available for 2 units BTL connection), Connector BNC-R on rear panel			Opposite phase of input. (Available for 2 units BTL connection), Connector BNC-R on rear panel		————
Output **DC bias**	±50V (by 10 turns potentiometer)	±100V (by 10 turns potentionmeter)		±200V (by 10 turns potentiometer)		±70V (by 10 turns potentiometer)
Output **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		
Input **Type**	2 inputs of A and B (Enable to add), Same phase both of A and B input against output			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 **Impedance**	50Ω/600Ω selectable			50Ω／600Ω selectable		50Ω
Gain	×10, ×20, ×50, ×100 and ×（1 to 3）variable continuously			×20, ×40, ×100, ×200 and ×（1 to 3）variable continuously		×10,×20,×50,×100 and ×（0.4 to 1）variable continuously
Frequency response	1MHz (+0.5 to −1dB, 10Vrms)	1MHz (+0.5 to −3dB, 10Vrms, ±75V range)		500kHz (+0.5 to −3dB, 20Vrms, ±150V range)		10MHz (+0.5 to −3dB, 10Vrms)*2
Input voltage	AC100V (One of 120V/200V/220V/240V is enable to modify by factory option) 48Hz to 62Hz			AC100V (One of 120V/200V/220V/240V is enable to modify by factory option) 48Hz to 62Hz		AC85V to 138V, AC170V to 250V 48Hz to 62Hz
Power consumption	200W/300VA	400W/550VA	700W/900VA	400W/600VA	700W/950VA	400W/700VA
Dimensions (mm) / Weight (NET)	220(W)×132.5(H)×450(D) /approx.10kg	290(W)×132.5(H)×450(D) /approx.13kg	290(W)×177(H)×450(D) /approx.18kg	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
Reference	*1 Average value indication of DC+AC			*1 Average value indication of DC+AC *2 DC mode : DC to 100kHz (±0.3dB)、AC mode : 40Hz cutoff frequency HPF is inserted.		※HSA4101 is only enable to change input coupling (AC/DC) .

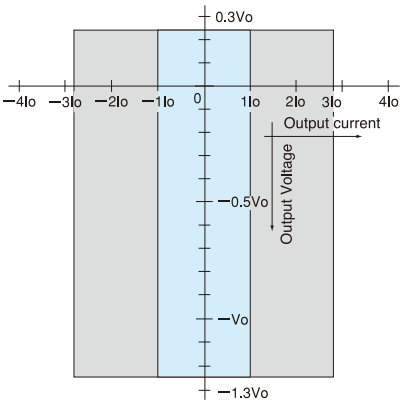
■ Operating area



For the +125V to −25V range of the **HSA4012** and **HSA4014**, and the +250V to −50V range of the **HSA4051** and **HSA4052**.



For the ±75V range of the **HSA4012** and **HSA4014**, and the ±150V range of the **HSA4051** and **HSA4052**, and output of **HSA4011.** (HSA 4011 applies to a dotted line portion.)



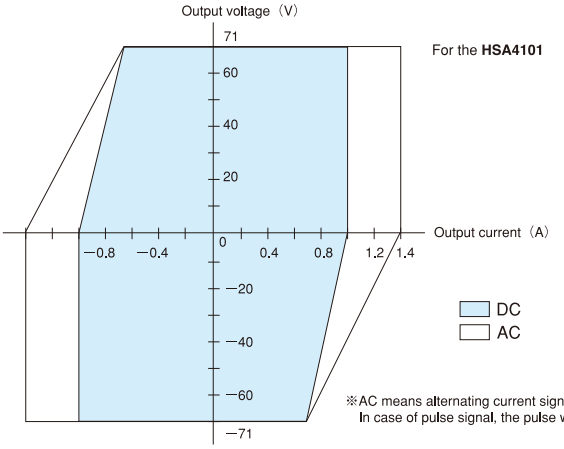
For the +25V to −125V range of the **HSA4012** and **HSA4014**, and the +50V to −250V range of the **HSA4051** and **HSA4052**.

: For DC (including AC at 1Hz or less) or the mean value of AC.

: For the peak value of AC at 40Hz or more.

■ Values of Vo and Io

Models	Vo	Io
HSA4011	100V	0.75A
HSA4012		1.0A
HSA4014		2.0A
HSA4051	200V	0.5A
HSA4052		1.0A

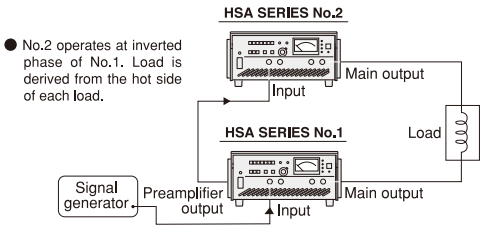


※AC means alternating current signal of 40Hz to 100kHz. In case of pulse signal, the pulse width is 25ms or less.

■ One point advice

● Provided more high voltage (by BTL connection)

It is available for two times output voltage and power against floating load (isolated load from ground) by using BTL connection of 2 units of HSA series.



※In case of increasing current : As this series are not able to perform a parallel operation, Current synthesized unit is required.

■ Relevant products

High Speed Bipolar Amplifier — BA series

- BA4825 : DC to 2MHz, 300Vp-p, 0.5Arms
- BA4850 : DC to 50MHz, 20V, 1A
- Four-quadrant output

BA4825 ►

Multifunction Generator — WF1973/WF1974

▲WF1974

Prepared function generator as the most suitable signal source for power amplifiers including high speed bipolar amplifier.

NF Corporation

Specifications are subject to change without notice.

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● REPRESENTATIVE

http://www.nfcorp.co.jp/english/

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