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Datasheet



A1110-16-A

4-Quadrant Voltage Amplifier
DC - 1 MHz



1 Product Description

The A1110-16-A is a linear, extreme-broadband, precision power amplifier designed for all applications which require fast-changing signals with high performance.

Three selectable operating voltages per polarity are available for high voltage/low current or low voltage/high current applications. Voltage switching is manual. Especially for very low impedance loads, the operating voltage can be reduced to a 1/3, which results in a corresponding reduction of power dissipation.

The device is equipped with a temperature-controlled, quietly-running fan. An over-temperature disconnection, a power-loss calculation and an absolute-current monitoring guarantee perfect short-circuit and overload protection. An interlock offers the possibility of a remote-controlled security system. The operation is implemented over the operating elements on the front panel and over the USB interface by PC with a graphical user interface.

Please find the latest release of this datasheet on our website:

www.drhubert.com



2 Features

- 4-quadrant voltage amplifier
- Fully configurable and operable by means of the supplied software
- Output voltages up to $75 V_{\text{peak}}$
- Output current up to $28 A_{\text{peak}}$
- Symmetrical input
- Series / parallel input connection in case of higher voltage / current requirements
- USB port as standard
- 3 supply voltages

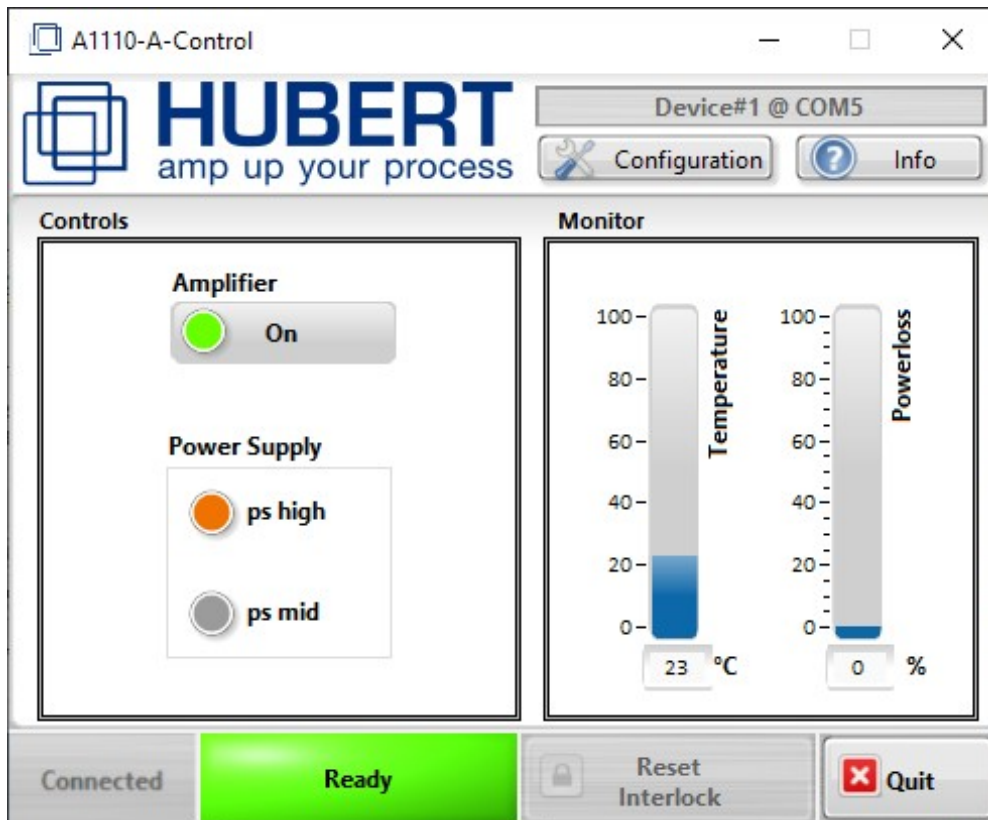
3 Applications

- General lab applications for research, development and testing
- EMC testing
- Material testing
- MRI
- Component tests
- Plunger coil drives
- Piezo actuation
- Generation of magnetic fields (e.g. with Helmholtz coils)
- Medical engineering
- Laser technology
- Plasma technology



4 Control Software

The device includes an application software that ensures fully remote-controlled operation and comprehensive configuration of the amplifier via the USB interface. A trouble-free integration to existing automated test systems is guaranteed by a complete remote command list.



5 Pictures





6 Specifications

Parameters	Specification	Conditions/Moments
	Controlled Voltage Mode	25° C ambient temperature
		Continuous operation
Input Impedance	100 kOhm	unbalanced, 1kHz
	200 kOhm	balanced, 1kHz
Maximum Input Level	5.5 V (+14,5 dBV)	< 1 % THD, 1 kHz, 8 Ohm Load
Common-Mode Rejection Ratio	> 60 dB	Rs= 50 Ohm, 10 Hz – 200 kHz, re +34.5 dBV @ Output
Small Signal Frequency Response	DC - 200 kHz	+0, -0.5 dB, 1 W @ 8 Ohm High Voltage Mode
	DC - 1 MHz	+0, -3.0 dB, 1 W @ 8 Ohm High Voltage Mode
Phase response	+0, -5 degrees	10 Hz - 30 kHz
Power Response (continuous)		
8 Ohm Load	400 W	DC - 100 kHz, < 0.2% THD High Voltage Mode
	200 W	DC – 200 kHz, < 1% THD High Voltage Mode
3 Ohm Load	1000 W	DC - 30 kHz, < 0.2% THD High Voltage Mode
	800 W	DC - 100 kHz, < 0.5% THD High Voltage Mode
	450 W	DC - 200 kHz, < 1% THD High Voltage Mode
1 Ohm Load	350 W	DC – 200 kHz, < 0.5% THD Mid Voltage Mode
0.5 Ohm Load	175 W	DC – 200 kHz, < 0.5% THD Low Voltage Mode
Slew Rate	100 V/uSec	
Residual Noise		
10 Hz - 22 kHz	< 100 uV (< -80 dBV)	All Voltage Modes Input shorted 8 Ohm Load
10 Hz - 80 kHz	< 125.5 uV (< -78 dBV)	All Voltage Modes Input shorted 8 Ohm Load
10 Hz - 200 kHz	< 158.5 uV (< -76 dBV)	All Voltage Modes Input shorted 8 Ohm Load
Signal-to-Noise Ratio		
10 Hz - 22 kHz	< -114.5 dB	re +34.5 dBV, < 1% THD 8 Ohm Load High Voltage Mode

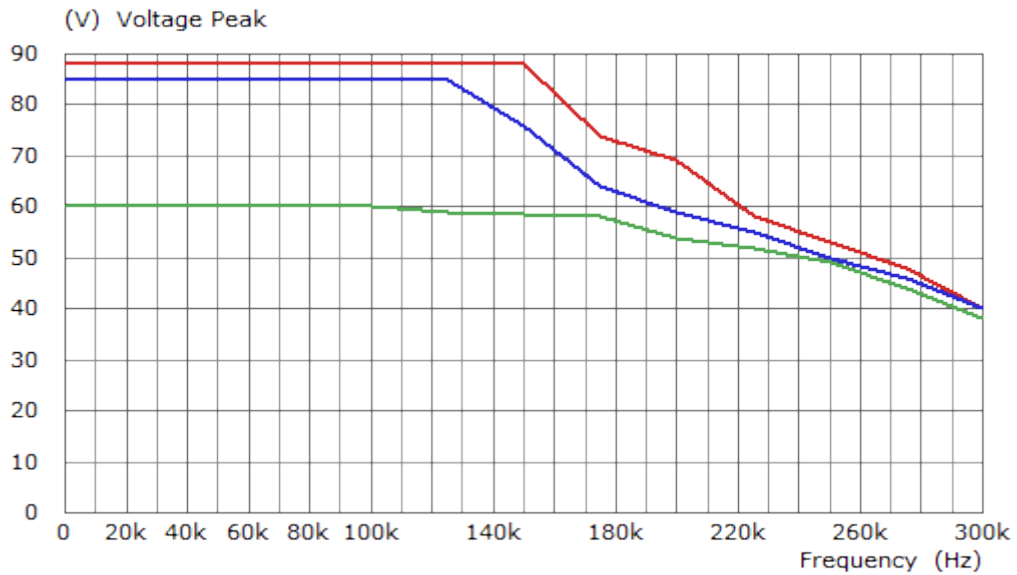


Parameters	Specification	Conditions/Moments
10 Hz - 80 kHz	< -112.5 dB	re +34.5 dBV, < 1% THD 8 Ohm Load High Voltage Mode
10 Hz – 200 kHz	< -110.5 dB	re +34.5 dBV, < 1% THD 8 Ohm Load High Voltage Mode
THD+N		
10 Hz – 100 kHz All Voltage Modes	< 0.03 %	1 W @ 8 Ohm
Output Offset	< 1.0 mV	DC
Output Impedance	< 60 mOhm	@1 kHz; Instrument: HP8751A, Network Analyzer
Power, Pulse, 40ms, 20% Duty Cycle		
Peak output		
3.1 Ohm	80 V, 25.8 A	High Voltage Mode
0.25 Ohm	7 V, 28 A	Low Voltage Mode
Current, Pulse, 500ms, 5% Duty Cycle, unipolar		
Peak Output		
60 mOhm	+ 55 A	+Umid / -Ulow
60 mOhm	- 55 A	+Ulow / -Umid
Power, Sinus, 100Hz, continuous		
3 Ohm	55.5 V, 18.5 A, 1026 W	< 1 % THD, High Voltage Mode
0.25 Ohm	4.75 V, 19 A, 90 W	< 0.5% THD Low Voltage Mode
Power, DC		
3 Ohm	45 V, 15 A, 675 W	Mid Voltage Mode
0.55 Ohm	13.5 V, 24.5 A, 330 W	Low Voltage Mode
Sink Power, DC	340 W	Low Voltage Mode; see U/I-Plot
Gain	1 V / 10 V	Uin / Uout
Physical Characteristics		
AC Power	230 VAC / 50 Hz	
Remote control	USB Ethernet (Option)	
Operating Temperature	10 °C to 55 °C	
Humidity	80% or less	non-condensing
Cooling	Forced air	
Dimensions (W x H x D)	449 x 177 x 585.5 mm	
Weight	Approx. 30 kg	



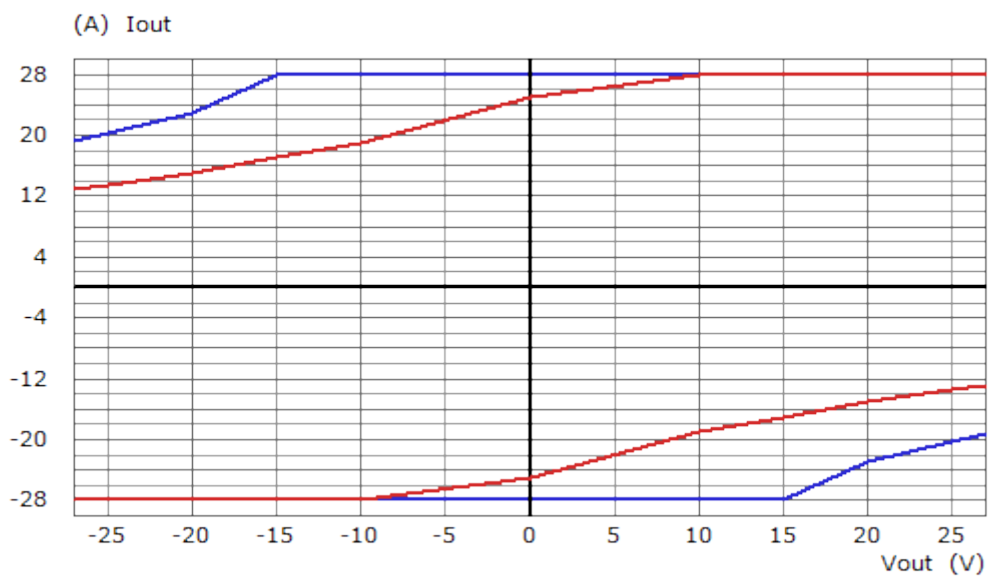
6.1 Output Voltage vs. Frequency (THD + N < 1%)

Red: @ 8 Ohm
Blue: @ 4 Ohm
Green: @ 2 Ohm



6.2 Output Current vs. Output Voltage (THD + N < 1%)

Supply Voltage: Low
Blue: AC Limit
Red: DC Limit



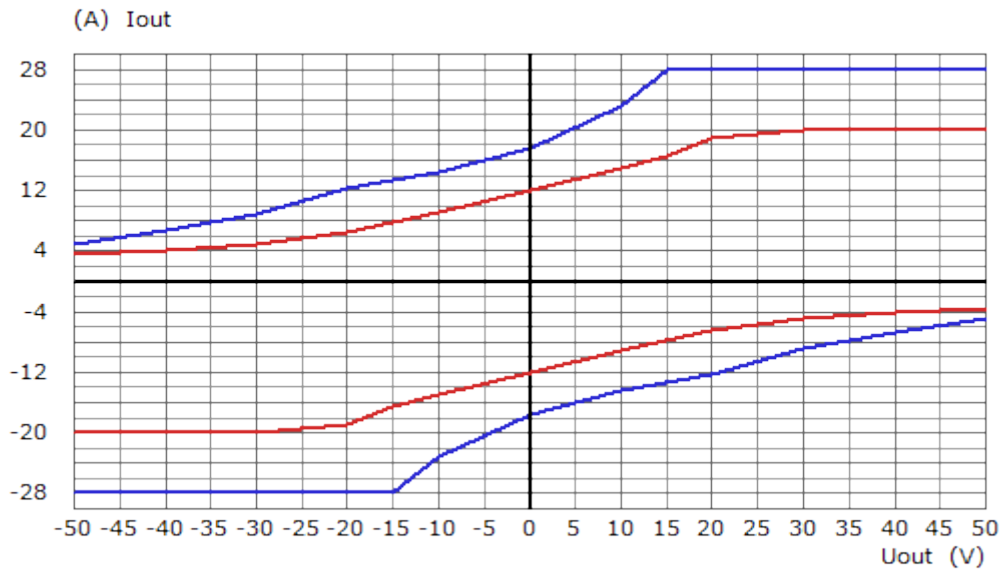


6.3 Output Current vs. Output Voltage (THD + N < 1%)

Supply Voltage: Mid

Blue: AC Limit

Red: DC Limit

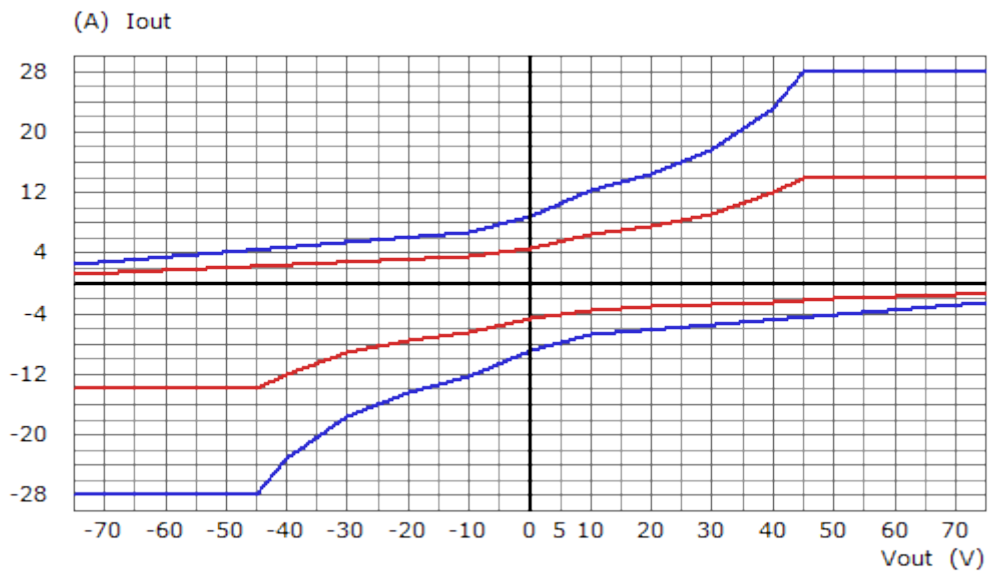


6.4 Output Current vs. Output Voltage (THD + N < 1%)

Supply Voltage: High

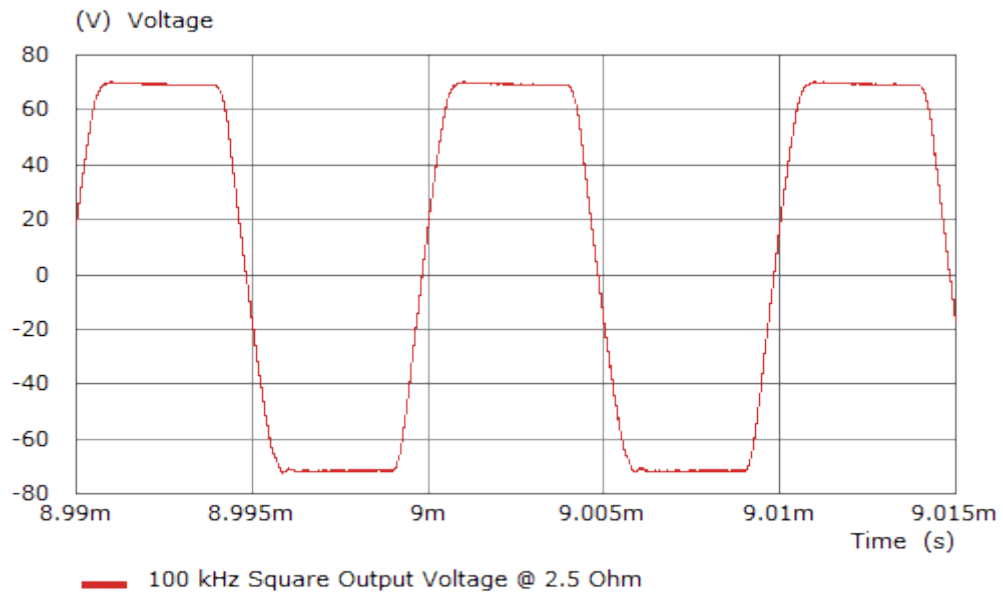
Blue: AC Limit

Red: DC Limit



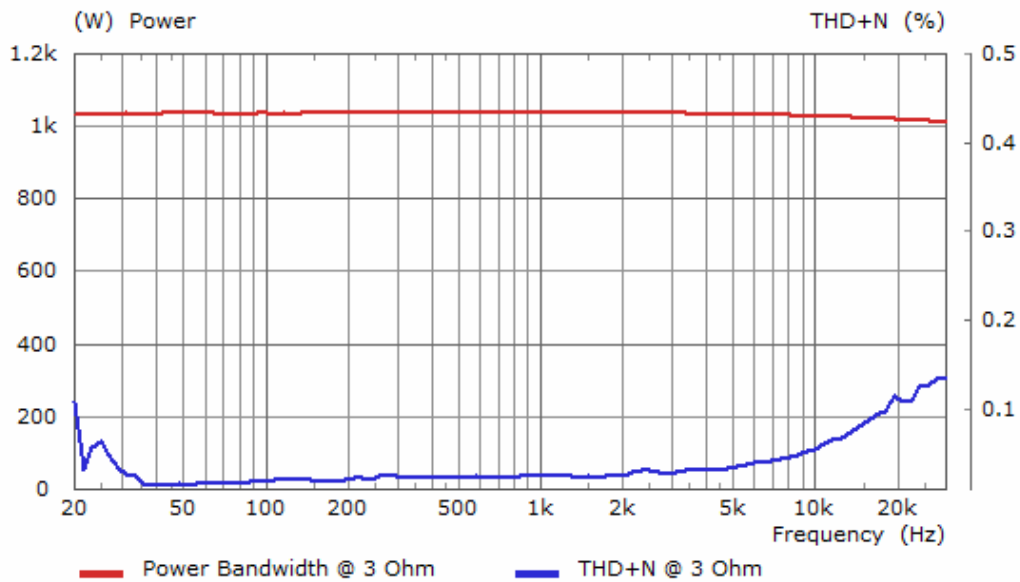


6.5 Square Wave at 100 kHz and 2,5 Ohm Load



6.6 Power Bandwidth at 3 Ohm Load

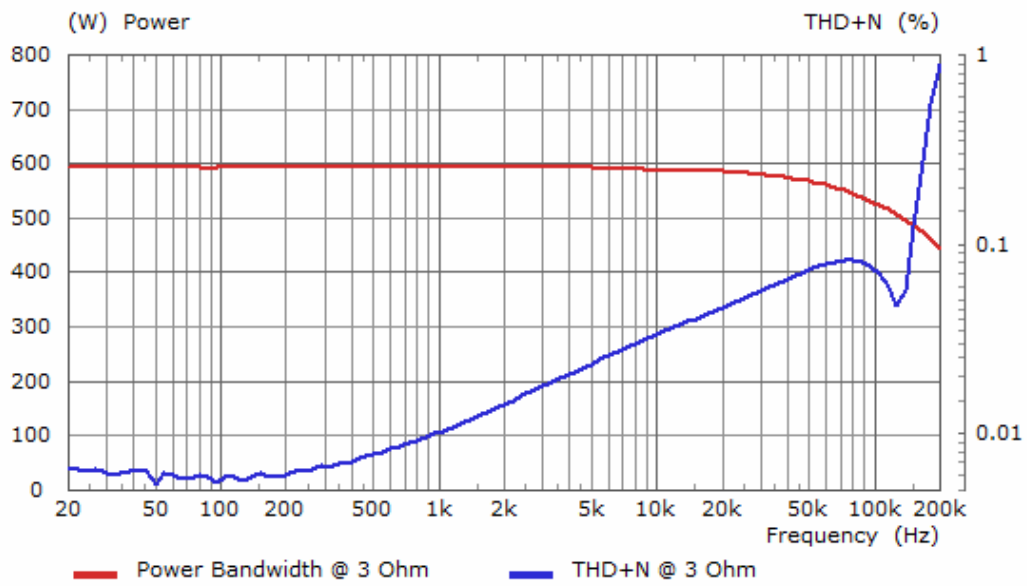
Input Level Normalised to Max. Output Level at 30 kHz; THD+N < 1%





6.7 Power Bandwidth at 3 Ohm Load

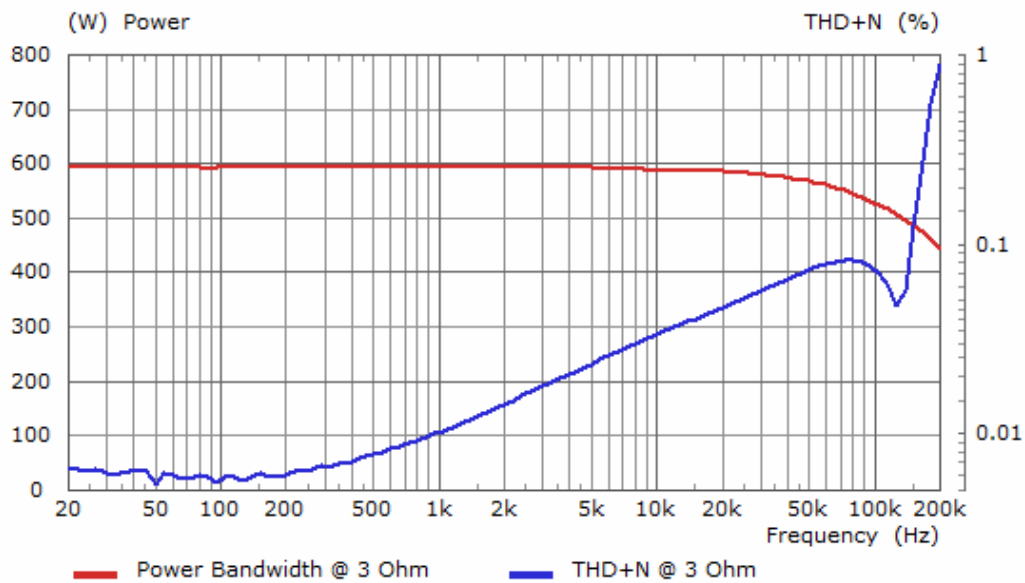
Input Level Normalised to Max. Output Level at 200 kHz; THD+N < 1%



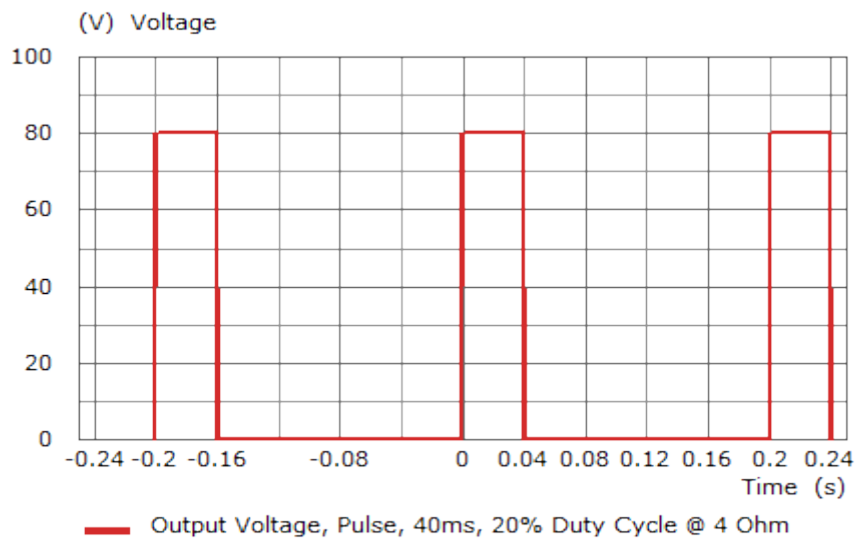


6.8 Power Bandwidth at 8 Ohm Load

Input level normalized to max. output level at 100 kHz; THD+N < 1%

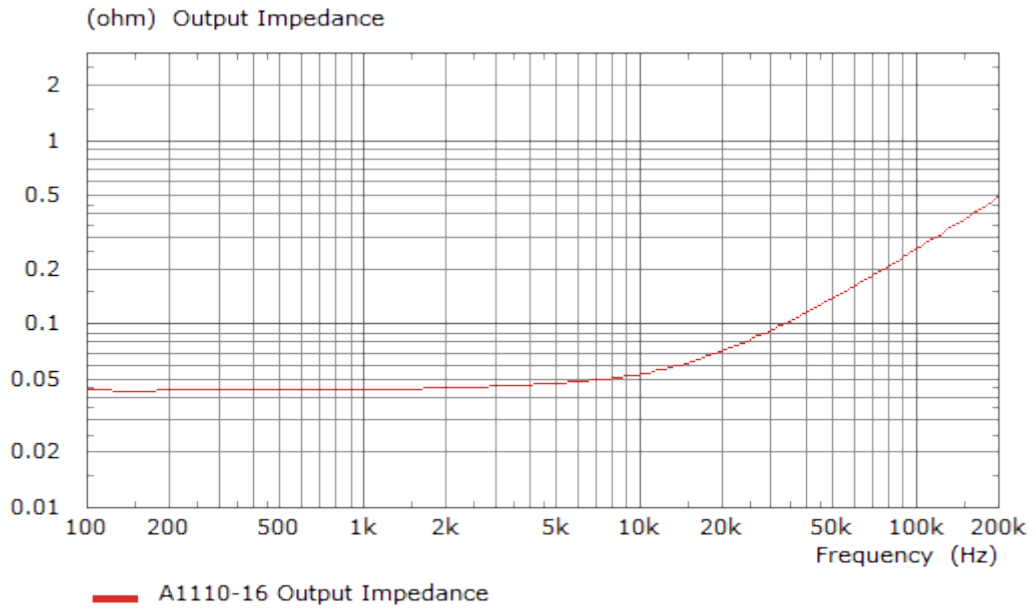


6.9 Pulse at 4 Ohm Load





6.10 Output Impedance





7 Product Options

The following product options are available at the time of placing the order. Upgrades of existing devices are not possible.

Article Name	Article Description	Order Number
A1110-16-A	4-Quadrant Voltage Amplifier	11100020
Option_02: Internal Current Measurement	High-performance current transformer; Precision DC +/-0.1%; Output BNC bush, galvanically isolated from the amplifier	11101020
Option_03: Ultra Stable Gain	Gain $10 \pm 0,1\%$ ($\pm 25\text{ppm}/\text{C}^\circ$); Offset $\pm 1\text{mV}$ ($\pm 25\text{uV}/\text{C}^\circ$)	11101030
Option_05: Isolation Amplifier	For potential isolation of input and output	11101050
Option_09: 100 V Output Voltage	Output Voltage up to $\pm 100\text{V}$	11101090
Option_13: Ethernet Interface	For connection to a computer (RJ45)	11101130
Option_16: Sensing	Adjustable voltage drop: 500mV / 1V / 2V	11101230

8 Contact

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9 Document History

Revision	Date	Changes
2.0	March 2020	First publication in new layout