Performance of your APA:

Technical Specifications

A note about how we measure performance.

Amplifier power ratings differ from manufacturer to manufacturer making it very difficult to compare models directly from spec sheets. We have tried to make the measurements presented as real world as possible for the application, which is music reproduction. Following these specifications, there is a section explaining the stimuli and conditions used to measure the amplifier - this enables you to subject other amplifiers to the same conditions to compare their performance – the *(Test type N)* you will see after all power specifications refers to these tests – see page 63.

General

Parameter	APA-4E8	APA-4E6
Amplifier Type	Class D amplifier with digital processing and control	
Power Supply Type	Universal input, power factor corrected switch mode	
Number of Processing Channels	4	
Number of Output Channels	2 or 4	
Output Channel Operating Modes	Quad half bridge driving loads from 2-16 Ohms Stereo full bridge driving loads from 4-32 Ohms	
Peak Usable Output Voltage per Half Bridge Channel	180V	135V
Peak Usable Output Voltage per Full Bridge Channel	360V	270V
Peak Usable Output Current per Channel	72A	54A
Maximum output power: All channels driven (all channels running pink noise with 12dB crest factor)		
8 Ohms	6800W (4 x 1700W)	3760W (4 x 940W)
4 Ohms	13200W (4 x 3300W)	7440W (4 x 1860W)
2.7 Ohms	20000W (4 x 5000W)	12000W (4 x 3000W)
2 Ohms	20000W (4 x 5000W)	13000W (4 x 3250W)
Maximum output power: Both bridged pairs driven (all channels running pink noise with 12dB crest factor)		
16 Ohms	6800W (2 x3400W)	3760W (2 x1880W)
8 Ohms	13200W (2 x 6600W)	7440W (2 x 3720W)
4 Ohms	20000W (2 x 10000W)	13000W (2 x 6500W)

Audio System

Parameter	APA-4E8	APA-4E6
Frequency Response at 2000W into 4 Ohms	20Hz = +0dB / -0.25dB, 20kHz = +0dB / -0.5dB	
System Latency	1.25mS (Analogue) 1.64mS/(AES 96k)	
Maximum Output Level into 4 Ohms	+44dBu	+41.5dBu
Nominal Output Impedance	0.05 Ohm (half bridge), 0.1 Ohm (bridge)	
Output Noise into 4 Ohms (un-weighted)	-62dBu (22-22kHz)	-63.5dBu (22-22kHz)
Output Dynamic Range into 4 Ohms (un-weighted)	105dB (22-22kHz)	105dB (22-22kHz)
Maximum Input Level	+22dBu	
Nominal Input Impedance	16k (balanced), 8k (un-balanced)	
Nominal Analogue Gain	+32dB	
Analogue Input Channel Noise (un-weighted)	-90dBu (22-22kHz)	
Analogue Input Dynamic Range (un-weighted)	112dBu (22-22kHz)	
Analogue Input CMR at 100Hz	-80dB	
THD + Noise at 1kHz, 10W into 4 Ohms	0.04% (22-22kHz)	
THD + Noise at 1kHz, 100W into 4 Ohms	0.04% (22-22kHz)	
THD + Noise at 1kHz, 500W into 4 Ohms	0.06% (22-22kHz)	
THD + Noise at 1kHz, 1000W into 4 Ohms	0.08% (22-22kHz)	
THD + Noise at 1kHz, 2000W into 4 Ohms	0.10% (22-22kHz)	

Digital Audio

Parameter	APA-4E8 APA-4E6
ADC and DAC Sample Rate	96kHz (oversampling type)
ADC and DAC Resolution	24bit
Accepted AES3 Sample Rates	44.1kHz, 48kHz, 96kHz, 192kHz
AES3 Resolution	16 to 24bit
DSP Sample Rate	96kHz
DSP Resolution	32bit (floating point)
Processing	
General	Delay, Polarity, Gain, Latency Compensation
Dynamic EQ (4 x 3 Bands)	Cut/Boost Abv/Blw THD; PEQ/Shelf/Full Range
IIR Equalisation (108 Bands)	PEQ, Shelf, VariQ, Notch, BP, Allpass, Phase
FIR Filtering	Variable # of taps x 4 output channels
Crossover Filtering (4 x 2)	From 6dB/Oct. To 48dB/Oct. But./Bes./L-R
Compressor (4 x 1)	Soft knee, manual/auto T.C., ratio up to 16:1
Speaker Protection Limiters (4 x 2)	Look-ahead program; zero overshoot peak
Amplifier Protection Limiters	Peak current limiter: per channel (optimised)
Mains Breaker Protection Limiter	Average mains current draw (user adjustable)
System Pre-sets	Over 100
System latency	
Analogue In to Speaker Out	1.25mS
AES In to Speaker Out	1.64mS

Storage & Losses

Parameter	APA-4E8	APA-4E6
Stored Charge	7.5 Coulomb	2.5 Columb
Energy Stored	2700 Joules	900 Joules
Sleep Mode Power	<1WRMS	
Idle Power	200WRMS	150W RMS
Power Losses (for low power music)	400WRMS	300W RMS
Power Losses (for very high power use)	800WRMS	600W RMS
Efficiency (load dependant)	70% - 80% typical	65% - 75% typical

Physical and Mechanical

Parameter	APA-4E8 APA-4E6
Input Connections Audio	4 x XLR (AES switched onto inputs A & C)
Output Connections Audio	4 x NL4 "Speakon"
Power Connector	1 x 32A "PowerCon"
Recommended Circuit Breaker	C32
GPI Connections	10 pin mini-Phoenix
RS485 Connector	1 x XLR Male (legacy only)
Ethernet Connections	1 x RJ45 (100Mbit) Control; 2 x RJ45 (1Gbit) Audio
Front Panel USB	Micro USB Type 'B'
Display	QVGA Full Colour TFT
Metering	4 x 10 point tri-colour LED, multi-mode
System start-up time (from cold/standby)	24/18 seconds
Dimensions	88mm x 482mm x 498mm (2U)
Dimensions (shipping)	620mm x 620mm x 210mm
Weight	15.0kg 14.0kg
Weight (shipping)	18.0kg 17.0kg

Input Power

Parameter	APA-4E8	APA-4E6
Operating voltage range	90V – 240V[3]	
230V AC		
MAX long term current (1 hour)	16.5ARMS	9.3ARMS
MAX long term power (1 hour)	3800W RMS	2140W RMS
MAX short term current (2 sec)	24.3A RMS	13.5A RMS
MAX short term power (2 sec)	5600W RMS	3150W RMS
115V AC		
MAX long term current (1 hour)	29.6A RMS	18.0A RMS
MAX long term power (1 hour)	3400W[4] RMS	2070W RMS
MAX short term current (2 sec)	43.5A RMS	24.5A RMS
MAX short term power (2 sec)	5000W[2] RMS	2820W RMS

Output Power: Peak Performance

Parameter	APA-4E8	APA-4E6
All channels driven Maximum output power (all channels running pink noise with 12dB crest factor)		
8 Ohms	6800W (4 x 1700W)	3760W (4 x 940W)
4 Ohms	13200W (4 x 3300W)	7440W (4 x 1860W)
2.7 Ohms	20000W (4 x 5000W)	12000W (4 x 3000W)
2 Ohms	20000W (4 x 5000W)	13000W (4 x 3250W)
Both bridged pairs driven Maximum output power (all channels running pink noise with 12dB crest factor)		
16 Ohms	6800W (2 x3400W)	3760W (4 x 940W)
8 Ohms	13200W (2 x 6600W)	7440W (4 x 1860W)
4 Ohms	14800W (2 x 7400W)	12000W (4 x 3000W)
All channels driven 25mS 80Hz sine wave power burst at 150BPM with 10dB crest factor with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 3)*		
8 Ohms	6000W (4 x 1500W)	3400W (4 x 850W)
4 Ohms	10000W (4 x 2500W)	5600W (4 x1400W)
2.7 Ohms	12000W (4 x 3000W)	6600W (4 x 1650W)
2 Ohms	12000W (4 x 3000W)	5600W (4 x 1400W)
Both bridged pairs driven 25mS 80Hz sine wave power burst at 150BPM with 10dB crest factor with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 3)*		
16 Ohms	6000W (2 x 3000W)	3400W (4 x 850W)
8 Ohms	10000W (2 x 5000W)	5600W (4 x1400W)
4 Ohms	12000W (2 x 6000W)	6600W (4 x 1650W)
Single channel driven RMS sine wave long power burst with 9dB crest factor (2 seconds on, 12 off) *(Test type 4)*		
8 Ohms	1800W	950W
4 Ohms	3200W	1800W
2.7 Ohms	3600W	2000W
2 Ohms	3600W	2000W
Single bridged pair driven RMS sine wave long power burst with 9dB crest factor (2 seconds on, 12 off) *(Test type 4)*		
16 Ohms	3600W	1900W
8 Ohms	3600W	2000W
4 Ohms	3600W	2000W

[3] Low mains voltages may result in reduced power output due to over current protection
[4] Power de-rating indicated for mains operating at 115V

Output Power: Continuous Performance

Parameter	APA-4E8	APA-4E6
All channels driven (230V) RMS sine wave long term continuous power with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 1)*		
8 Ohms	3000W (4 X 750W)	1500W (4 X 375W)
4 Ohms	3000W (4 X 750W)	1500W (4 X 375W)
2.7 Ohms	3000W (4 x 750W)	1500W (4 X 375W)
2 Ohms	3000W (4 x 750W)	1500W (4 X 375W)
Both bridged pairs driven (230V) RMS sine wave long term continuous power with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 1)*		
16 Ohms	3000W (2 x 1500W)	1500W (4 X 375W)
8 Ohms	3000W (2 x 1500W)	1500W (4 X 375W)
4 Ohms	3000W (2 x 1500W)	1500W (4 X 375W)
All channels driven (115V) RMS sine wave long term continuous power with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 1)*		
8 Ohms	2400W[5]	1300W
4 Ohms	2400W[3]	1300W
2.7 Ohms	2400W[3]	1300W
2 Ohms	2400W[3]	1300W
Both bridged pairs driven (115V) RMS sine wave long term continuous power with all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 1)*		
16 Ohms	2400W[3]	1300W
8 Ohms	2400W[3]	1300W
4 Ohms	2400W[3]	1300W
Single channel driven RMS sine wave medium term continuous power per single channel (over 60 seconds assuming 20 degree ambient) *(Test type 1)*		
8 Ohms	1800W	950W
4 Ohms	3000W	1200W
2 Ohms	2000W	1000W
Single channel driven RMS sine wave long term continuous power per single channel (over an hour assuming 20 degree ambient) *(Test type 1)*		
8 Ohms	1000W	850W
4 Ohms	1000W	850W
2 Ohms	1000W	600W
Single bridged pair driven RMS sine wave long term continuous power per bridged pair (over an hour assuming 20 degree ambient) *(Test type 1)*		
16 Ohms	2000W	1200W
8 Ohms	2000W	1200W
4 Ohms	2000W	1200W
All channels driven Long term continuous pink noise with 12dB crest factor and all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 2)*		
8 Ohms	6800W	3760W
4 Ohms	13200W	7440W
2.7 Ohms	20000W	12000W
2 Ohms	20000W	13000W
Both bridged pairs driven Long term continuous pink noise with 12dB crest factor and all channels run simultaneously (over an hour assuming 20 degree ambient) *(Test type 2)*		
16 Ohms	6800W	3760W
8 Ohms	13200W	7440W
4 Ohms	20000W	12000W

[5] Power de-rating indicated for mains operating at 115V

Power Measurement Test Types

Test type 1: Continuous RMS Sine Wave

Electronic engineers usually find it easy to measure with constant sine wave tones, so we provide power figures in a continuous RMS sine wave format so that measurements can be made and understood in that context. In reality typical music programme is much more transient in nature, with large peaks and gaps in the sound and it has been generally accepted for many years that the peak power of music is 8 times higher than the average RMS power. However the modern trend towards heavily compressed or synthesised music in dance environments means that continuous sine wave tests once again have some relevance showing the sustained power capability of an amplifier's power supply and output channels. Tests are not limited to, but usually performed at 1kHz.

Test type 2: Continuous Pink Noise

The relationship between peak and RMS equates to a crest factor of 4 (or 12dB), which is commonly available in the form of pink noise which also conveniently provides a broad spread frequency spectrum. Power ratings using pink noise are also relatively easy to make and reasonably representative of real music, so we provide power figures in this format.

Test type 3: Short Burst Sine Wave

Some of the most taxing program material for an amplifier is electronic dance music. This is often dominated in the lower frequency spectrum by bass drum beats which concentrate all the high power energy into repeated large power pulses. These typically consist of one or two cycles of low frequency energy around 80Hz followed by decay and then a string of ongoing repeats, or beats.

To simulate this we have chosen to measure using burst waveforms with 2 cycles of 80Hz sine wave at full power and 30 cycles of 80Hz sine wave at a lower power (0.1466 of the burst power). This produces an average power that is $1/5^{th}$ of the burst power and equates to a crest factor of 3.16 (or 10dB) but with all the high power energy concentrated into the large pulses which are 25mS long and repeated at 150bpm. This pulsed power distribution is much more taxing on an amplifier than the more even distribution found in pink noise. Test can also be run at other frequencies providing their period is a multiple of 25mS.

Test type 4: Long Burst Sine Wave

Synthesised music often contains very high levels of low frequency, low crest factor energy in the form of complex waveforms that can last for several seconds. To test this we use a repeated burst format with full power sine wave applied for 2 seconds, and a 10 second rest state set at a lower power (0.1 of the burst power). This produces an average power that is 1/4th of the full power; equating to a crest factor of 2.83 or (or 9dB), which is extremely demanding on an amplifier and the AC mains supply. Typically the AC mains and safety breakers will only be capable of supplying enough current for a single channel or bridged pair to be driven in this way so it is assumed that the other channels of the amplifier will run with much lighter loads reproducing the other areas of the frequency spectrum. For simplicity, this additional power is not simulated in the test. Tests are not limited to, but usually performed at 1kHz.