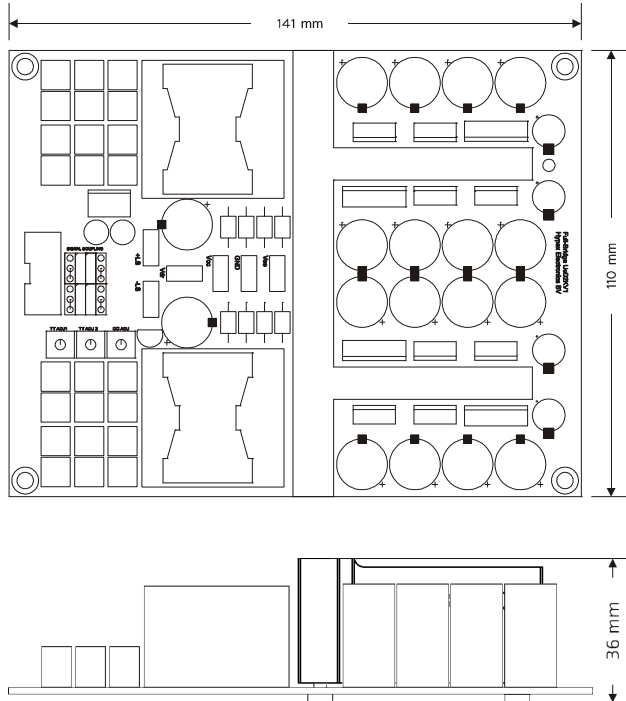


## High Efficiency Power Amplifier Module (OEM Version)



### Highlights

- Flat, fully load-independent frequency response
- Low output impedance
- Low, frequency-independent THD
- Very low noise
- Fully passive loop control

### Features

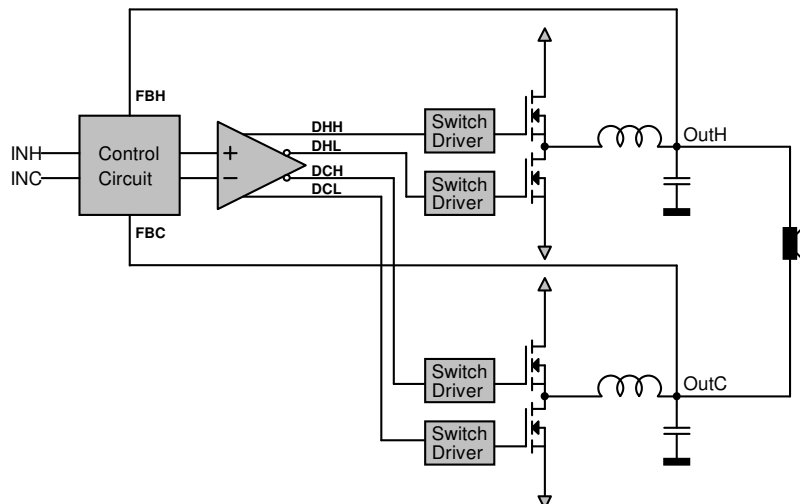
- Runs on unregulated +/- rails
- Pop-free start and stop control
- Differential audio input
- On-board clipping detection
- DC-fault detection
- Overcurrent and overvoltage protection
- Dimensions: 141x110x36mm

### Applications

- Public Address systems
- Active loudspeakers

### Description

The UcD2k™ (OEM version) amplifier module is a self-contained high-performance class D amplifier intended for a audio applications requiring reliable, high power amplification and high audio quality. Chief distinguishing features are flat frequency response irrespective of load impedance, nearly frequency-independent distortion behaviour and very low radiated and conducted EMI. Control is based on a phase-shift controlled self-oscillating loop taking feedback only at the speaker output.



## Performance data

Power supply = +/-72V, Load=4Ω, MBW=40kHz, unless otherwise noted

Item	Symbol	Min	Typ	Max	Unit	Notes
Output Power	P <sub>R</sub>	2500			W	4Ω, THD=1%
		2000	-	-	W	2Ω, THD=1%
Distortion	THD+N	-	0.02	0.05	%	20Hz<f<20kHz. P <sub>out</sub> <P <sub>R</sub> /2
		-	-	0.03	%	20Hz<f<20kHz P <sub>out</sub> =1W
Output noise	U <sub>N</sub>	-	30μ	35μ	V	Unwtd, 20Hz-20kHz
Output Impedance	Z <sub>OUT</sub>	-	-	10m	Ω	f<1kHz
		-	-	50m	Ω	f<20kHz
Power Bandwidth	PBW		20-35k		Hz	
Frequency Response		10	-	50k	Hz	+0/-3dB. All loads.
Voltage Gain	A <sub>V</sub>	32.5	33	33.5	dB	
Supply Ripple Rejection	PSRR		65		dB	Either rail, all frequencies.
Efficiency	η		92		%	Full power
Idle Losses	P <sub>0</sub>		35		W	
Standby Current	I <sub>STBY</sub>		10m		A	
Current Limit			50		A	Hiccup mode after limiting for 40ms

## Absolute maximum ratings

Correct operation at these limits is not guaranteed. Operation beyond these limits may result in irreversible damage

Item	Symbol	Rating	Unit	Notes
Power supply voltage	V <sub>B</sub>	+/-100	V	Unit shuts down when either rail exceeds 98V
Driver supply voltage	V <sub>DR</sub>	+15	V	Referred to -V <sub>B</sub>
Peak output current	I <sub>OUT,P</sub>	52	A	Unit current-limits at 50A
Input voltage	V <sub>IN</sub>	+/-12	V	Either input referred to ground
Air Temperature	T <sub>AMB</sub>	65	°C	
Heat-sink temperature	T <sub>SINK</sub>	90	°C	User to select heat sink to insure this condition under most adverse use case

## Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit	Notes
Power supply voltage	V <sub>B</sub>	50	72	100	V	
Load impedance	Z <sub>LOAD</sub>	1			Ω	
Source impedance	Z <sub>SRC</sub>			7k	Ω	Differential. Corresponds to 3dB noise increase.
Effective power supply storage capacitance	C <sub>SUP</sub>	20m			F	Per rail, per attached amplifier. 2Ω load presumed.

## Connections

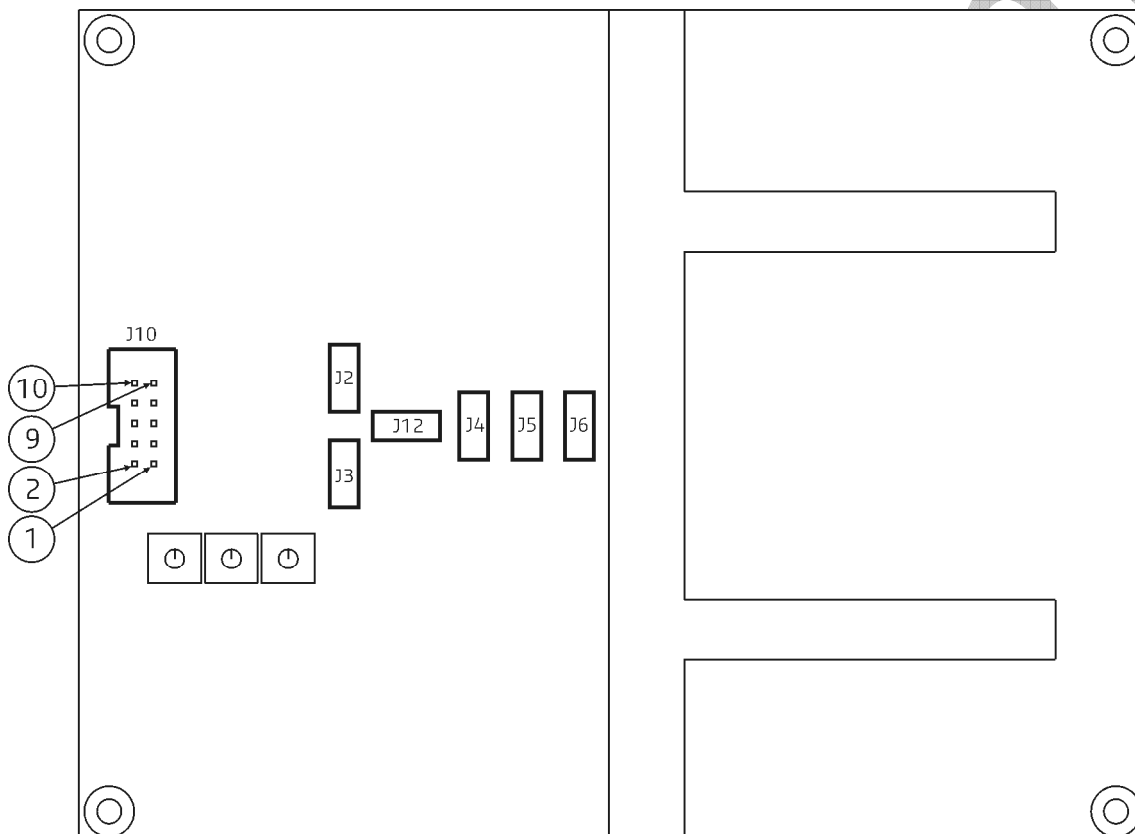
In order to ease connecting the amplifier, all necessary connections to operate the amplifier are grouped in one standard 2.54mm pitch dual row 36 pin header.

Pin	Function
J4	Positive power supply connection
J5	Power supply ground connection <sup>1)</sup>
J6	Negative power supply connection
J12	Driver supply connection (Referred to $-V_B$ )
J2	Loudspeaker connection (hot) <sup>2)</sup>
J3	Loudspeaker connection (cold) <sup>2)</sup>
J10: 1	DC-error output
J10: 2	Ground <sup>1)</sup>
J10: 3	Inverting audio input
J10: 4	Non-inverting audio input
J10: 5	ON/OFF control (Active low)
J10: 6	Clipping detection output
J10: 7	Amplifier Ready
J10: 8	Ground <sup>1)</sup>
J10: 9	Negative auxiliary supply connection (-12VDC) <sup>3)</sup>
J10: 10	Positive auxiliary supply connection (+12VDC) <sup>3)</sup>

1) Physically connected to the same potential (ground).

2) Is NOT connected to ground due to the full bridge topology.

3) This auxiliary supply only supplies the on-board buffer opamp and can be omitted when this opamp is bypassed.



## Audio Input Characteristics

Item	Symbol	Min	Typ	Max	Unit	Notes
Input Impedance	$Z_{IN}$		100k		$\Omega$	Either input to ground
Common Mode Rejection Ratio	CMRR		45		dB	All frequencies

## Control DC-Fault Signalling Characteristics

The UcD2k™ (OEM version) has an integrated DC-error detection which will pull pin 1(J10) low in case of such an event. It is recommended to sense this fault condition and to interrupt both power supply lines in such an event.

Item	Min	Typ	Max	Unit	Notes
Voltage on pin 1(J10), DC-error			1	V	Internal open collector*

\* Must be pulled to a positive voltage by means of an external resistor.

## Clipping detection Characteristics

The UcD2k™ (OEM version) has an integrated output clipping detection which will pull pin 6(J10) low in case of such an event.

Item	Min	Typ	Max	Unit	Notes
Voltage on pin 6(J10), clipping			1	V	Internal open collector *

\* Is meant to be externally pulled to a positive voltage by means of a resistor.

## Amplifier ON/OFF Characteristics

The UcD2k™ (OEM version) is enabled by pulling either pin 5(J10) or pin 4(J11) low. Leaving these pins floating will put the amplifier in standby.

Item	Min	Typ	Max	Unit	Notes
Voltage on pin pin 5(J10)/pin 4(J11), left floating			6,5	V	Internally pulled up*

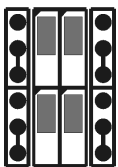
\* Must be pulled low by means of an open collector.

## Amplifier Ready Characteristics

The UcD2k™ (OEM version) has an integrated Amplifier Ready condition which will pull pin 7(J10) high to indicate that the amplifier shut itself down due to an error. This error can be either an overvoltage event or a shorted output

Item	Min	Typ	Max	Unit	Notes
Voltage on pin 7(J10), error			5,6	V	Internally pulled up

## Signal path characteristics



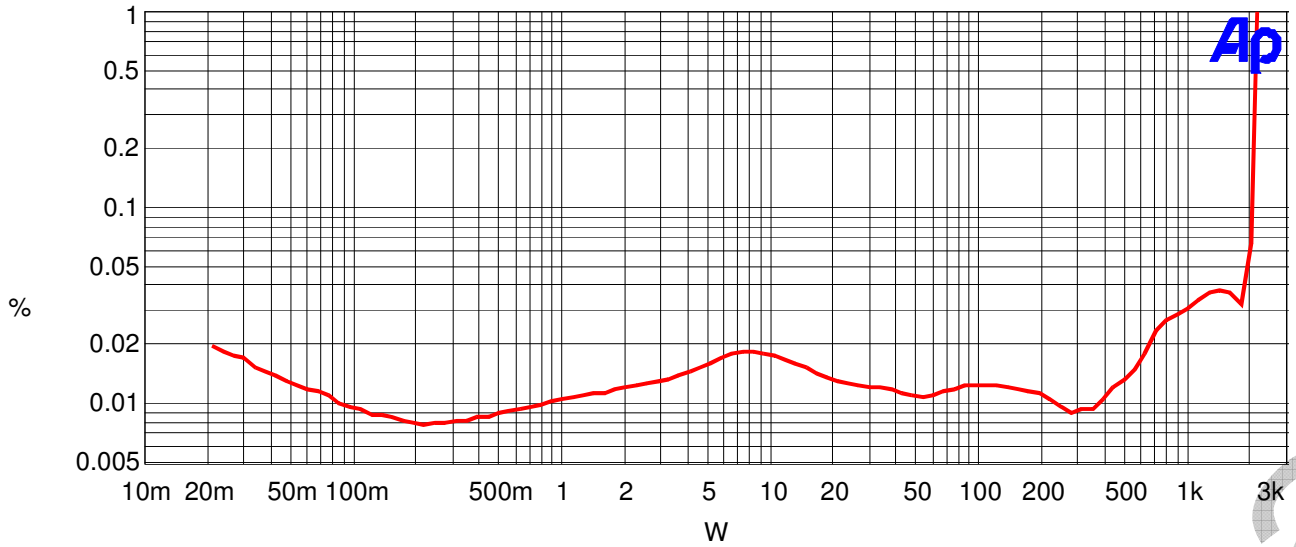
The UcD2k™ (OEM version) enables the user to choose between two different ways of input signal routing. Standard jumper settings are set to use the on-board buffer opamp (NE5532). In order to bypass the on-board buffer and AC-coupling capacitors all four jumpers (J21, J22, J23, J24) need to be set according to picture.

## Amplifier start-up delay

During initial power up the amplifier is disabled for approx. 1.5s regardless of the state of the enable pin. Once powered up there is no start or stop delay.

## Typical Performance Graphs

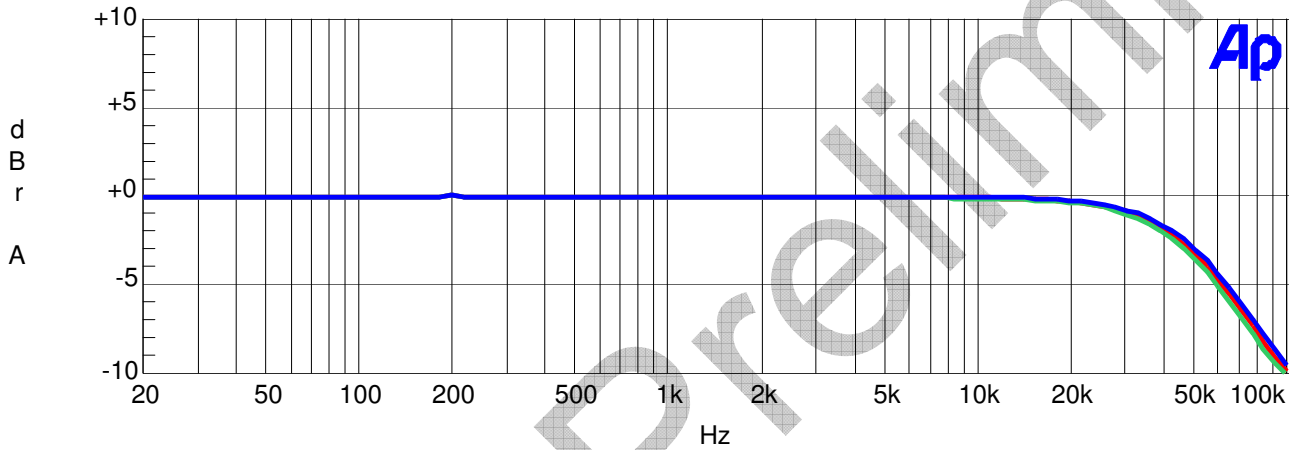
THD vs. Power (1kHz, 2Ω)



THD vs. Frequency (8Ω)

tbd

Frequency Response (2Ω, 4Ω and open circuit)



From top to bottom: open circuit, 4Ω, 2Ω

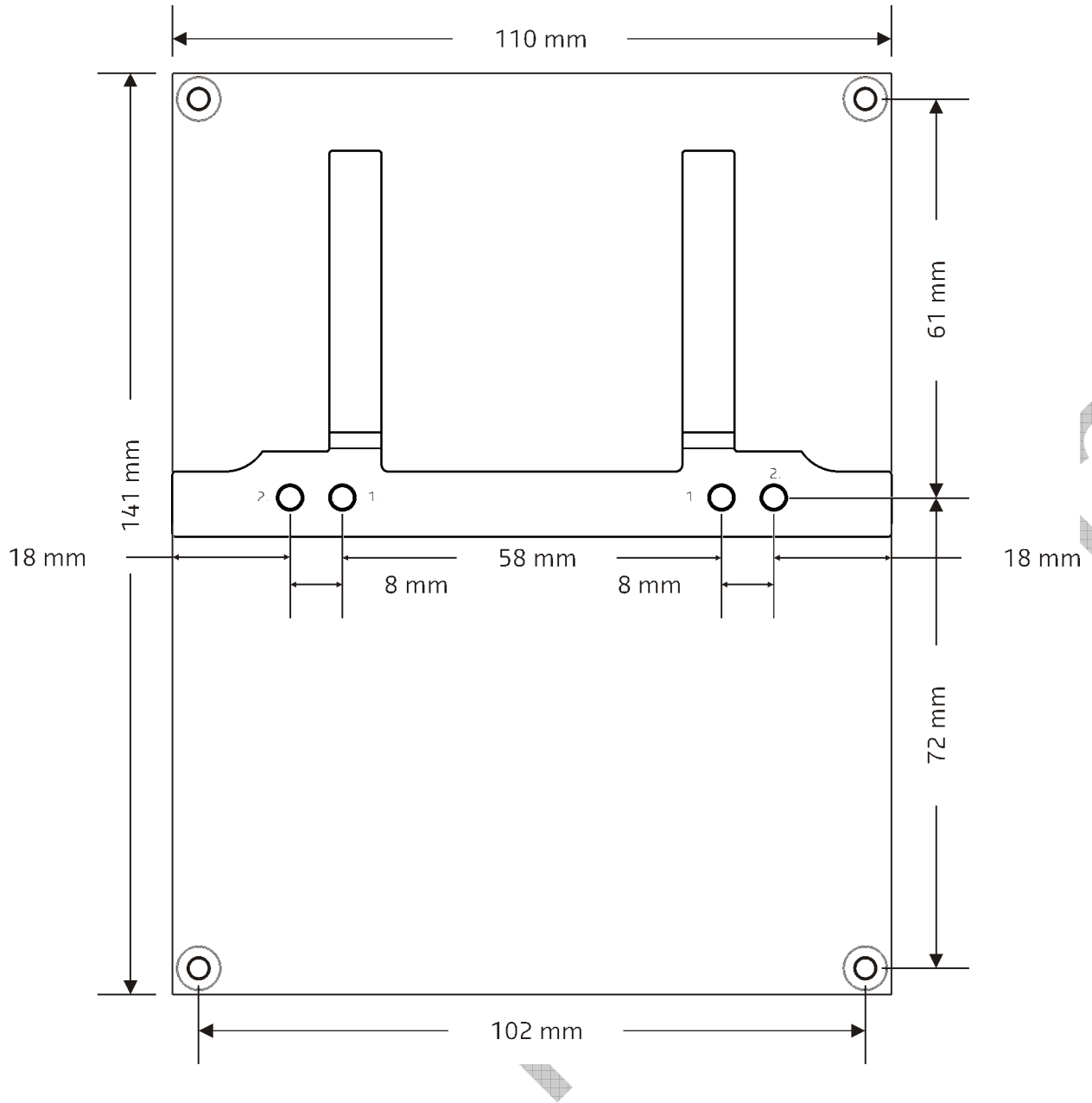
Output Impedance

tbd

19+20kHz IMD (10W, 4Ω)

tbd

Heatsink drill pattern. Top view.



- 1. Metric M5
- 2. UNC 10-24