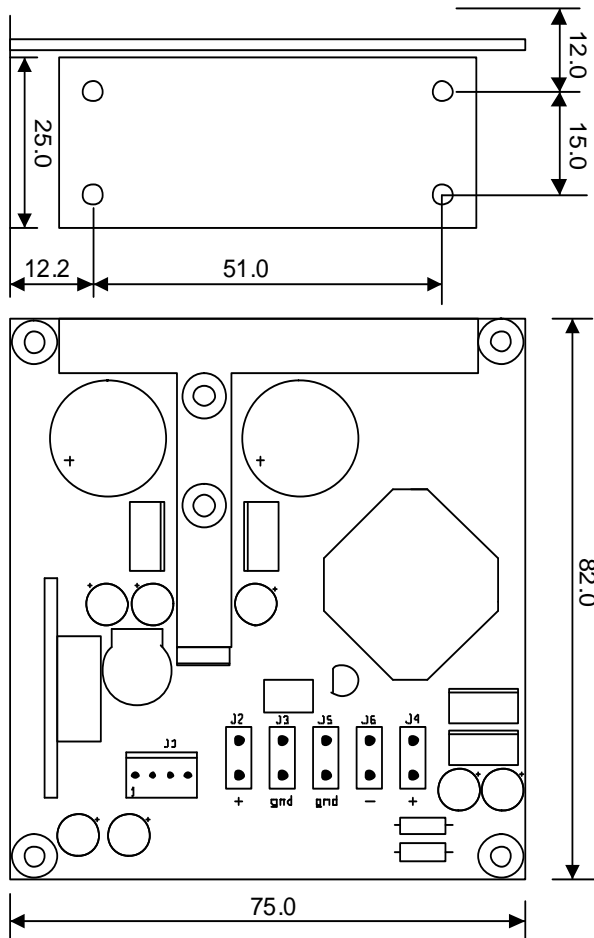


High Efficiency Power Amplifier Module



Highlights

- Flat, fully load-independent frequency response
- Low output impedance
- Very low, frequency-independent THD
- Very low noise
- Fully passive loop control
- Consistent top performer in listening trials

Features

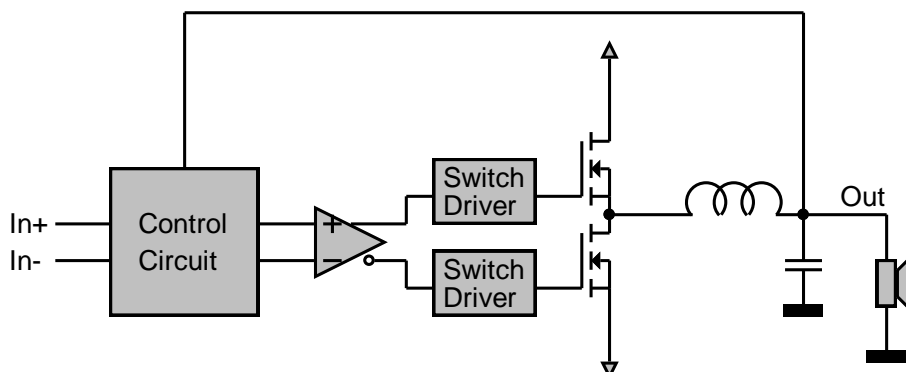
- Runs on unregulated +/- rails
- Pop-free start and stop control
- Differential audio input
- Overcurrent and overvoltage protection
- Weight: 160gms (5.5oz.)

Applications

- Monitor loudspeakers for recording and mastering studios
- Audiophile power amplifiers for professional and consumer use
- Public Address systems
- Home theatre systems
- Active loudspeakers

Description

The UcD400 amplifier module is a self-contained high-performance class D amplifier intended for a wide range of audio applications, ranging from Public Address systems to ultrahigh-fidelity replay systems for studio and home use. 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.



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1 Performance data

Power supply = +/-65V, Load=4Ω, MBW=40kHz, unless otherwise noted

Item	Symbol	Min	Typ	Max	Unit	Notes
Output Power	P_R	-	400	-	W	THD=1%, Load=4Ω
		-	240	-	W	THD=1%, Load=8Ω
Distortion	THD+N	-	0.01	0.05	%	20Hz<f<20kHz ¹⁾ Pout<P _R /2
		-	-	0.004	%	20Hz<f<20kHz Pout=1W
Output noise	U_N	-	30	35	μV	Unwtd, 20Hz-20kHz
Output Impedance	Z_{OUT}	-	-	20	mΩ	f<1kHz
		-	-	150	mΩ	f<20kHz
Power Bandwidth	PBW		20-35		kHz	²⁾
Frequency Response		10	-	50k	Hz	+0/-3dB. All loads.
Voltage Gain	A_V	25.5	26	26.5	dB	
Supply Ripple Rejection	PSRR		65		dB	Either rail, all frequencies.
Efficiency	η		92		%	Full power
Idle Losses	P_0		8		W	
Standby Current	I_{STRY}		10		mA	
Current Limit			20		A	Stop mode after limiting 40ms

Note 1: At higher audio frequencies there are not enough harmonics left in the audio band to make a meaningful THD measurement. High frequency distortion is therefore determined using a 18.5kHz+19.5kHz 1:1 two-tone IMD test.

Note 2: Dielectric losses in the output capacitor limit long term (>30s) full-power bandwidth to 15kHz.

2 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_R	+/-75	V	Unit shuts down when either rail exceeds 68V
Peak output current	I_{OUTP}	18	A	Unit current-limits at 18A
Input voltage	V_{IN}	+/-12	V	Either input referred to ground
Air Temperature	T_{AMB}	65	°C	
Heat-sink temperature	T_{SINK}	90	°C	User to select heat sink to insure this condition under most adverse use case

3 Recommended Operating Conditions

Item	Symbol	Min	Typ	Max	Unit	Notes
Power supply voltage	VB	45 ¹⁾	57	67 ²⁾	V	
Load impedance	Z _{LOAD}	1			Ω	
Source impedance	Z _{SRC}			7	kΩ	Differential. Corresponds to 3dB noise increase.
Effective power supply storage capacitance	C _{SUP}	4700 ³⁾			μF	Per rail, per attached amplifier. 4Ω load presumed.

1) Unit shuts down when either rail drops below 30V.

2) Unit shuts down when either rail exceeds 75V.

3) The effective power supply storage capacitance of Hypex SMPS is already in excess of 4700μF. Do not add supplementary capacitance.

4 Connections

4.1 J1: Input and ON/OFF control

Connector type: 4-pin MOLEX® KK® series, part number 22-27-2041.

Pin	Function
1	ON/OFF control
2	Inverting Audio Input
3	GND
4	Noninverting Audio Input

4.2 Input Characteristics

Item	Symbol	Min	Typ	Max	Unit	Notes
Input Impedance	Z _{IN}		100		kΩ	Either input to ground
Common Mode Rejection Ratio	CMRR		45		dB	All frequencies
Control voltage on pin 4, amplifier ON				3	V	
Control voltage on pin 4, amplifier OFF		12			V	Internally pulled up to 15V

Note: It is recommended to use an open collector output to control the on/off pin.

4.3 J2: Loudspeaker output (hot)

Connector type: 6,3x0,8 FASTON® tab.

4.4 J3: Loudspeaker output (cold)

Connector type: 6,3x0,8 FASTON® tab.

Internally connected to GND. Note: This is the feedback reference. For best performance, do not use another ground connection for the loudspeaker.

4.5 J4: Positive power supply connection, +VB

Connector type: 6,3x0,8 FASTON® tab.

4.6 J5: Power supply ground connection, GND

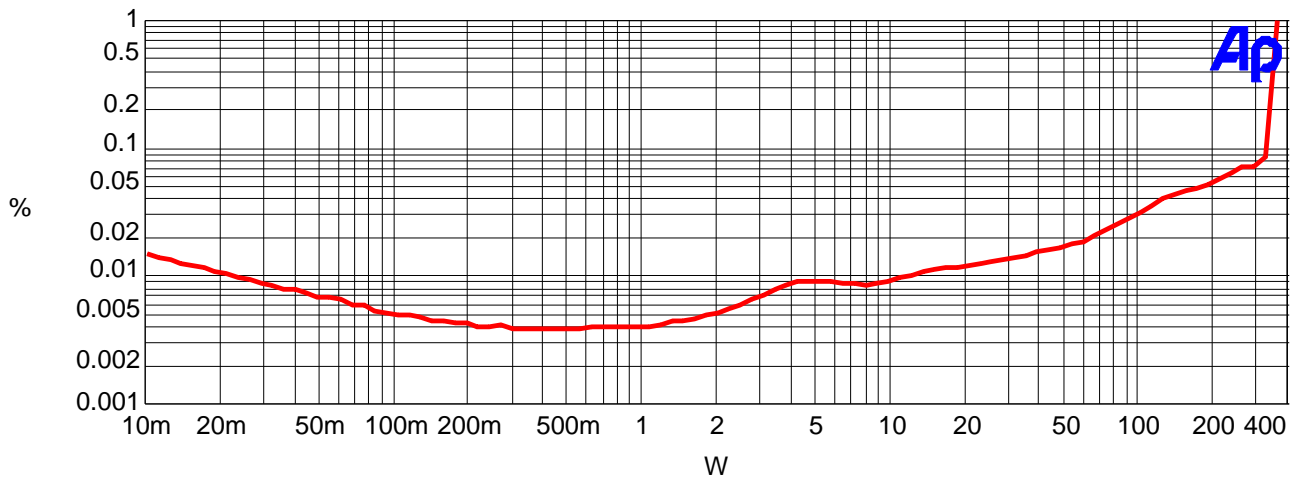
Connector type: 6,3x0,8 FASTON® tab.

4.7 J6: Negative power supply connection, -VB

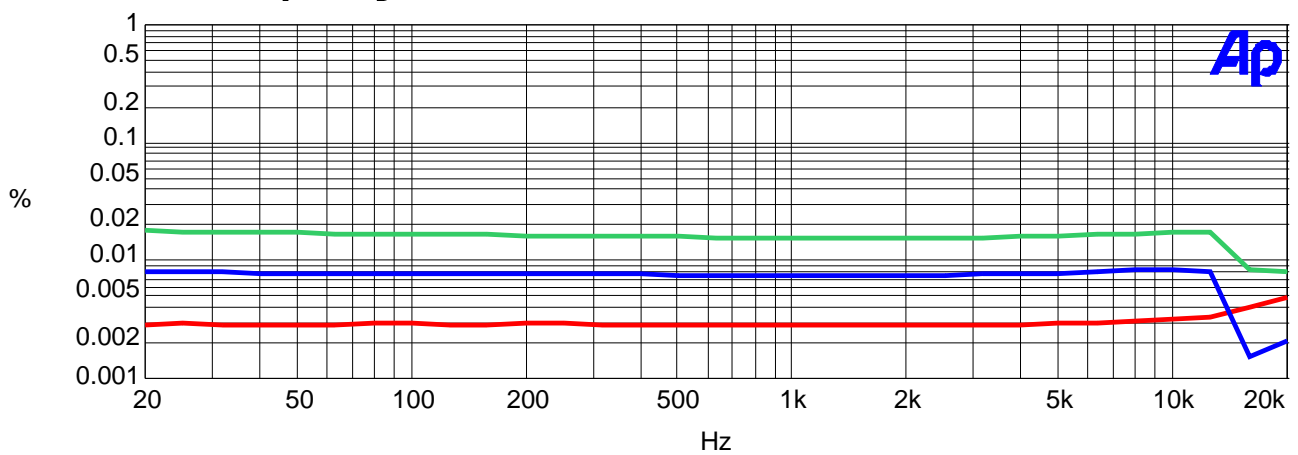
Connector type: 6,3x0,8 FASTON® tab.

5 Typical Performance Graphs

5.1 THD vs. Power (1kHz, 4Ω)

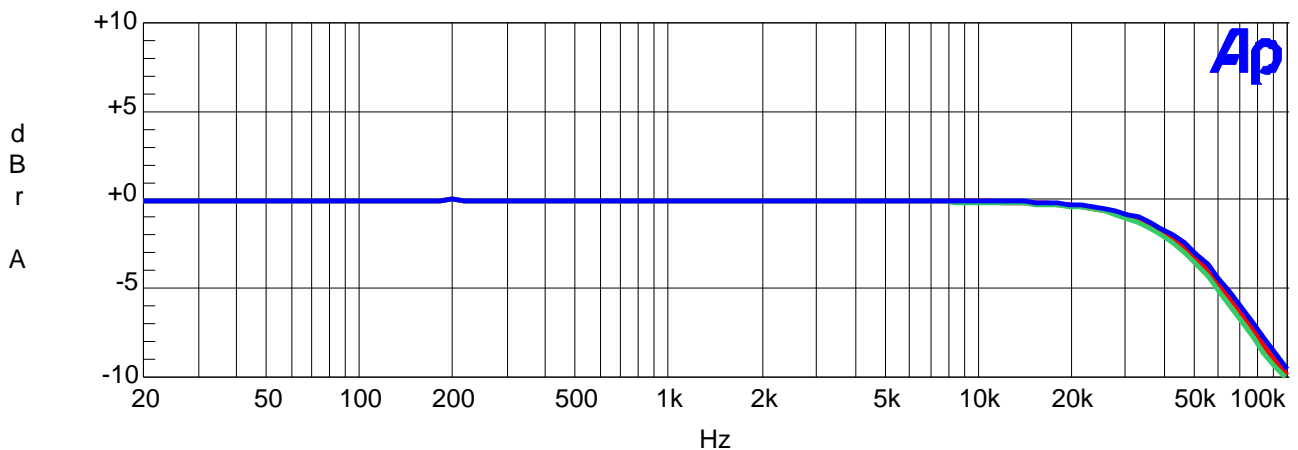


5.2 THD vs. Frequency (8Ω)



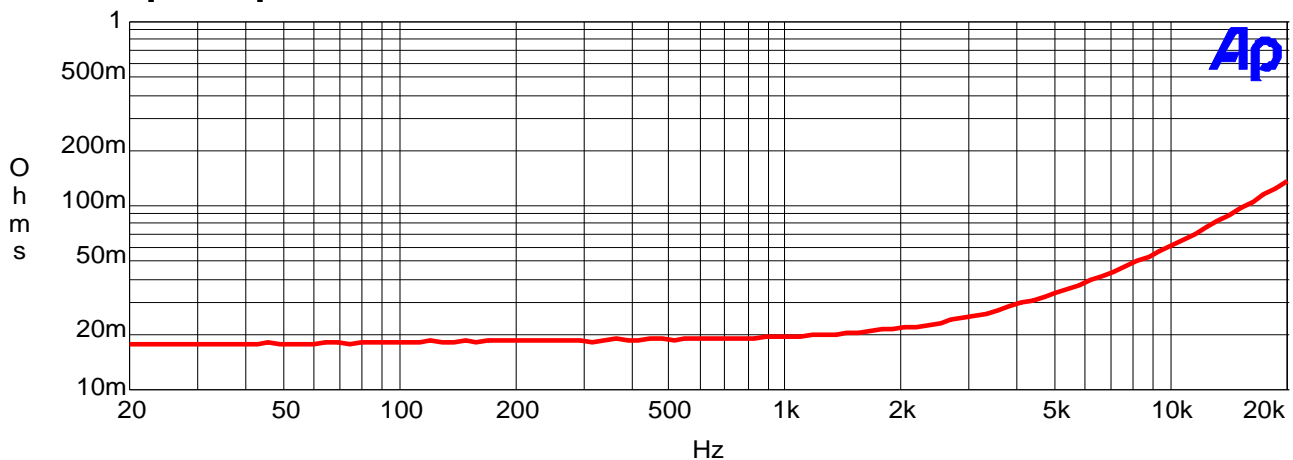
From top to bottom: 40W, 10W, 1W

5.3 Frequency Response (4Ω, 8Ω and open circuit)

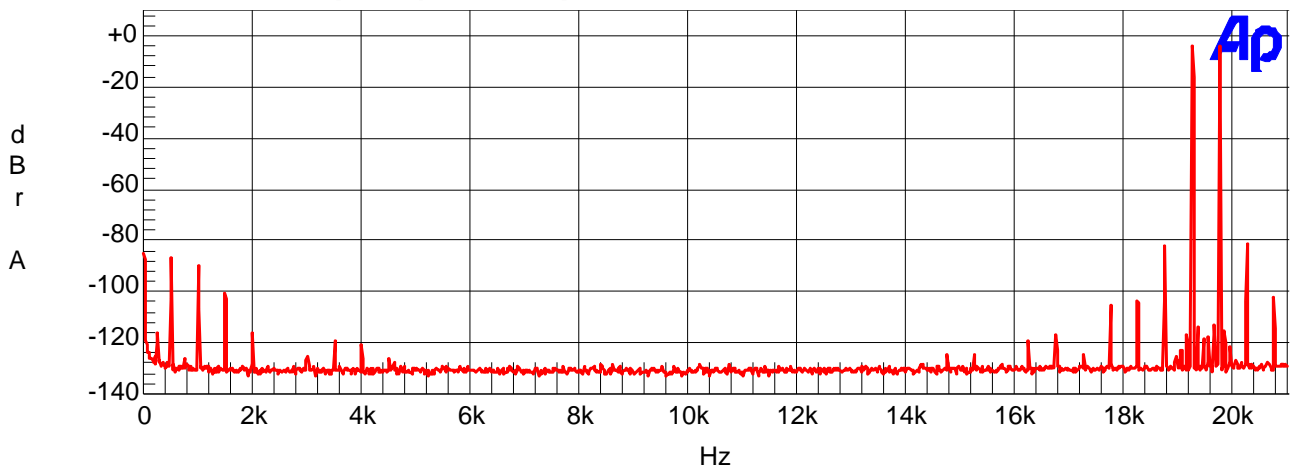


From top to bottom: open circuit, 8Ω, 4Ω

5.4 Output Impedance



5.5 19+20kHz IMD (10W, 4 ohms)



DISCLAIMER: This subassembly is designed for use in music reproduction equipment only. No representations are made as to fitness for other uses. Except where noted otherwise any specifications given pertain to this subassembly only. Responsibility for verifying the performance, safety, reliability and compliance with legal standards of end products using this subassembly falls to the manufacturer of said end product.

LIFE SUPPORT POLICY: Use of Hypex products in life support equipment or equipment whose failure can reasonably be expected to result in injury or death is not permitted except by explicit written consent from Hypex Electronics BV.

Document Revision	PCB Version	Description	Date
R1		Initial Draft.	29.07.2005
R2	UcD400STV6.1	- Component changes	11.01.2006
R3	UcD400STV7	- Modulator current source moved to main board for better thermal stability. - Coupling caps changed from 22u to 10u/Bip.	23..04.2007
R4	UcD400STV8	- Updated enable circuit. Functionality is not changed. - New logo added on silkscreen.	10.07.2008
R5	UcD400STV8	- Current limiter value correct (21A): 18A. - Undervoltage lockout values added.	24.11.2009
R6	UcD400STV8	- Format changed	09.03.2012
R7	UcD400STV8	- Recommended operating conditions updated	25.05.2012