ETS

CLASS D AUDIO AMPLIFIER
PLATE AMPLIFIER

SDV1056-250: 250W RMS, CLASS D, PLATE AMPLIFIER

FEATURES

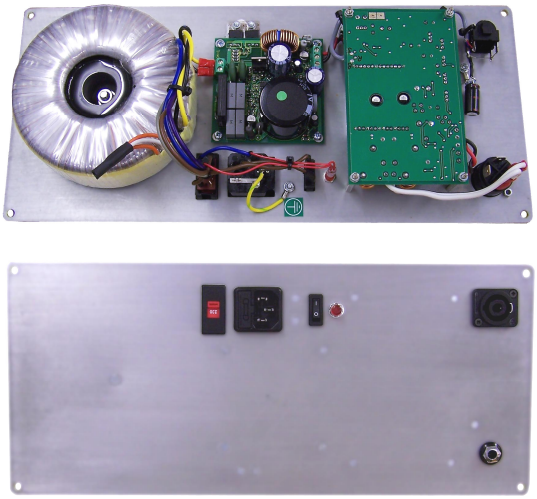
- **HIGH POWER: up to 250W RMS[1]**
- **HIGH EFFICIENCY typically 90%**
- **HIGH SWITCHING FREQUENCY: 330KHz.**
- **LOW DISTORTION: c. 0.5% THD OPEN LOOP[2]**
- **INTEGRAL REGULATED POWER SUPPLY**
- **FULL SHORT-CIRCUIT PROTECTION**
- **THERMAL PROTECTION**
- **START-UP, SHUTDOWN SYCHRONISATION**
- **ONBOARD TEMPERATURE MONITOR**
- **DRIVES 16Ω, 8Ω, 4Ω and 2ΩSPEAKERS[4]**
- **COMPACT**
- **LOW COST**
- **LIGHTWEIGHT**
- **ALTERNATIVE CONFIGURATIONS AVAIALBLE[3]**
- **CUSTOM DESIGNS AVAILABLE**

NOTES

1) **Other power options include 600W. Alternatively, custom power levels can be produced.**
2) **Assumes minimisation of external noise coupling and measured in audio band only.**
3) **Contact EcoTec Systems Ltd Ltd. for more details of these options**
4) **Requires modification to standard layout for 2Ω operation.**

APPLICATIONS

- **AUDIO POWER AMPLIFIER**
- **ACTIVE SPEAKER SYSTEMS**
- **ACTIVE SONAR SYSTEMS**
- **NOISE CANCELLATION SYSTEMS**
- **MOTOR / MAGNET DRIVE MODULES**
- **POWER CONVERSION**
- **UPS - SINE WAVE INVERTER**



DESCRIPTION

The SDV1056-250 is a class D plate amplifier, which contains the SDV1042-300 class D amplifier module and the SDV1058-250 switching regulator. The amplifier contains an input pre-amplifier, an output filter; short-circuit protection and turn-on/off synchronisation. The power supply consists of a conventional linear transformer for isolation and transformation and a switching regulator. All necessary supplies are generated on the unit. The unit can be powered from 220Vac or 110Vac supplies (switch selectable).
This plate amplifier is designed to give a simple, user friendly introduction to our class D amplifier range. If higher power levels are required then the SDV1056-600, 600W plate amplifier unit should be considered.

Please contact EcoTec Systems Ltd. for a confidential discussion of your requirements and further application information.

SPECIFICATIONS

Absolute maximum ratings

Operating free air temperature, T_A …..…… -10°C to 40°C
Storage temperature range, T_{stg} …….. -40°C to 70°C

Stresses beyond those listed under absolute maximum ratings may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated "recommended operating conditions" is not implied.

Recommended operating conditions

	MIN	TYP	MAX	UNIT
INPUT VOLTAGE (220Vac), V_{IN}	200	220	245	Vac
INPUT VOLTAGE (110Vac), V_{IN}	95	110	125	Vac
MODULATION FACTOR	0	0.95	1	
OPERATING FREE AIR TEMPERATURE, T_A	10		40	°C

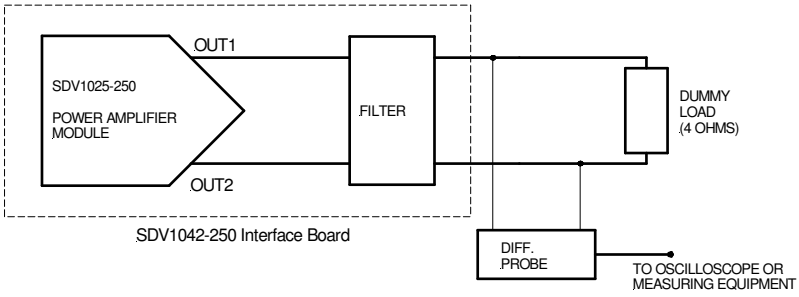
Electrical characteristics at a free air temperature of 25°C

	PARAMETER	NOTES/TEST CONDITIONS	VALUE (V_{RS} = 55 V)			UNIT
			MIN	TYP	MAX	
R_{IN}	AUDIO INPUT IMPEDANCE (Other input options available)		1			MΩ
I_{RS}	POWER RAIL CURRENT	R_L = 4Ω		6		Arms
P_{RR}	ALLOWABLE POWER RAIL RIPPLE	SEPARATE POWER SUPPLY MODULE AVAILABLE		2		%
r_O	OUTPUT RESISTANCE	R_L = 4Ω			100	mΩ
SNR	SIGNAL TO NOISE RATIO	R_L = 4Ω (in audio band)		-90		dB
f_{SW}	SWITCHING FREQUENCY			330		KHz
t_{PD}	PROPAGATION DELAY (POWER OUTPUT STAGE)	R_L = 4Ω		100		ns

OUTPUT POWER

When discussing the output power of a class D power amplifier an important distinction must be made between the power levels when the amplifier is run into clip or if the output is to be operated clean (un-distorted). The SDV1056-250 will produce up to 200Wrms clean into a 4 load. To achieve 250Wrms output the output level will clip (flattening of the top of a sine wave signal).

The output power from the SDV1056-250 plate amplifier must be measured differentially across both of the amplifier outputs (see layout and connection details later). Failure to measure differentially will produce erroneous power level readings. A typical measurement scenario is shown opposite (Amplifier component only shown).



Best results are achieved using a battery powered differential probe, which can then be connected directly to an oscilloscope. A single ended probe connected to one output and the earth lead connected to the other output will trigger the protection circuitry of the unit which will shutdown the amplifier operation. Connecting a probe to one output and the earth lead to the amplifier ground will give erroneous readings, such that the measured power will be 25% of the actual power. The load shown in the measurements is a resistive 4-Ohm load rated at the power level for the amplifier.

The output power from the amplifier to the load is determined by three parameters. These are:

1. The input signal level with respect to the maximum input level (*Modulation factor*)
2. The *Inherent efficiency* of the amplifier module.
3. The attenuation of the audio signal by the output filter (*Filter attenuation*).

The measured output power (Wrms) can be expressed as:

$$P_{out} = \frac{(V_p)^2}{2R_{load}}$$

Where V_p is the peak output voltage (48V)

R_{load} is the output load

This can be compared with the theoretical maximum output power (Wrms), where:

$$P_{out\,\max} = \frac{MF * V_{rail}{}^2}{2 * R_{load}}$$

Where V_{rail} is the main rail voltage

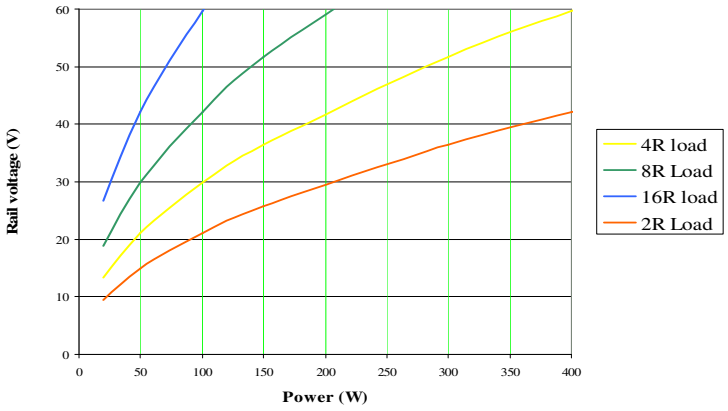
MF is the modulation factor

For a modulation factor of 0.9, the power into various loads is shown below:

At low frequencies the filter attenuation should be minimal and hence, the inherent efficiency (%) can be determined from:

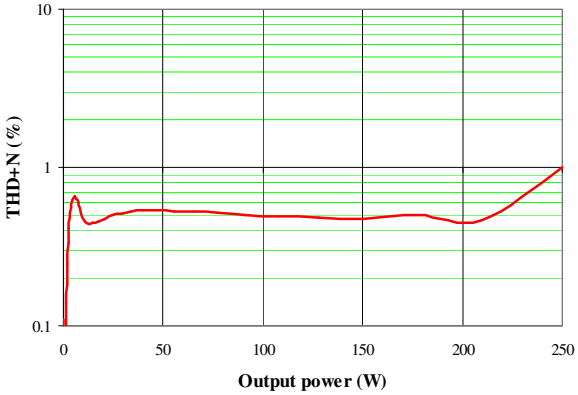
$$Eff = \frac{P_{out} * 100}{P_{out\,\max}}$$

For the amplifier module inherent efficiencies up to 90% are possible. If the inherent efficiency measured is less than this value it is normally due to power supply droop.



DISTORTION

The distortion present on the output signal varies with the output power level. A plot of distortion versus output power is shown opposite. At low power levels the distortion is due to noise in particular the residual noise from the amplifier filter. At higher output levels close to 200Wrms the distortion increases and approaches 1%. In the critical mid-power range from 50W to 180W the distortion is about 0.5%.



THERMAL EFFICIENCY

The SDV1056-250 plate amplifier is designed to be a compact power module for audio applications. It will run continuously at full power for a brief period of time typically 4-5 minutes. If longer periods of operation at full power are required then alternative heatsinking methods must be used. EcoTec Systems Ltd has alternative heatsinking designs for operation at full power for in excess of 10 minutes. If you wish to explore these alternatives, please contact EcoTec Systems Ltd for a confidential discussion of your application.

INPUT CHARACTERISTICS

The input impedance of the standard amplifier module is in excess of 1MΩ. The input pre-amplifier is a differential configuration, although it can also directly accept single ended input signals. The basic unit ships without variable gain control. This feature can be added to the unit by connecting a variable resistor to the input stage. Provision has been made on the PCB layout for direct connection of a gain potentiometer if required. For discussion of other input circuitry options, please contact EcoTec Systems Ltd.