

TDA2003 Audio Power Amplifier

General Description

The TDA2003 is an audio power amplifier designed primarily for automotive applications. Its high current capability and low saturation resistance of the output drivers enables the device to deliver large power outputs into low impedance loads where supply voltage is a limiting factor.

Features

- Short circuit protection
- Supply over-voltage protection
- Thermal shutdown protection
- Low distortion
- Low noise
- Externally programmable gain

Typical Application

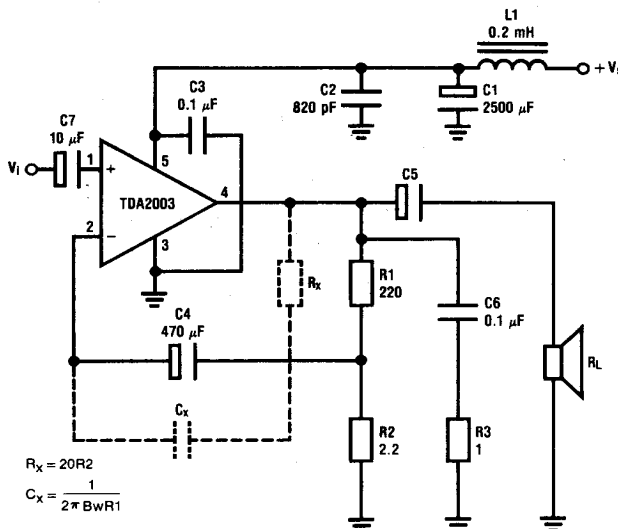


FIGURE 1

Order Number TDA2003T
See NS package T05B

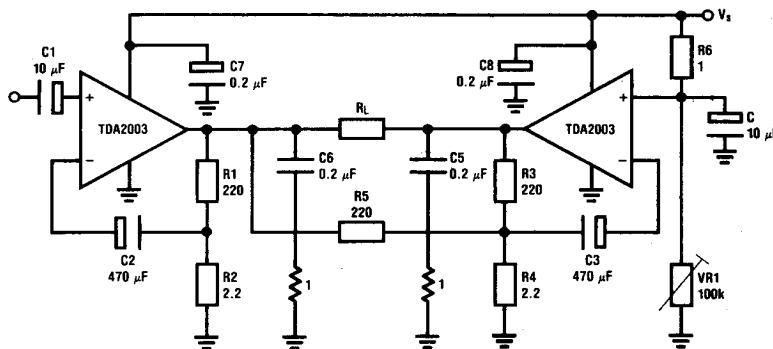
Absolute Maximum Ratings

Peak Supply Voltage 50 ms (Load Dump, see Test Circuit)	50V
DC Supply Voltage (Continuous)	30V
Operating Supply Voltage	20V
Output Peak Current (Repetitive)	3.5A
Output Peak Current (Non-Repetitive)	4.5A

Electrical Characteristics $T_A = 25^\circ\text{C}$, $V_S = 14.4\text{V}$ (unless stated otherwise)

Parameter	Conditions	Min	Typ	Max	Units
Supply Voltage		6		20	V
Quiescent Current (Pin 5)		50		100	mA
Quiescent Voltage (Pin 4)		6.1	6.9	7.7	V
Output Power $R_L = 4\Omega$	THD = 10%, $f = 1\text{ kHz}$ $A_v = 40\text{ dB}$	5.5	6		W
$R_L = 2\Omega$	THD = 10%, $f = 1\text{ kHz}$ $A_v = 40\text{ dB}$	9.5	10		W
Distortion (THD) $R_L = 4\Omega$	$P_O = 0.05\text{W} - 4.5\text{W}$ $A_v = 40\text{ dB}$, $f = 1\text{ kHz}$		0.12		%
$R_L = 2\Omega$	$P_O = 0.05\text{W} - 7.5\text{W}$ $A_v = 40\text{ dB}$, $f = 1\text{ kHz}$		0.18		%
Open Loop Voltage Gain			80		dB
Closed Loop Voltage Gain			40		dB
Input Noise Voltage			1	5	μV
Input Resistance	$f = 1\text{ kHz}$	70	150		$\text{k}\Omega$

Application Circuit



Voltage and current swings for a bridge amplifier are twice that of a single-ended amplifier; i.e., with the same R_L , the bridge configuration can deliver an output power that is four times the output power of a single-ended amplifier. Care must be taken when selecting V_S and R_L in order to avoid an output peak current above the maximum rating.

$$\text{i.e., } R_L \text{ min} = \frac{V_S - 2 V_{CE \text{ sat}}}{I_O \text{ max}}$$

FIGURE 2. 20W Bridge Amplifier

BRIDGE AMPLIFIER DESIGN FORMULAE

	Single-Ended	Bridge
Max output voltage swing (1/2 wave before clipping)	$1/2 (V_S - 2 V_{CE \text{ sat}})$	$V_S - 2 V_{CE \text{ sat}}$
Max output current swing (1/2 wave before clipping)	$\frac{(V_S - 2 V_{CE \text{ sat}})}{2 R_L}$	$\frac{V_S - 2 V_{CE \text{ sat}}}{R_L}$
Max output power (before clipping)	$\frac{(V_S - 2 V_{CE \text{ sat}})^2}{8 R_L}$	$\frac{(V_S - 2 V_{CE \text{ sat}})^2}{2 R_L}$

Test Circuits

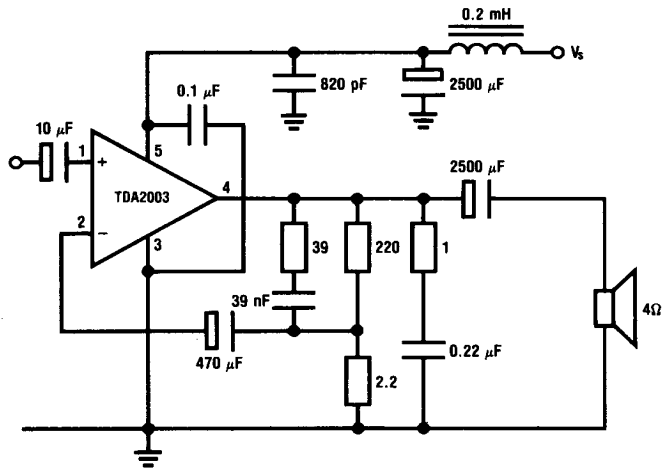


FIGURE 3. IC Audio Amplifier

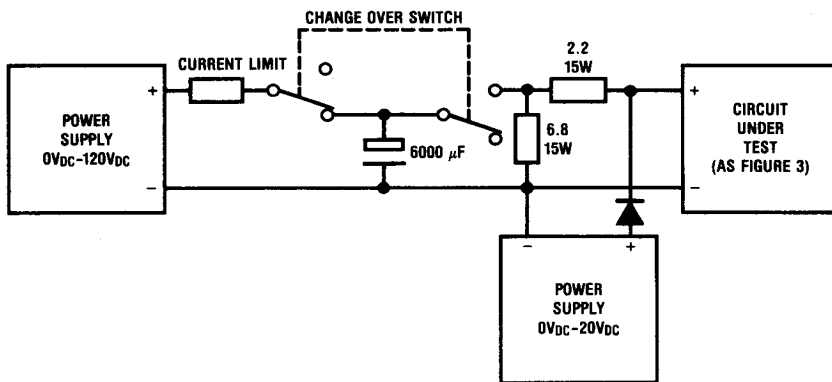


FIGURE 4. Load Dump