



# TEA2025A

## LINEAR INTEGRATED CIRCUIT

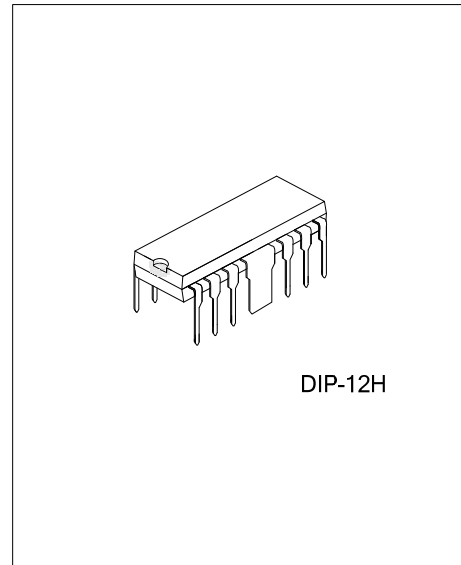
### STEREO AUDIO AMPLIFIER

#### DESCRIPTION

The UTC **TEA2025A** is a monolithic integrated circuit, consisting of a 2-channel power amplifier. It is suitable for stereo and bridge amplifier application of radio cassette tape recorders.

#### FEATURES

- \* High output power  
Stereo:  $P_o=2.3W$  (Typ) at  $V_{cc}=9V$ ,  $R_L=4\ \Omega$   
Bridge:  $P_o=4.7W$  (Typ) at  $V_{cc}=9V$ ,  $R_L=8\ \Omega$
- \* Low switching distortion at high frequency
- \* Small shock noise at the time of power on/off due to a built-in muting circuit
- \* Good ripple rejection due to a built-in ripple filter
- \* Good channel separation
- \* Soft tone at the time of output straiten
- \* Closed loop voltage gain fixed 45dB (Bridge: 51dB) but availability with external resistor added
- \* Minimum number of external parts required
- \* Easy to design radiator fin

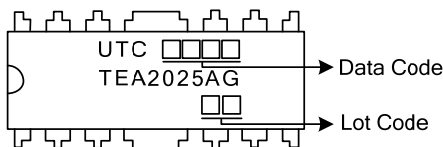


#### ORDERING INFORMATION

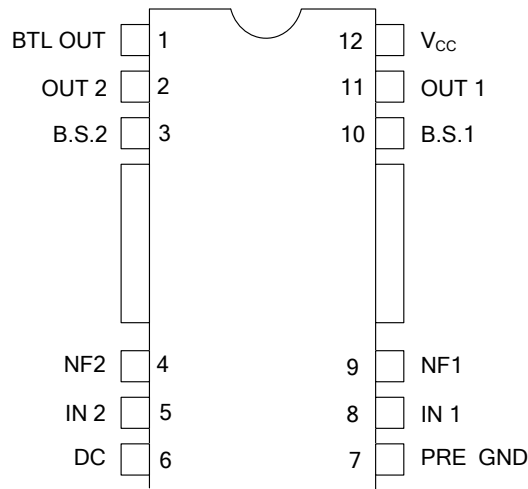
Order Number	Package	Packing
TEA2025AG-D12-H-T	DIP-12H	Tube

<p>TEA2025AG-D12-H-T</p> <p>(1) Packing Type (2) Package Type (3) Green Package</p>	<p>(1) T: Tube (2) D12-H: DIP-12H (3) G: Halogen Free and Lead Free</p>
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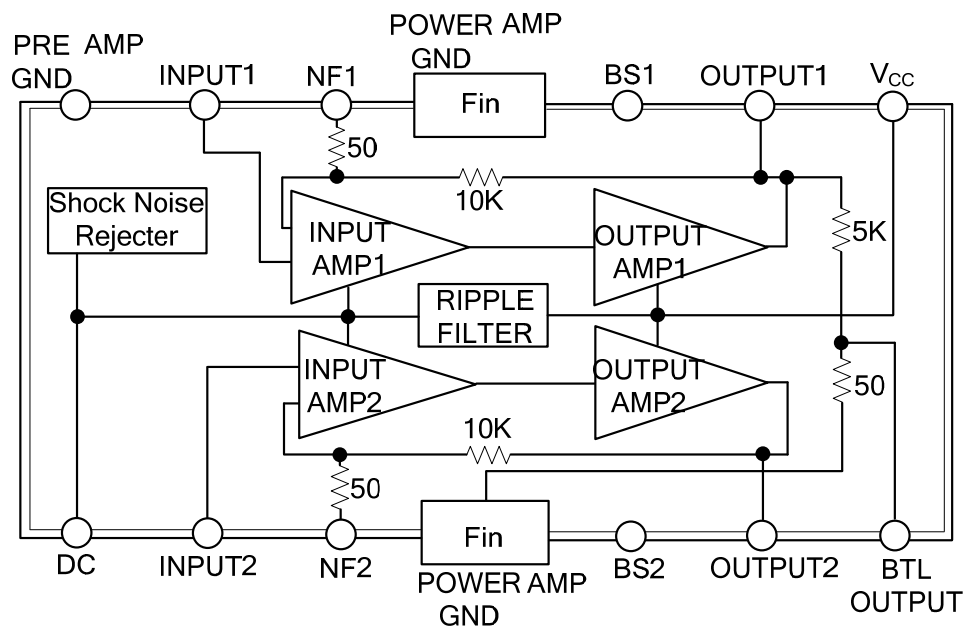
#### MARKING



### ■ PIN CONFIGURATION



### ■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS ( $T_A=25^\circ\text{C}$ , unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$V_S$	15	V
Power Dissipation	$P_D$	4	W
Operating Temperature	$T_{OPR}$	-20~+70	$^\circ\text{C}$
Storage Temperature	$T_{STG}$	-40~+150	$^\circ\text{C}$

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ ,  $R_G=600\Omega$ , Stereo, unless otherwise specified.)

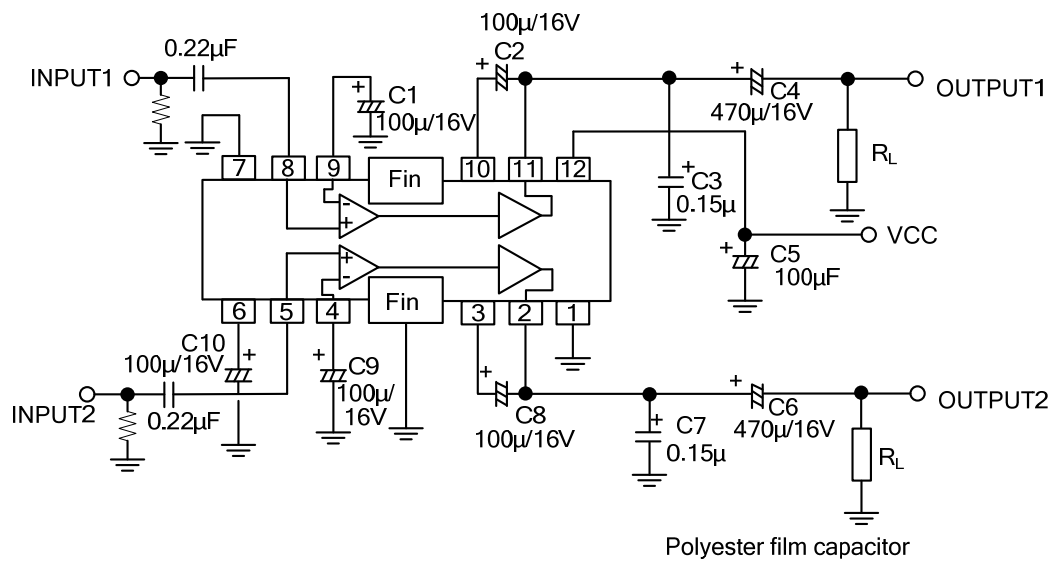
PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Operating Supply Voltage	$V_{CC}$		3		12	V
Quiescent Current	$I_{CC}$	$V_i=0$ , Stereo		40	50	mA
Closed Loop Voltage Gain	$A_V$	Stereo, $V_i=-45\text{dBm}$	43	45	47	dB
		Bridge, $V_i=-45\text{dBm}$	49	51	53	dB
Channel Balance	$C_B$	Stereo	-1	0	+1	dB
Output Power	$P_O$	Stereo, $R_L=4\Omega$ , THD=10%	1.7	2.3		W
		Stereo, $R_L=8\Omega$ , THD=10%		1.3		W
		Bridge, $R_L=8\Omega$ , THD=10%		4.7		W
Total Harmonic Distortion	$T_{HD}$	Stereo, $P_o=250\text{mW}$ , $R_L=4\Omega$		0.3	1.5	%
		Bridge, $P_o=250\text{mW}$ , $R_L=4\Omega$		0.5		%
Input Resistance	$R_I$		21	30		$\text{K}\Omega$
Ripple Rejection	$R_R$	Stereo, $R_g=0\Omega$ , $V_r=150\text{mV}$ , $f=100\text{Hz}$	40	46		dB
Output Noise Voltage	$V_{NO}$	Stereo, $R_g=0\Omega$		1.5	3	mV
		Stereo, $R_g=10\text{K}\Omega$		3	6	mV
Cross-Talk	$C_T$	Stereo, $R_g=10\text{K}\Omega$ , $V_o=0\text{dBm}$	40	55		dB

# TEA2025A

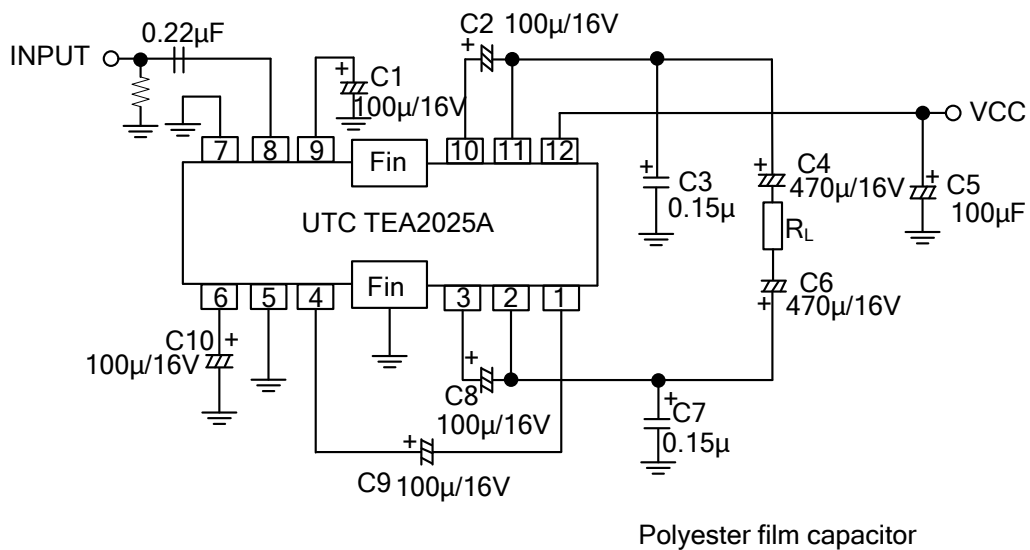
## LINEAR INTEGRATED CIRCUIT

### APPLICATION INFORMATION

#### Stereo Amplifier



#### Bridge Amplifier



## ■ APPLICATION INFORMATION

### Input Capacitor

Input capacitor is PNP type allowing source to be referenced to ground. In this way no input coupling capacitor is required. However, a series capacitor (0.22 uF) to the input side can be useful in case of noise due to variable resistor contact.

### Bootstrap

The bootstrap connection allows to increase the output swing. The suggested value for the bootstrap capacitors (100uF) avoids a reduction of the output signal also at low frequencies and low supply voltages.

### Voltage Gain Adjust

STEREO MODE (Figure 1)

The voltage gain is determined by on-chip resistors R1 and R2 together with the external RfC1 series connected between pin 6 (11) and ground. The frequency response is given approximated by:

$$\frac{V_{OUT}}{V_{IN}} = \frac{R_1}{R_f + R_2 + \frac{1}{j\omega C_1}}$$

With  $R_f=0$ ,  $C_1=100\mu\text{F}$ , the gain results 46 dB with pole at  $f=32$  Hz.

The purpose of  $R_f$  is to reduce the gain. It is recommended to not reduce it under 36 dB.

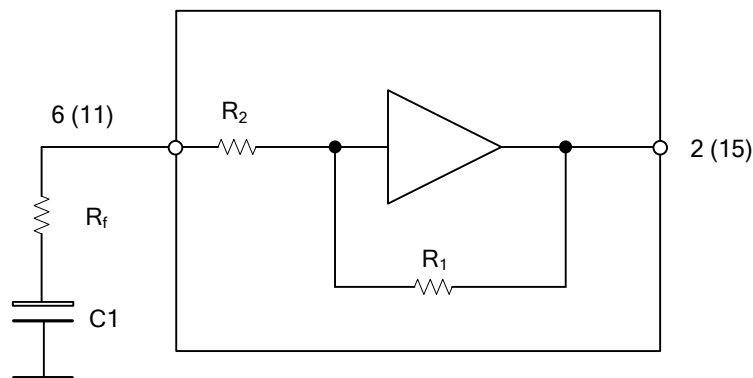


Figure 1

BRIDGE MODE (Figure 2)

The bridge configuration is realized very easily thanks to an internal voltage divider which provides (at pin 1) the CH 1 output signal after reduction. It is enough to connect pin 6 (inverting input of CH 2) with a capacitor to pin 1 and to connect to ground the pin 7.

The total gain of the bridge is given by:

$$\frac{V_{OUT}}{V_{IN}} = \frac{R_1}{R_f + R_2 + \frac{1}{j\omega C_1}} \left( 1 + \frac{R_3}{R_4} \frac{R_1}{R_2 + R_4 + \frac{1}{j\omega C_1}} \right)$$

and with the suggested values ( $C_1 = C_2 = 100$  uF,  $R_f = 0$ ) means:  $G_v = 52$  dB with first pole at  $f = 32$  Hz

## ■ APPLICATION INFORMATION(Cont.)

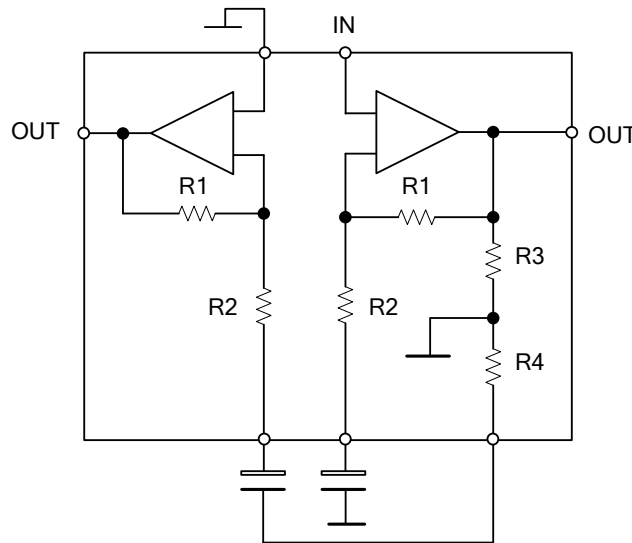


Figure 2

### Output Capacitors

The low cut off frequency due to output capacitor depending on the load is given by:

$$F_L = \frac{1}{2 \pi C_{OUT} \times R_L}$$

with  $C_{OUT}$  470uF and  $R_L = 4$  ohm it means  $F_L = 80$ Hz.

### Pop Noise (Figure 3)

Most amplifiers similar to UTC **TEA2025A** need external resistors between DC outputs and ground in order to optimize the pop on/off performance and crossover distortion.

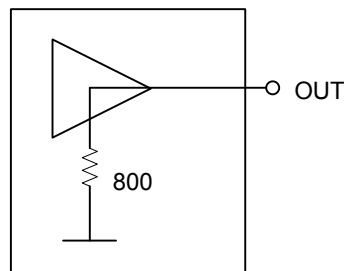


Figure 3

The UTC **TEA2025A** solution allows to save components because of such resistors (800 ohm) are included into the chip.

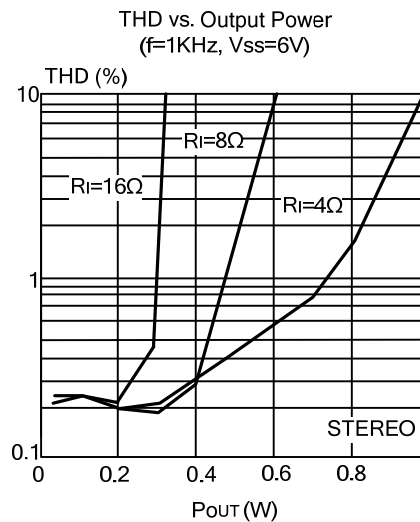
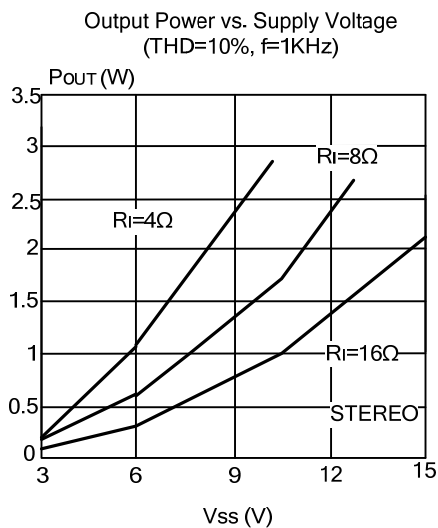
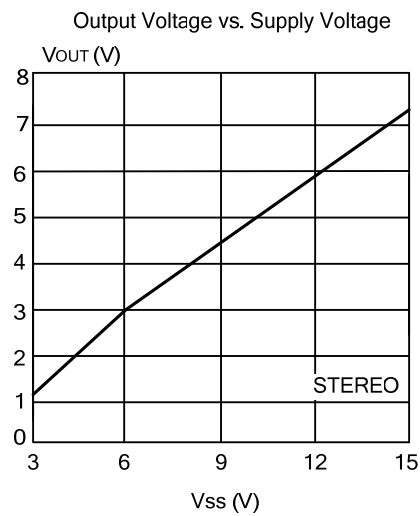
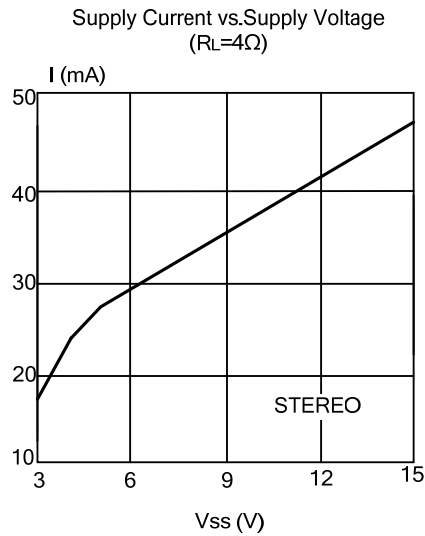
### Stability

A good layout is recommended in order to avoid oscillations. Generally the designer must pay attention on the following points:

- Short wires of components and short connections.
- No ground loops.
- Bypass of supply voltage with capacitors as nearest as possible to the supply I. C. pin. The low value (poliester) capacitors must have good temperature and frequency characteristics.
- No sockets.

The heatsink can have a smaller factor of safety compared with that of a conventional circuit. There is no device damage in the case of excessive junction temperature: all that happens is that  $P_O$  (and therefore  $P_{tot}$ ) and  $I_d$  are reduced.

## ■ TYPICAL CHARACTERISTICS



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