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# TV STEREO/DUAL SOUND IDENTIFICATION DECODER

The TDA2795 is a monolithic integrated circuit for stereo/dual sound in television receivers.

The circuit incorporates the following functions:

- Controlled pilot signal amplifier.
- Envelope demodulator.
- Two separate signal paths for processing the identification frequencies: operational amplifier for active filter, integral evaluation circuit with TTL compatible 'open collector' outputs.
- Stereo indicator driver.

## QUICK REFERENCE DATA

| | | | | |
|---|---|---|---|---|
| Supply voltage | $V_S$ | typ. | 12 | V |
| Supply current | $I_S$ | typ. | 8 | mA |
| Nominal input voltage at f = 54,6875 kHz | $V_i$ | typ. | 10 | mV |
| Input impedance | $\lvert Z_i \rvert$ | ≥ | 500 | kΩ |
| Operational amplifier | | | | |
| open loop voltage gain at 200 Hz | $G_o$ | ≥ | 78 | dB |
| input resistance | $R_i$ | ≥ | 1 | MΩ |
| output resistance | $R_o$ | ≤ | 3,5 | kΩ |
| Supply voltage range | $V_S$ | | 10,8 to 13,2 | V |
| Operating ambient temperature range | $T_{amb}$ | | 0 to + 70 | °C |

## PACKAGE OUTLINE

18-lead DIL; plastic (SOT102).

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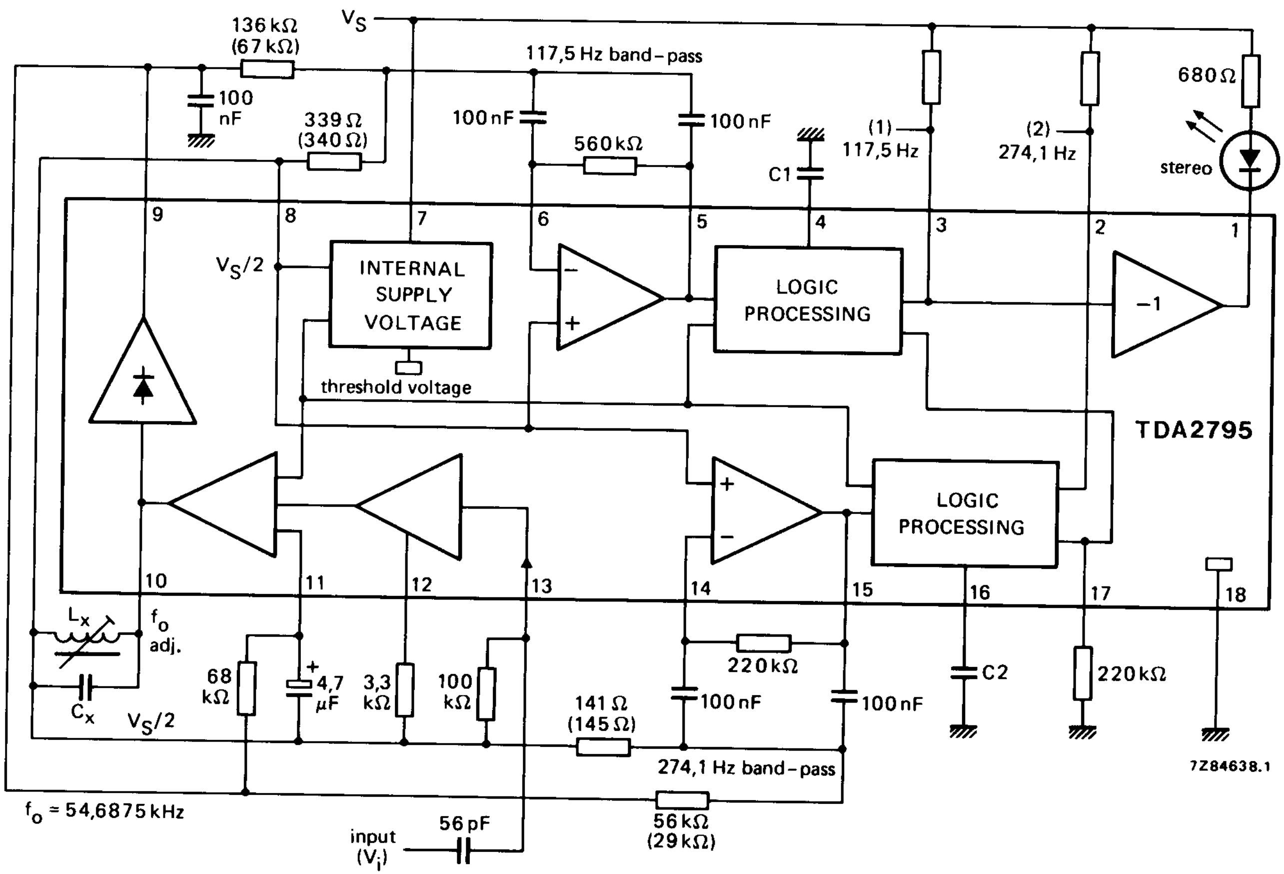



Fig. 1 Block diagram; C1 and C2 values 22 to 150 nF (dependent on switching time); values given in parenthesis are for G = 4 at 117,5/274,1 Hz; $C_x$ = 3,3 nF.

## RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | | | |
|---|---|---|---|---|
| Supply voltage (pin 7) | $V_{7\text{-}18} = V_S$ | max. | 15 | V |
| Signal input (pin 13) | $V_{13\text{-}18}$ | max. | $V_S$ | V |
| | $-V_{13\text{-}18}$ | max. | 0,5 | V |
| Switch outputs (pins 1, 2 and 3) | $V_{1\text{-}18}$ | max. | 18 | V |
| | $I_1$ | max. | 50 | mA |
| | $V_{2;\,3\text{-}18}$ | max. | 15 | V |
| | $I_{2;3}$ | max. | 5 | mA |
| | $-V_{1;\,2;\,3\text{-}18}$ | max. | 0,5 | V |
| Total power dissipation | $P_{tot}$ | max. | 800 | mW |
| Storage temperature range | $T_{stg}$ | | −25 to +125 | °C |
| Operating ambient temperature range | $T_{amb}$ | | 0 to + 70 | °C |

## CHARACTERISTICS

$V_S = 12$ V; $T_{amb} = 25$ °C, unless otherwise specified; measured in Fig. 1, at $V_i = 10$ mV; f = 54,6875 kHz amplitude modulated with $f_{m1} = 117{,}5$ Hz or $f_{m2} = 274{,}1$ Hz; $m_1 = m_2 = 50\%$.

| | | | | |
|---|---|---|---|---|
| Supply voltage range | $V_S$ | 10,8 to | 13,2 | V |
| Supply current | $I_S$ | typ. | 8 | mA |
| | | ≤ | 12 | mA |
| **Pilot signal amplifier and envelope demodulator** | | | | |
| Maximum input voltage (peak-to-peak value) | $V_{i(p\text{-}p)}$ | typ. | 2 | V |
| Input impedance | $\lvert Z_{13\text{-}18} \rvert$ | ≥ | 500 | kΩ |
| Voltage gain ($V_{9\text{-}18}/V_{13\text{-}18}$) at $V_i = 1$ mV | $G_{v9\text{-}13}$ | typ. | 42 | dB |
| Start of control at $V_i$ | see Fig. 3 | | | |
| Control range | $\Delta G_v$ | ≥ | 40 | dB |
| Controlled output voltage (r.m.s. value) (pin 9) | $V_{o(rms)}$ | typ. | 550 | mV |
| **Operational amplifiers** | | | | |
| Input bias current (pins 6 and 14) | $\pm I_6; \pm I_{14}$ | ≤ | 70 | nA |
| Open loop voltage gain at f = 200 Hz | $G_o$ | ≥ | 78 | dB |
| Available output current (pins 5 and 15) | $\pm I_5; \pm I_{15}$ | ≥ | 1,5 | mA |
| Output resistance (pins 5 and 15) | $R_o$ | typ. | 2 | kΩ |
| | | ≤ | 3,5 | kΩ |
| Allowable load capacitance | $C_L$ | ≤ | 30 | pF |
| Output offset voltage at $R_{5\text{-}6} = 560$ kΩ | $\pm V_{o5\text{-}8}$ | ≤ | 70 | mV |

**CHARACTERISTICS** (continued)

**Evaluation circuitry**

| | | | |
|---|---|---|---|
| Switch-on threshold voltage (pins 5 and 15) | $V_5; V_{15}$ | typ. | 1,0 V |
| Switch hysteresis | $\frac{V_{5on}}{V_{5off}} = \frac{V_{15on}}{V_{15off}}$ | typ. | 3,8 ± 0,5 dB |
| Switch outputs (pins 2 and 3) | | | |
| allowable output current | $I_3; I_2$ | ⩽ | 2 mA |
| saturation voltage at $I_3 = I_2 = 1,5$ mA | $V_{3;2\text{-}18sat}$ | ⩽ | 0,35 V |
| leakage voltage at $I_3 = I_2 \leqslant 5\ \mu A$ | $V_{3;2\text{-}18}$ | ⩽ | 15 V |
| Indicator driver (pin 1) | | | |
| allowable output current | $I_1$ | ⩽ | 40 mA |
| saturation voltage at $I_1 = 20$ mA | $V_{1\text{-}18sat}$ | ⩽ | 0,8 V |
| leakage voltage at $I_1 < 10\ \mu A$ | $V_{1\text{-}18}$ | ⩽ | 18 V |

**Internal reference voltage**

| | | | |
|---|---|---|---|
| Reference voltage (pin 8) | $V_{8\text{-}18}$ | typ. | 6 V |
| Available output current (pin 8) | $-I_8$ | ⩾ | 2 mA |
| | $+I_8$ | ⩾ | 0,6 mA |

**Reference current source**

| | | | |
|---|---|---|---|
| Reference voltage (pin 17) | $V_{17\text{-}18}$ | typ. | 5,3 V |
| Internal bias resistor | $R_{i17}$ | typ. | 5 kΩ |
| Allowable load resistor (pin 17) | $R_L$ | | 180 to 270 kΩ |

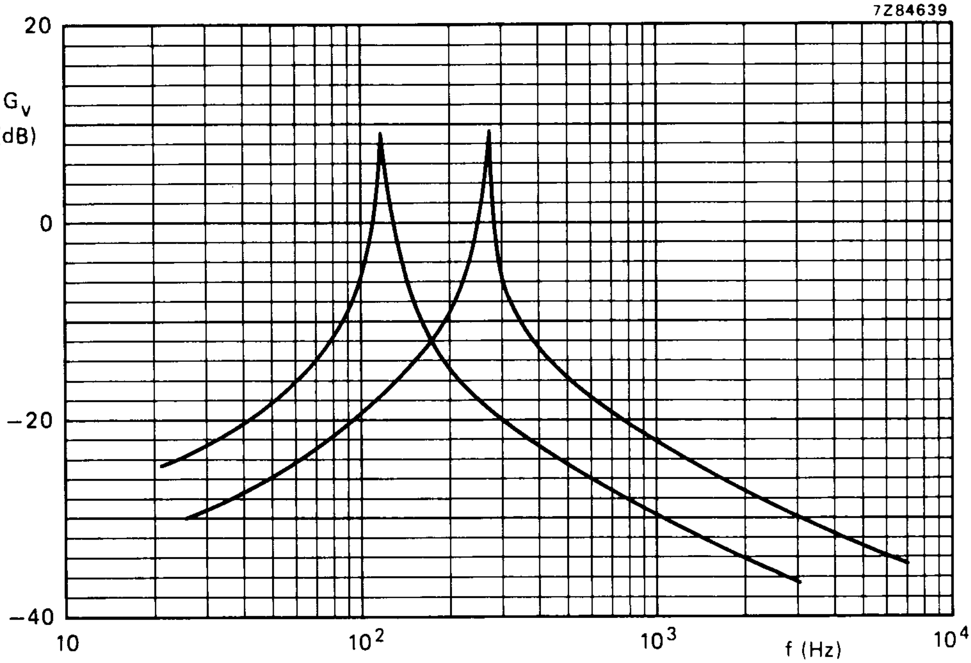



Fig. 2 Band-pass curves for 117,5 Hz and 274,1 Hz.

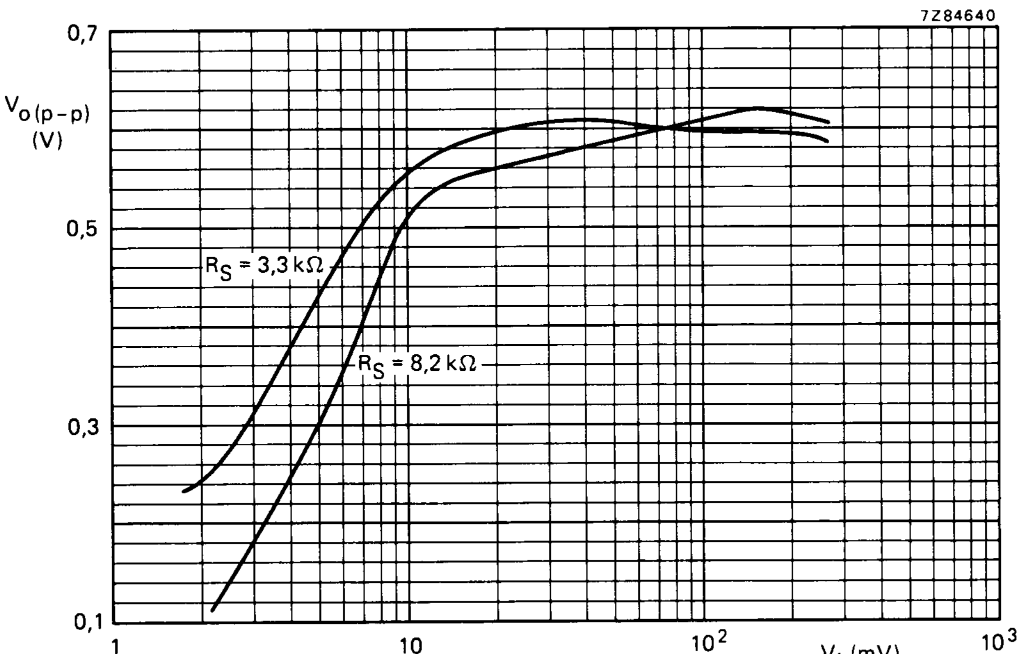


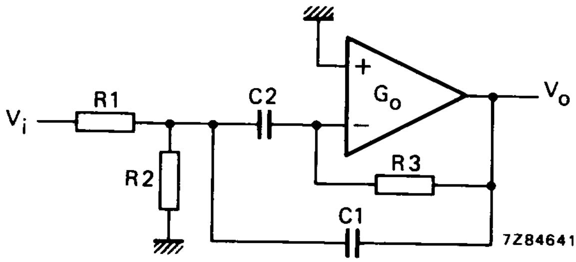

Fig. 3 Controlled output voltage as a function of the input signal ($Q_o$ = 80); pilot frequency $f_o$ = 54,6875 kHz; $R_S$ is source resistance.

## GENERAL FILTER CALCULATIONS

1. Gain

Amplifier conditions: $G_o >> G_v$ and $G_o >> 2 \cdot Q^2$

$$G_v = -\frac{\frac{p}{R1 \cdot C1}}{p^2 + p\frac{C1 + C2}{R3 \cdot C1 \cdot C2} + \frac{R1 + R2}{R1 \cdot R2 \cdot R3 \cdot C1 \cdot C2}}, \text{ in which: } p = j\omega;\ G_v = \frac{V_o}{V_i}$$




2. Resonance frequency

$$\omega_r = \frac{1}{\sqrt{\frac{R1 \cdot R2}{R1 + R2} \cdot R3 \cdot C1 \cdot C2}}$$

3. Gain at $\omega = \omega_r$

$$-G_{vr} = \frac{C2}{C1 + C2} \cdot \frac{R3}{R1}$$

4. Quality

$$Q = \frac{\sqrt{C1 \cdot C2}}{C1 + C2} \cdot \sqrt{\frac{R3\,(R1 + R2)}{R1 \cdot R2}}$$

5. Recommended components

C1 and C2: 5% MKC (metallized polycarbonate film capacitor)
R1, R2 and R3: 2% MR (metal film resistor)

or:

C1 and C2: 5% MKT (metallized polyester film capacitor)
R1, R2 and R3: 2% CR (carbon film resistor)