

TV VHF mixer/oscillator UHF preamplifier**TDA5030A****GENERAL DESCRIPTION**

The TDA5030A provides VHF local oscillator, VHF mixer and UHF IF preamplifier functions for VHF/UHF television receivers. It includes a buffered output from the VHF local oscillator, a VHF/UHF switching circuit and an IF amplifier stage for an external SAW filter.

Features

- Balanced VHF mixer
- Voltage-controlled VHF local oscillator
- IF amplifier for SAW filter
- UHF IF preamplifier
- Local oscillator buffer output for external prescaler
- Voltage stabilizer
- UHF/VHF switching circuit
- Electrostatic discharge protection diodes at pins 10, 11, 12 and 13

QUICK REFERENCE DATA

| parameter | conditions | symbol | min. | typ. | max. | unit |
|---|------------|-----------|------|------|-------|--------------|
| Supply voltage | pin 15 | V_p | 10 | — | 13,2 | V |
| Supply current | | I_p | — | 42 | — | mA |
| VHF mixer frequency range | | f | 50 | — | 470 | MHz |
| Conversion gain | | | — | 24,5 | — | dB |
| Conversion noise | 300 MHz | | — | 10 | — | dB |
| Input signal for 1% cross modulation | | | — | 99 | — | dB μ V |
| Storage temperature range | | T_{stg} | -55 | — | + 125 | $^{\circ}$ C |
| Operating ambient temperature range | | T_{amb} | -25 | — | + 85 | $^{\circ}$ C |

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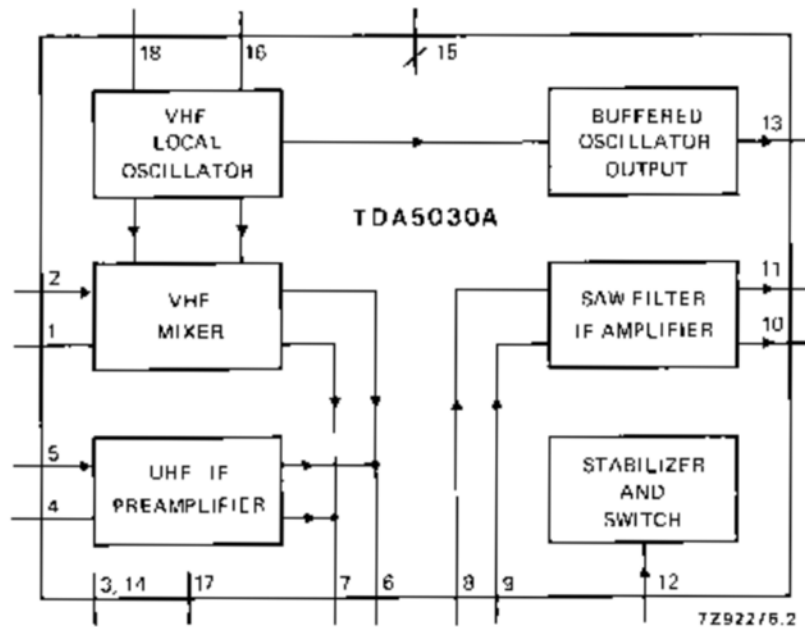


Fig. 1 Block diagram.

RATINGS

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

| parameter | conditions | symbol | min. | max. | unit |
|-------------------------------------|--------------------|-------------------|------|--------------|------|
| Supply voltage | pin 15 | $V_P = V_{15-3}$ | — | 14 | V |
| Input voltage | pins 1, 2, 4 and 5 | V_i | 0 | 5 | V |
| VHF switching voltage | pin 12 | V_{12} | 0 | $V_{15+0,3}$ | V |
| Output current | pins 10, 11 or 13 | $-I_{10, 11, 13}$ | — | 10 | mA |
| Short-circuit time on outputs | pins 10 and 11 | t_{ss} | — | 10 | s |
| Storage temperature range | | T_{stg} | -55 | + 125 | °C |
| Operating ambient temperature range | | T_{amb} | -25 | + 85 | °C |
| Junction temperature range | | T_j | — | + 125 | °C |

THERMAL RESISTANCE

From junction to ambient

 R_{thj-a}

55 K/W

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CHARACTERISTICSMeasured in circuit of Fig. 2, $V_P = V_{15-3} = 12\text{ V}$, $T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$, unless otherwise specified

| parameter | conditions | symbol | min. | typ. | max. | unit |
|--|--------------|------------|------|------|----------------|------------|
| Supply | | | | | | |
| Supply voltage | pin 15 | V_{15-3} | 10 | — | 13,2 | V |
| Supply current | | I_{15} | — | 42 | 55 | mA |
| Switch voltage level for VHF | pin 12 | V_{12} | 0 | — | 2,5 | V |
| Switch voltage level for UHF | pin 12 | V_{12} | 9,5 | — | $V_{15} + 0,3$ | V |
| Switch current | UHF selected | I_{12} | — | — | 0,7 | mA |
| VHF mixer (including IF amplifier) | | | | | | |
| Frequency range | | f | 50 | — | 470 | MHz |
| Noise factor | pin 2 | | | | | |
| | f = 50 MHz | F | — | 7,5 | 9 | dB |
| | f = 225 MHz | F | — | 9 | 10 | dB |
| | f = 300 MHz | F | — | 10 | 12 | dB |
| | f = 470 MHz | F | — | 11 | 13 | dB |
| Optimum source conductance | pin 2 | | | | | |
| | f = 50 MHz | G | — | 0,5 | — | mS |
| | f = 225 MHz | G | — | 1,1 | — | mS |
| | f = 300 MHz | G | — | 1,2 | — | mS |
| Input conductance | pin 2 | | | | | |
| | f = 50 MHz | G_i | — | 0,23 | — | mS |
| | f = 225 MHz | G_i | — | 0,5 | — | mS |
| | f = 300 MHz | G_i | — | 0,67 | — | mS |
| Input capacitance | pin 2 | | | | | |
| | f = 50 MHz | C_i | — | 2,5 | — | pF |
| Input voltage for 1% cross-modulation (in channel) | | V_{2-3} | 97 | 99 | — | dB μ V |
| Input voltage for 10 kHz pulling (in channel) | f < 300 MHz | V_{2-14} | 100 | — | — | dB μ V |
| Voltage gain | | A_v | 22,5 | 24,5 | 26,5 | dB |

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CHARACTERISTICS (continued)

| parameter | conditions | symbol | min. | typ. | max. | unit |
|--|--|--------------------------|------|--------------|------|------------|
| UHF preamplifier (including IF amplifier) | | | | | | |
| Input conductance | pin 5 | G_i | — | 0,3 | — | mS |
| Input capacitance | pin 5 | C_i | — | 3,0 | — | pF |
| Noise factor | pin 5 | F | — | 5 | 6 | dB |
| Optimum source conductance | pin 5 | G | — | 3,3 | — | mS |
| Input voltage for 1% cross-modulation (in channel) | | V ₅₋₁₄ | 88 | 90 | — | dB μ V |
| Voltage gain | | A _v | 31,5 | 33,5 | 35,5 | dB |
| VHF mixer | | | | | | |
| Conversion transadmittance | pins 2 to 6,7 | Y _{c2-6,7} | — | 5,7 | — | mS |
| Output impedance | pins 6 and 7 | Z _o | — | 1,6 | — | k Ω |
| VHF oscillator | | | | | | |
| Frequency range | | f | 70 | — | 520 | MHz |
| Frequency shift | $\Delta V_p = 10\%$; f = 70–330 MHz | Δf | — | — | 200 | kHz |
| Frequency drift | $\Delta T = 15$ K; f = 70–330 MHz | Δf | — | — | 250 | kHz |
| Frequency drift | between 5 s and 15 min after switch-on | Δf | — | — | 200 | kHz |
| SAW filter IF amplifier | | | | | | |
| Input impedance | Z _{10, 11} = 2 k Ω ; f = 36 MHz | Z _{8, 9} | — | 300+ j100 | — | Ω |
| Transimpedance | | Z _{8, 9-10, 11} | — | 2,2 | — | k Ω |
| Output reflection coefficient: | f = 36 MHz | | | | | |
| modulus | | | 0,45 | 0,37 | 0,41 | |
| phase | | | –63 | –112 | –134 | deg |

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| parameter | conditions | symbol | min. | typ. | max. | unit |
|--|---|--------------|------|------|------|----------|
| VHF local oscillator output buffer | | | | | | |
| Output voltage | pin 13 $R_L = 75 \Omega$ $f < 100 \text{ MHz}$ | V_{13} | 14 | 20 | — | mV |
| | $f > 100 \text{ MHz}$ | V_{13} | 10 | 20 | — | mV |
| Output impedance | $f = 100 \text{ MHz}$ | Z_{13} | — | 90 | — | Ω |
| RF signal on local oscillator output | $R_L = 75 \Omega$ $V_i = 1 \text{ V};$ $f \leq 225 \text{ MHz}$ | $RF/(RF+LO)$ | — | — | 10 | dB |
| | $V_i = 0,3 \text{ V};$ $f = 225\text{--}300 \text{ MHz}$ | $RF/(RF+LO)$ | — | — | 10 | dB |
| IF signal on local oscillator output | UHF selected; $R_L = 75 \Omega;$ $V_i = 350 \text{ mV}$ | $IF/(IF+LO)$ | — | — | 3 | mV |
| Local oscillator harmonics w.r.t. local oscillator output signal | $R_L = 75 \Omega$ | | — | — | -14 | dB |

