

**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<br>1% cross modulation |            |           | —    | 99   | —     | dB $\mu$ V |
| Storage temperature range               |            | $T_{stg}$ | −55  | —    | + 125 | °C         |
| Operating ambient<br>temperature range  |            | $T_{amb}$ | −25  | —    | + 85  | °C         |

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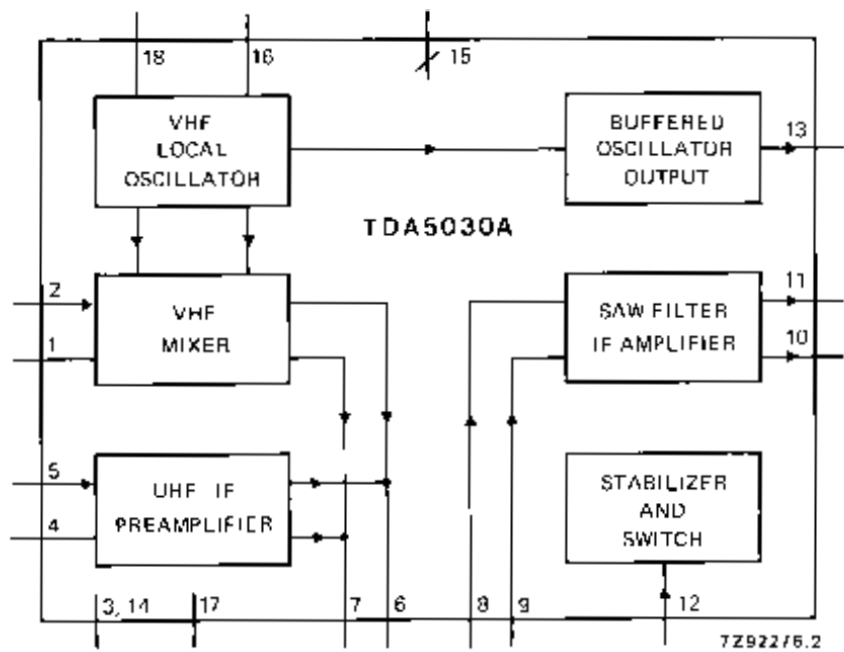


Fig. 1 Block diagram.

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

| parameter  | conditions   | symbol     | min. | typ. | max.           | unit       |
|--|--------------|------------|------|------|----------------|------------|
| <b>Supply</b>                                      |              |            |      |      |                |            |
| 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         |
| <b>VHF mixer (including IF amplifier)</b>          |              |            |      |      |                |            |
| 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 $\mu$ V |
| Input voltage for 10 kHz pulling (in channel)      | f < 300 MHz  | $V_{2-14}$ | 100  | —    | —              | dB $\mu$ 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       |
|--|--|-----------------|------|--------------|------|------------|
| <b>UHF preamplifier (including IF amplifier)</b>   |  |                 |      |              |      |            |
| 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 $\mu$ V |
| Voltage gain                                       |  | $A_v$           | 31,5 | 33,5         | 35,5 | dB         |
| <b>VHF mixer</b>                                   |  |                 |      |              |      |            |
| 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 $\Omega$ |
| <b>VHF oscillator</b>                              |  |                 |      |              |      |            |
| Frequency range                                    |  | f               | 70   | —            | 520  | MHz        |
| Frequency shift                                    | $\Delta V_p = 10\%$ ;<br>f = 70–330 MHz    | $\Delta f$      | —    | —            | 200  | kHz        |
| Frequency drift                                    | $\Delta T = 15$ K;<br>f = 70–330 MHz       | $\Delta f$      | —    | —            | 250  | kHz        |
| Frequency drift                                    | between 5 s and 15 min after switch-on     | $\Delta f$      | —    | —            | 200  | kHz        |
| <b>SAW filter IF amplifier</b>                     |  |                 |      |              |      |            |
| Input impedance                                    | $Z_{10,11} = 2$ k $\Omega$ ;<br>f = 36 MHz | $Z_{8,9}$       | —    | 300+<br>j100 | —    | $\Omega$   |
| Transimpedance                                     |  | $Z_{8,9-10,11}$ | —    | 2,2          | —    | k $\Omega$ |
| 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     |
|--|---|--------------|------|------|------|----------|
| <b>VHF local oscillator output buffer</b>                        |   |              |      |      |      |          |
| Output voltage   | pin 13<br>$R_L = 75 \Omega$<br>$f < 100 \text{ MHz}$                  | $V_{13}$     | 14   | 20   | —    | mV       |
|  | $f > 100 \text{ MHz}$   | $V_{13}$     | 10   | 20   | —    | mV       |
| Output impedance   | $f = 100 \text{ MHz}$   | $Z_{13}$     | —    | 90   | —    | $\Omega$ |
| RF signal on local oscillator output                             | $R_L = 75 \Omega$<br>$V_i = 1 \text{ V};$<br>$f \leq 225 \text{ MHz}$ | $RF/(RF+LO)$ | —    | —    | 10   | dB       |
|  | $V_i = 0,3 \text{ V};$<br>$f = 225\text{--}300 \text{ MHz}$           | $RF/(RF+LO)$ | —    | —    | 10   | dB       |
| IF signal on local oscillator output                             | UHF selected;<br>$R_L = 75 \Omega;$<br>$V_i = 350 \text{ mV}$         | $IF/(IF+LO)$ | —    | —    | 3    | mV       |
| Local oscillator harmonics w.r.t. local oscillator output signal | $R_L = 75 \Omega$   |              | —    | —    | —14  | dB       |

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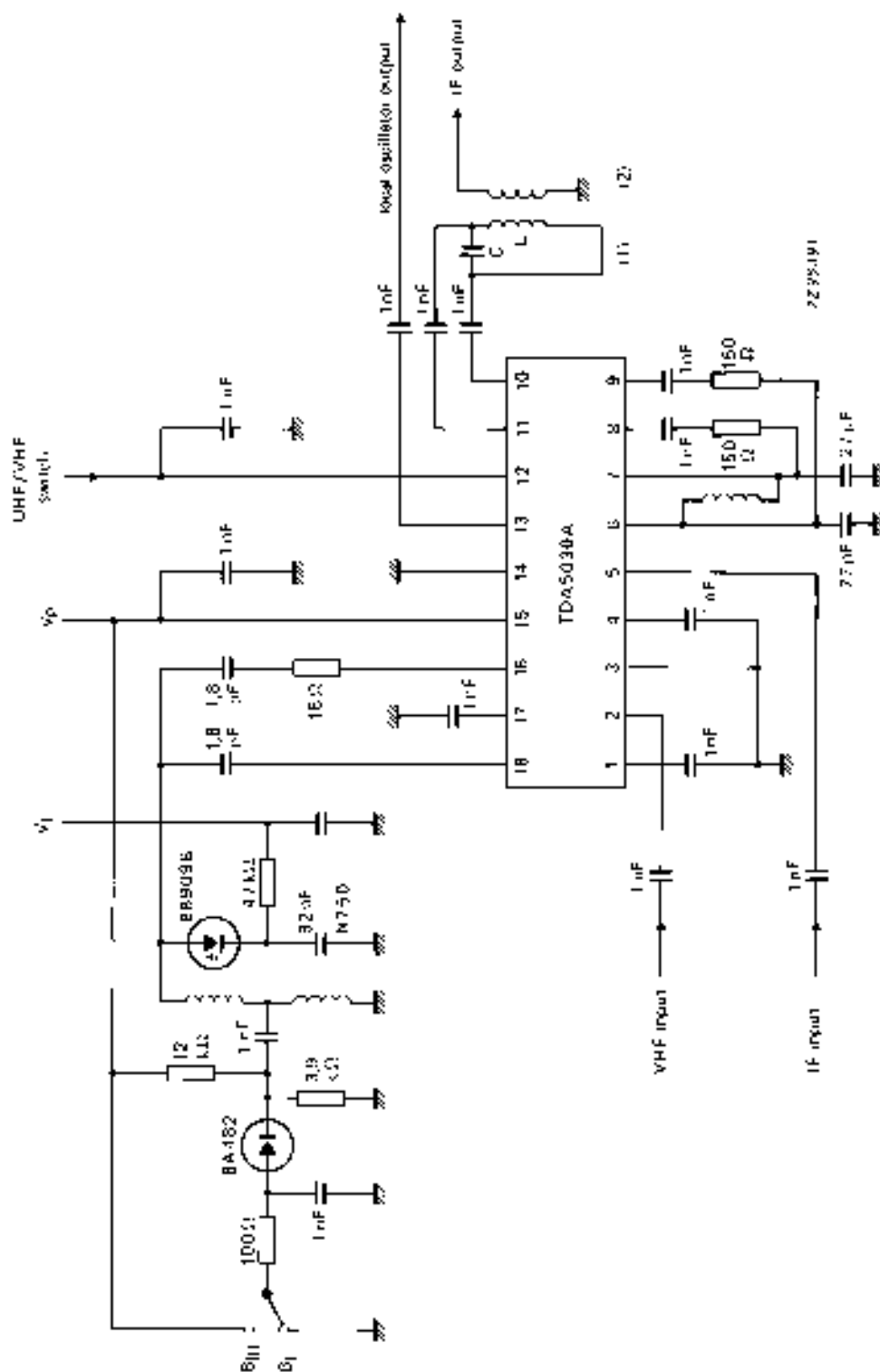


Fig. 2 Test circuit.

- (1)  $C = 18 \text{ pF}$ ,  $L = 2.2 \mu\text{H}$ ,  $f_{CL} = 36.5 \text{ MHz}$ .  
 (2) Turns ratio = 7 : 1, load =  $50 \Omega$ .