

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	°C
Operating ambient temperature range		T_{amb}	-25	—	+ 85	°C

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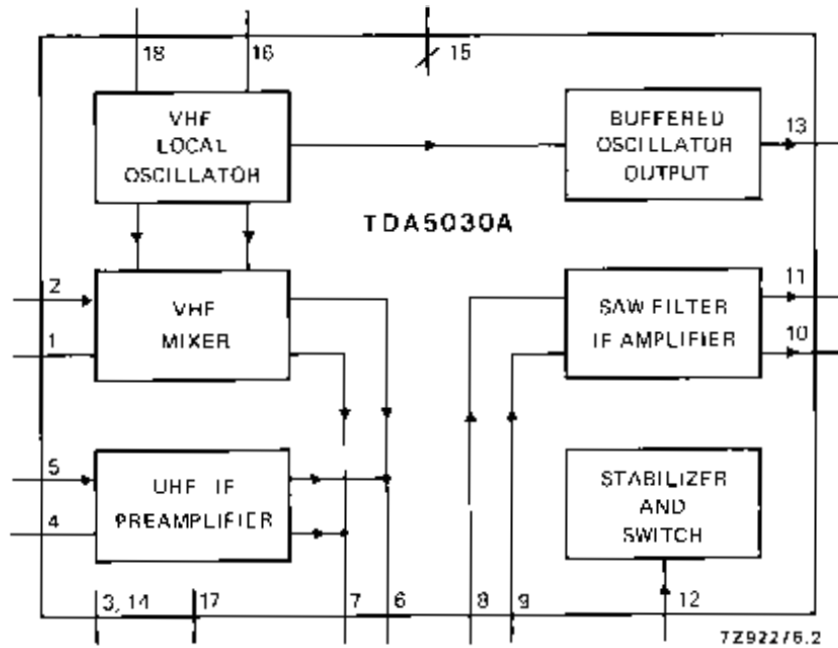


Fig. 1 Block diagram.

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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CHARACTERISTICSMeasured in circuit of Fig. 2, $V_P = V_{15-3} = 12$ V, $T_{amb} = 25$ °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

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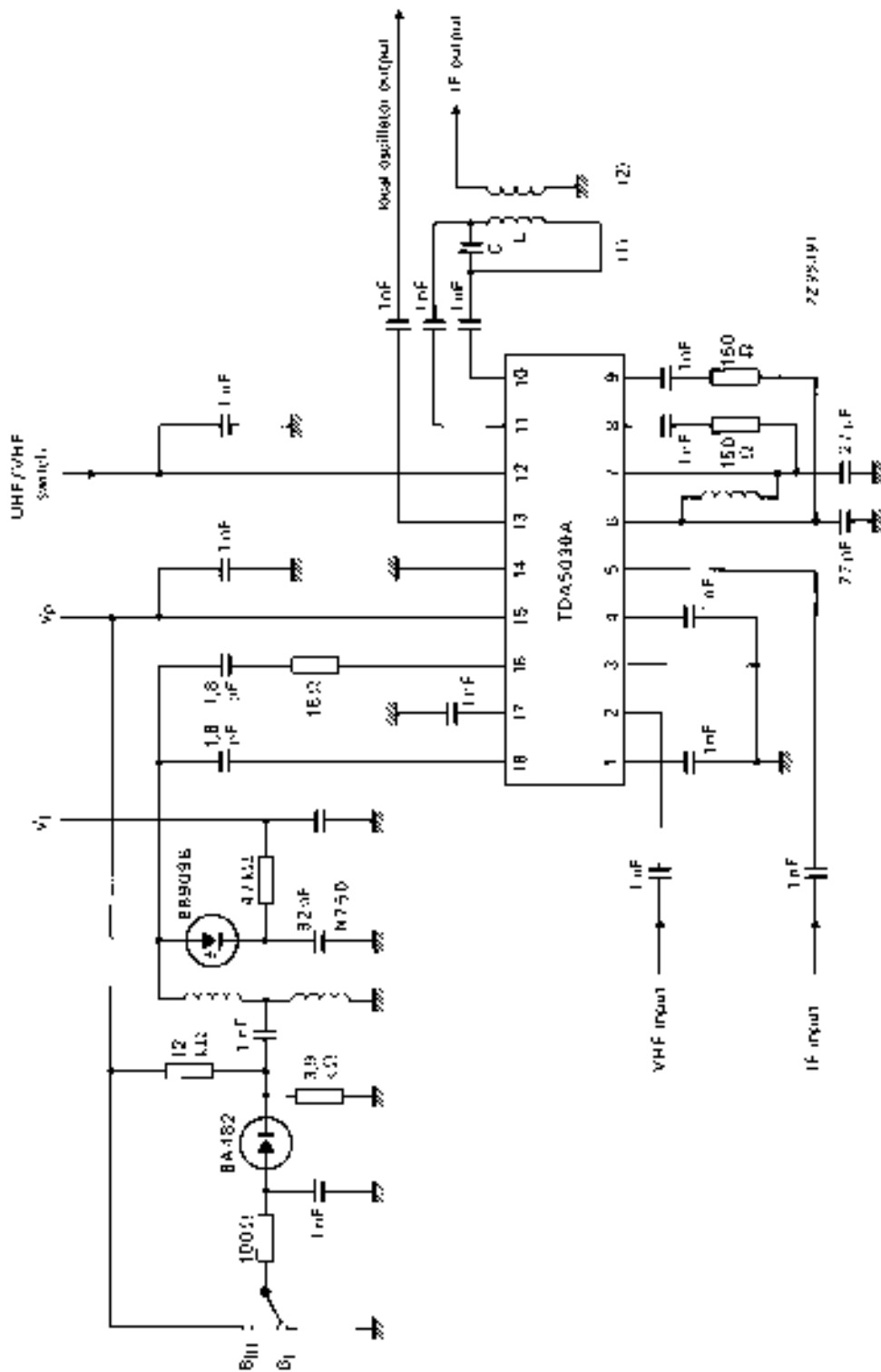


Fig. 2 Test circuit.

- (1) C = 18 pF, L = 2,2 μH, f_{CL} = 36,5 MHz.
- (2) Turns ratio = 7 : 1, load = 50 Ω.