PLESSEY
Semiconductors

T-77-07-05

TDA5030A

TV VHF MIXER OSCILLATOR/UHF IF PREAMPLIFIER/IF AMPLIFIER

The TDA5030A is designed for use within a UHF/VHF TV tuner and consists of a VHF local oscillator, a VHF mixer, a UHF IF preamplifier and an IF amplifier for driving a SAW filter. The device also includes a buffered output from the VHF local oscillator to drive a prescaler or synthesiser and a UHF/VHF switching circuit. The device requires a minimum of external components to produce a full VHF tuner with an IF amplifier for a UHF tuner section.

FEATURES

- Balanced VHF Mixer
- VHF Oscillator (70-520 MHz)
- Differential SAW Filter Drive
- IF Amp for UHF IF Input
- Buffered VHF Oscillator Output
- UHF/VHF Switching Circuit
- Full Static Protection on all Pins

APPLICATIONS

- TV Tuners for TV and Video Recorders

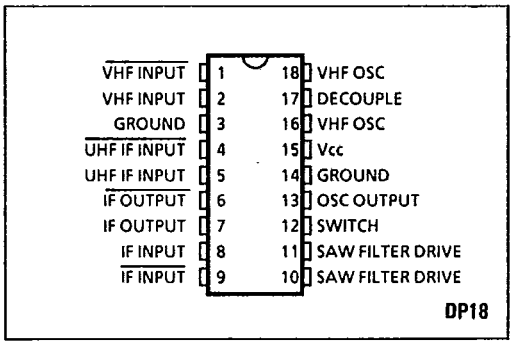

Fig 1 Pin Connections (top view)

ABSOLUTE MAXIMUM RATINGS

Supply voltage	14V
Input voltage	5V
VHF Switching voltage	Vcc + 0.3V
VHF Switching current	10mA
Output current	10mA
Operating temperature range	-25°C to + 85°C
Storage temperature range	-55°C to + 125°C

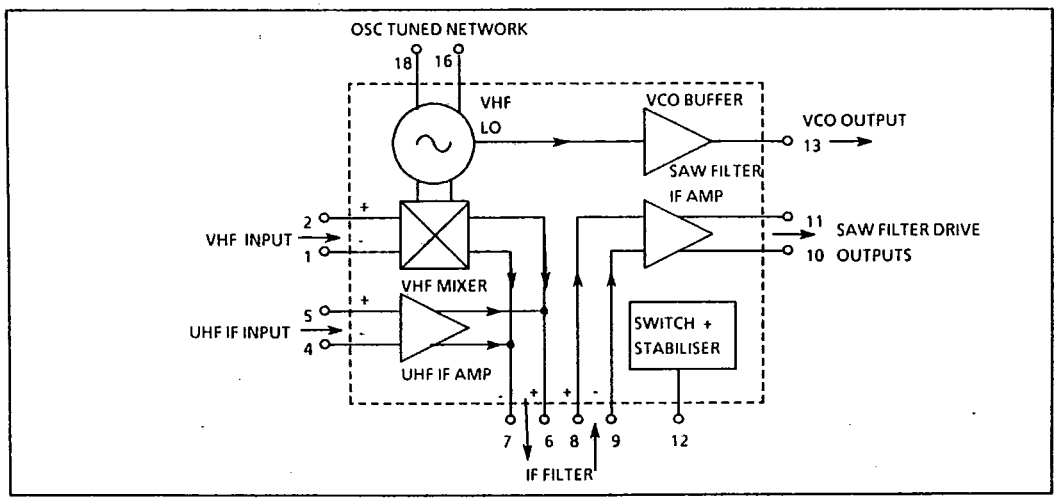

Fig 1 Block Diagram

ELECTRICAL CHARACTERISTICS

Test conditions (unless otherwise stated)
T_{amb} = 25°C, Supply Voltage = +12V

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Characteristic	Pin	Value			Units	Conditions
		Min	Typ	Max		
Supply Voltage Vcc	15	10	12	13.2	V	
Supply Current	15	-	42	55	mA	VHF Oscillator on
Switch voltage level for VHF	12	0	-	2.5	V	
Switch voltage level for UHF	12	9.5	-	Vcc + 0.3	V	
Switch current	12	0.05	-	0.7	mA	UHF selected
VHF Local Oscillator/Buffer						
Frequency range	13	70	-	470	MHz	
Frequency shift with Vcc	13	-	-	200	KHz	ΔVcc = 10% F = 70 to 330 MHz
Output Voltage	13	14	20	-	mV RMS	F < 100MHz
	13	10	20	-	mV RMS	F > 100MHz
Output impedance	13	-	90	-	Ω	
RF on Local oscillator output	13	-	-30	-	dB	w.r.t. local oscillator
IFon Local oscillator output	13	-	-30	-	dB	w.r.t. local oscillator
Local oscillator harmonics	13	-	-14	-	dB	w.r.t. local oscillator
VHF Mixer(including IF amp)						
Voltage gain	1,2,10,11	23	25	27	dB	See test circuit
Input conductance	1,2	-	0.23	-	mS	50MHz
	1,2	-	0.5	-	mS	225MHz
	1,2	-	0.67	-	mS	300MHz
Input capacitance	1,2	-	2.5	-	pF	
Output impedance	6,7	-	1.6	-	KΩ	(mixer only)
Noise Figure		-	7	-	dB	50
		-	8.5	-	dB	225MHz
		-	9.5	-	dB	300MHz
		-	10.25	-	dB	470MHz
Input for 1% cross-modulation(in channel)	1,2	97	99		dBμV	
UHF IF Amplifier(IF amp incl)						
Voltage gain	4,5,10,11	32	34	36	dB	
Input conductance	4,5	-	0.3	-	mS	
Input capacitance	4,5	-	3	-	pF	
Noise Factor			5	6	dB	
Input for 1% cross-modulation(in channel)	4,5	88	90	-	dBμV	
SAW filter IF amplifier						
Input impedance	8,9	-	300 + 100j	-	Ω	Load = 2K (between Pin 10 and 11)
Output impedance	10,11	-	200	-	Ω	

FUNCTIONAL DESCRIPTION

The on board VHF Local oscillator will oscillate between 70 and 470 MHz depending on the parallel tuned circuit connected to pins 16 and 18. The tuned circuit is coupled to pins 16 and 18 via two 1.8 pF capacitors, as in Fig 2, these capacitors provide the correct transfer caracteristics for oscillation. The tuned circuit will require a switcheable inductor if more than one of the VHF bands are to be tuned to, Fig 2 shows the inductor values required for European VHF Bands I and III.

The input to the VHF mixer can be differential or single ended with one input decoupled, as in Fig 2.

The output of the VHF mixer is coupled to the IF amplifier via a simple IF filter and two 150Ω resistors. The 150Ω resistors limit the gain of the IF amplifier to ensure stable operation. The output of the IF amplifier is designed to directly drive a standard SAW filter.

The VHF Local oscillator has a buffered output designed to drive a prescaler or synthesiser directly.

An alternative IF source,e.g. from a UHF mixer, can be coupled into the tuner after the mixer via Pins 4 and 5. This input is enabled and the VHF Local oscillator disabled when Pin 12 is taken high.

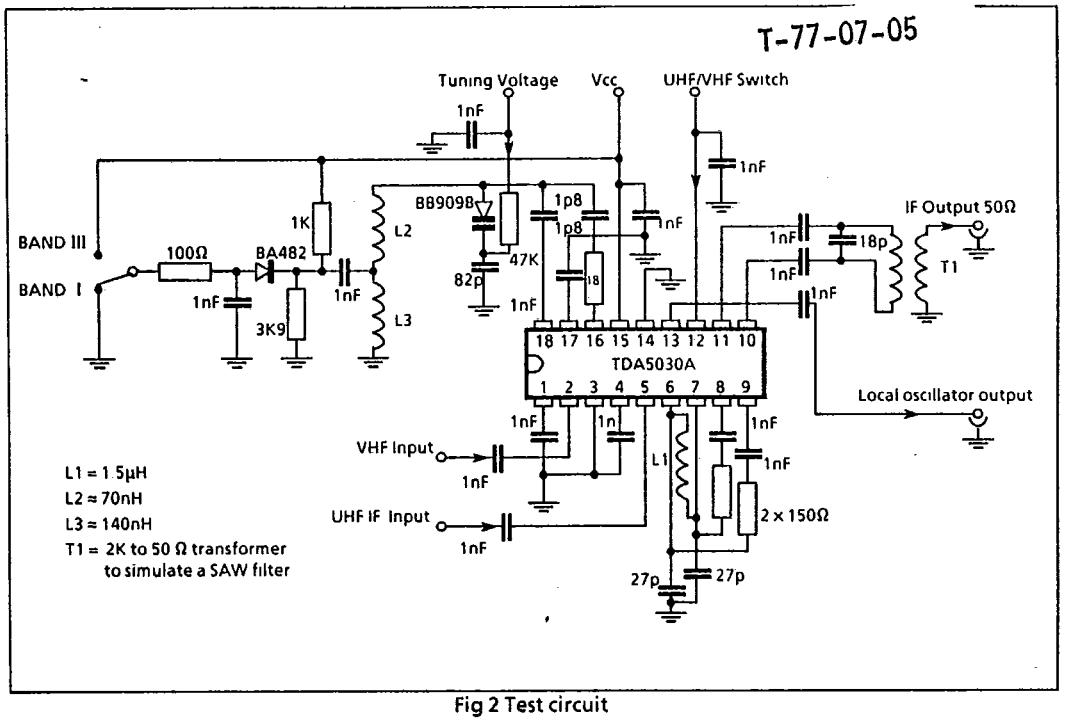

Fig 2 Test circuit

PCB LAYOUT

The Tuner should be layed out with the oscillator and decoupling components suituated as close as possible to the TDA5030A . A double sided PCB with a good earth plane is advised, although it is not essential.