

## VHF/ UHF-Tuner-IC

### Description

This tuner IC requires a power supply of 5 V and performs the function of three separate oscillators an mixers, SAWF-driver, L.O.-output and tri-state band switch.

This tuner IC is decigned for high performance tuners for TV, VCR and PCs.

### Features

- 5 V supply voltage
- Frequency range from 48 to 860 MHz
- Band A: balanced high impedance mixer input and amplitude controlled oscillator
- Band B + C: balanced low impedance mixer input and symmetrical oscillator
- Balanced L. O.-outputs for prescalers or PLL
- SAW filter driver with low impedance output
- Voltage regulator for stable operating characteristics
- ESD protection on all pins except oscillator pins and RF-inputs

### Benefits

- The integration of 3 bands and the small SSO28 package allows to design very small and economical 3-band tuners with high performance.

### Block Diagram

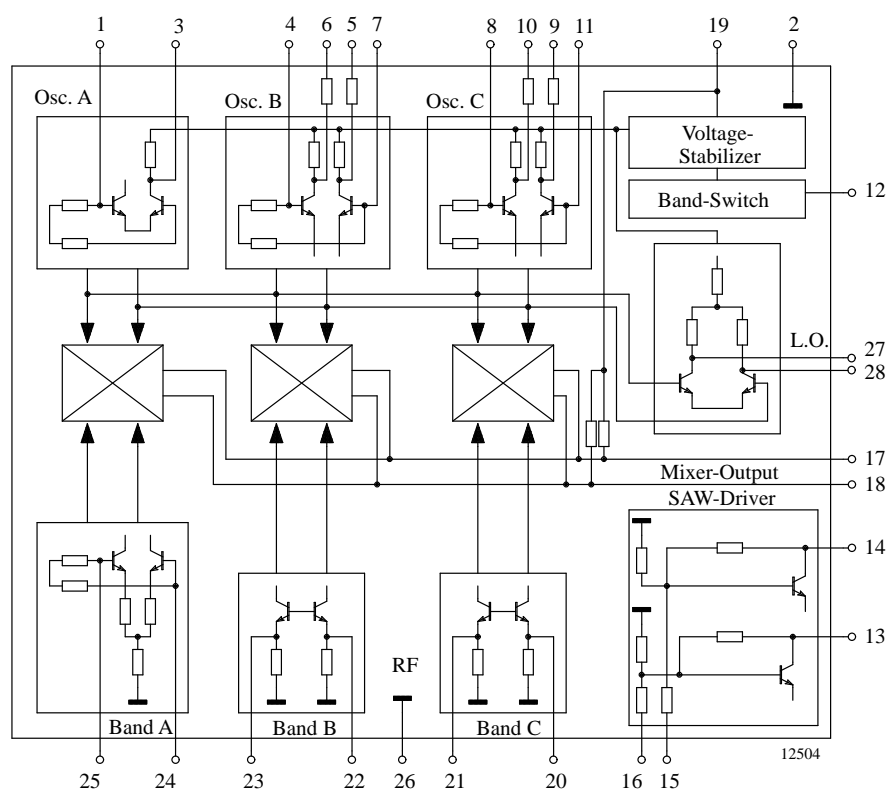
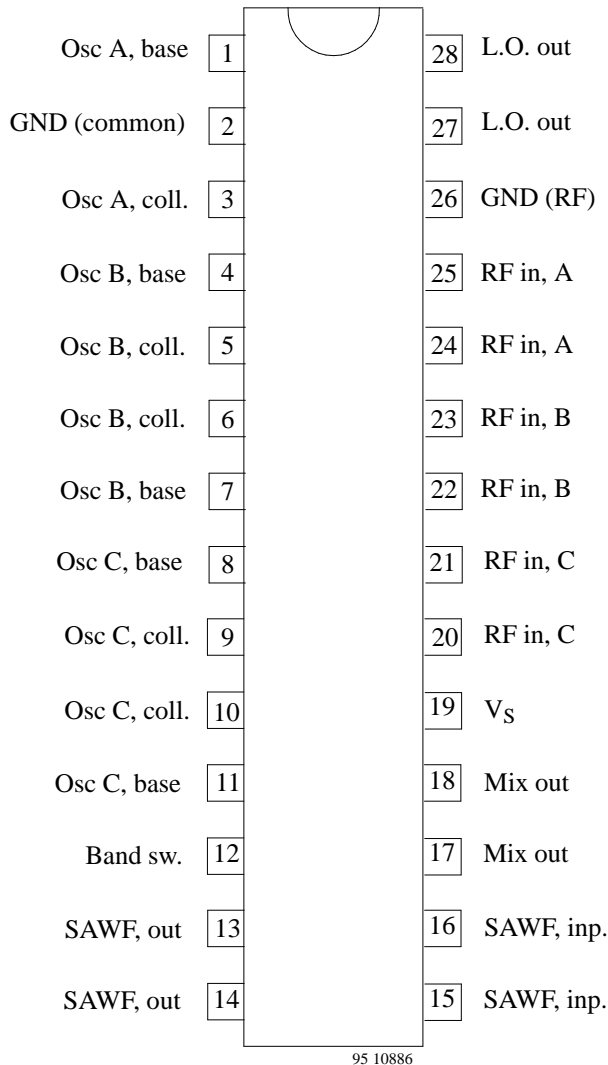


Figure 1. Block diagram

## Pin Description



Pin	Symbol	Function
1	Osc A, base	Oscillator band A, base
2	GND (common)	Ground, common
3	Osc A, coll.	Oscillator band A, collector
4, 7	Osc B, base	Oscillator band B, bases
5, 6	Osc B, coll.	Oscillator band B, collectors
8, 11	Osc C, base	Oscillator band C, bases
9, 10	Osc C, coll.	Oscillator band C, collectors
12	Band sw.	Tri-state band switch
13, 14	SAWF, out	SAWF filter driver outputs
15, 16	SAWF, inp.	SAWF filter driver inputs
17, 18	Mix out	Mixer outputs, open collector
19	V <sub>S</sub>	Supply voltage V <sub>S</sub>
20, 21	RF in, C	RF inputs, band C
22, 23	RF in, B	RF inputs, band B
24, 25	RF in, A	RF inputs, band A
26	GND (RF)	Ground, RF part
27, 28	L.O. out	L.O.-outputs

## Ordering Information

Extended Type Number	Package	Remarks
U2305B-AFSG3	SSO28	Taped and reeled

## Absolute Maximum Ratings

All voltages are referred to GND, Pin 2

Parameters	Symbol	Min.	Typ.	Max.	Unit
Supply voltage Pin 19	$V_S$			5.25	V
RF inputs Pin (20-25)				$V_S$	V
IF outputs Pin 17-18				5.5	V
Tri-state switch voltage Pin 12	$V_{ITRI}$			$V_S$	V
Junction temperature	$T_j$			125	°C
Storage temperature	$T_{stg}$	-40		125	°C

## Operating Range

All voltages are referred to GND, Pin 2

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
Supply voltage	Pin 17-19	$V_S$	4.5	5.0	5.25	V
Ambient temperature		$T_{amb}$	-25		75	°C

## Thermal Resistance

Parameters	Symbol	Typ	Unit
Junction ambient Package SSO28 soldered to PCB (see layout page 5)	$R_{thJA}$	128	K/W

## Electrical Characteristics

Test conditions (unless otherwise specified):  $V_S = 5$  V.  $T_{amb} = 25$  °C. Reference point Pin 2.  
Referred to test circuit page 5.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 17-19	$V_S$	4.5	5.0	5.25	V
Supply current	Pin 17-19	$I_S$		42		mA
<b>Band switch</b>						
Voltage band A	Pin 12	$V_{SWA}$	0		20%	$V_S$
Voltage band B	Pin 12	$V_{SWB}$	25%		50%	$V_S$
Voltage band C	Pin 12	$V_{SWC}$	55%		100%	$V_S$
Switching current	$V_{SW} = 5$ V Pin 12	$I_{SW}$			100	$\mu$ A
<b>LO output</b>						
LO level each output	$R_L = 50 \Omega$ Pin 27, 28	$P_{LO}$	-25		-17	dBm
<b>SAW filter driver</b> $f_i = 36$ MHz						
Input impedance	Pin 15, 16	$Z_{iSAW}$		450		Ohm
Output impedance	Pin 13, 14	$Z_{oSAW}$		70		Ohm
Voltage gain	Pin 15, 16 $\rightarrow$ 13, 14	$G_{vSAW}$		17		dB

## Electrical Characteristics (continued)

Parameters	Test Conditions / Pins	Symbol	Min	Typ	Max	Unit
<b>Band A</b>						
Input frequency range	Pin 24	fiA	48		170	MHz
Input impedance	Figure 3 Pin 24	S11A				
Gain (note 4)	Pin I/P to O/P	GA		28		dB
Noise figure DSB (note 2)	Pin I/P to O/P fiA = 50 MHz	NF		11.5		dB
		NF		12		dB
Input level for (note 3):	Each carrier					
IM3 (interm. of 3rd order)	fiA = 71 MHz Pin I/P	ViA		-23		dBm
IM2 (interm. of 2nd order)	fiA = 71 MHz Pin I/P	ViA		-22		dBm
<b>Band B (note 1)</b>						
Input frequency range	Pin 22, 23	fiA	170		470	MHz
Input impedance	Pin 22, 23	S11B		see Fig. 3		
Gain (note 4)	Pin I/P to O/P	GB		32		dB
Noise figure DSB (note 2)	Pin I/P to O/P fiB = 200 MHz	NF		9.5		dB
		NF		10		dB
Input level for (note 3):	Each carrier					
IM3 (interm. of 3rd order)	fiB = 300 MHz Pin I/P	ViB		-28		dBm
<b>Band C (note 1)</b>						
Input frequency range	Pin 20, 21	fiC	470		860	MHz
Input impedance	Figure 3 Pin 20, 21	S11C				
Gain	Pin I/P to O/P	GC		32		dB
Noise figure DSB (note 2)	Pin I/P to O/P fiC = 500 MHz	NF		10.5		dB
		NF		11.5		dB
Input level for IM3 (interm. of 3rd order, note 3)	Each carrier fiC = 600 MHz Pin I/P	ViC		-28		dBm

### Notes

- 1) The RF inputs B and C are symmetrical driven by means of a hybrid for 180° phase shifting, consequently the source impedance is 100 Ω. All other impedance for RF tests is 50 Ω.
- 2) The noise figure (NF) is the value for double-side-band measurement.
- 3) The intermodulation test (2-carrier-method) which is made on IF-centre is in reference to a signal-to-IM ratio of 60 dB.
- 4) Gain is the ratio of the voltage at the primary coil of L5 to the available voltage at the input.

**Test and Principle Application Circuit**

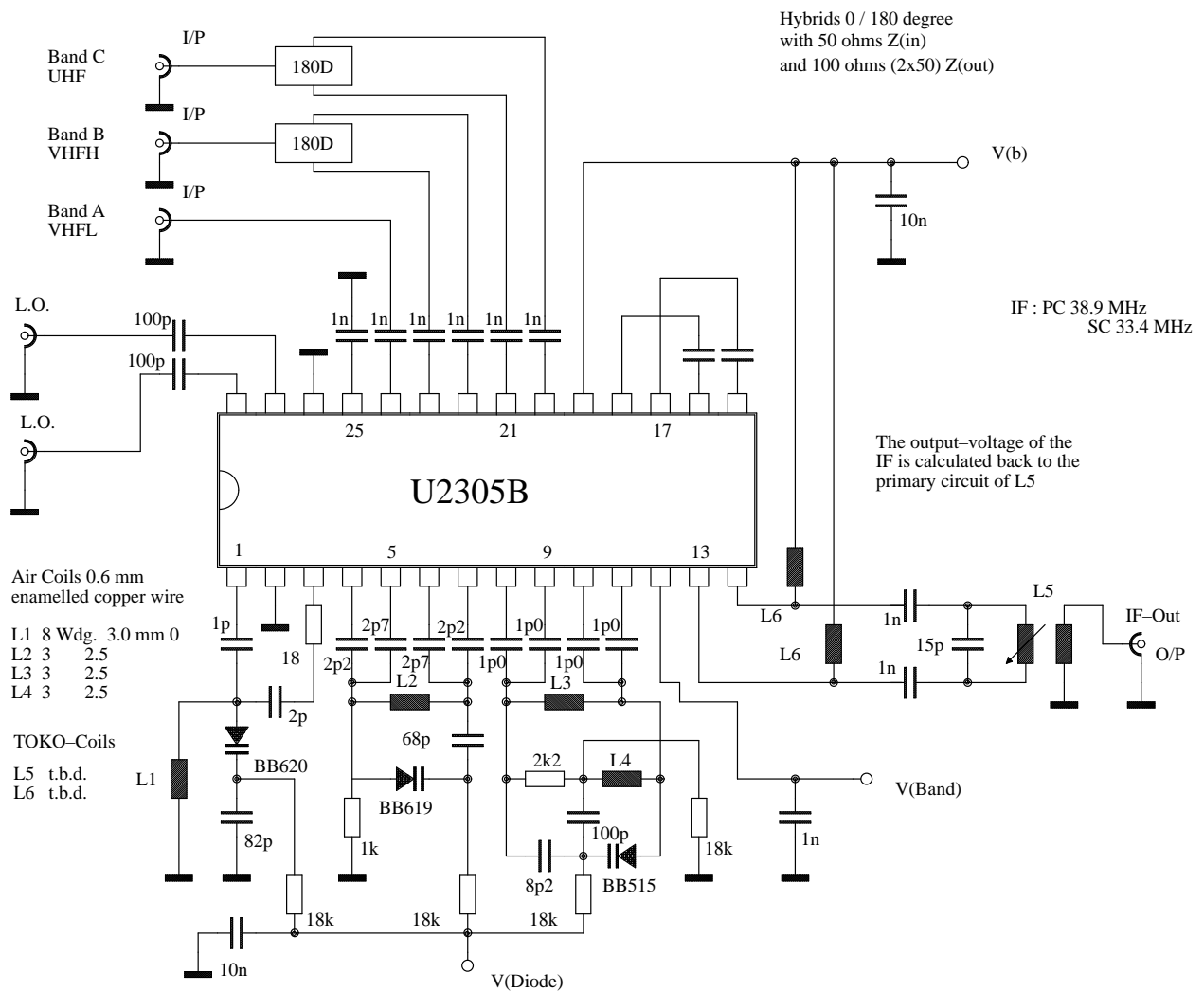
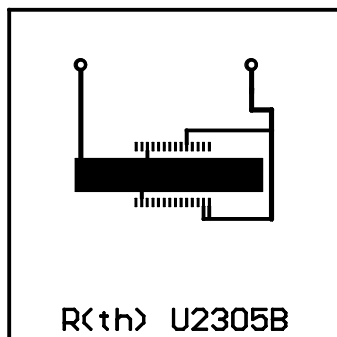


Figure 2. Test and principle application circuit

**PCB for the R<sub>thJA</sub>-Measurement**



Material: 35 μm one-sided Cu-coated epoxy PCB, 40 mm × 40 mm × 1.5 mm

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Figure 3. PCB for the R<sub>thJA</sub>-measurement

## Input Impedance Mixer Band A (S11A), B and C (S11B/C)

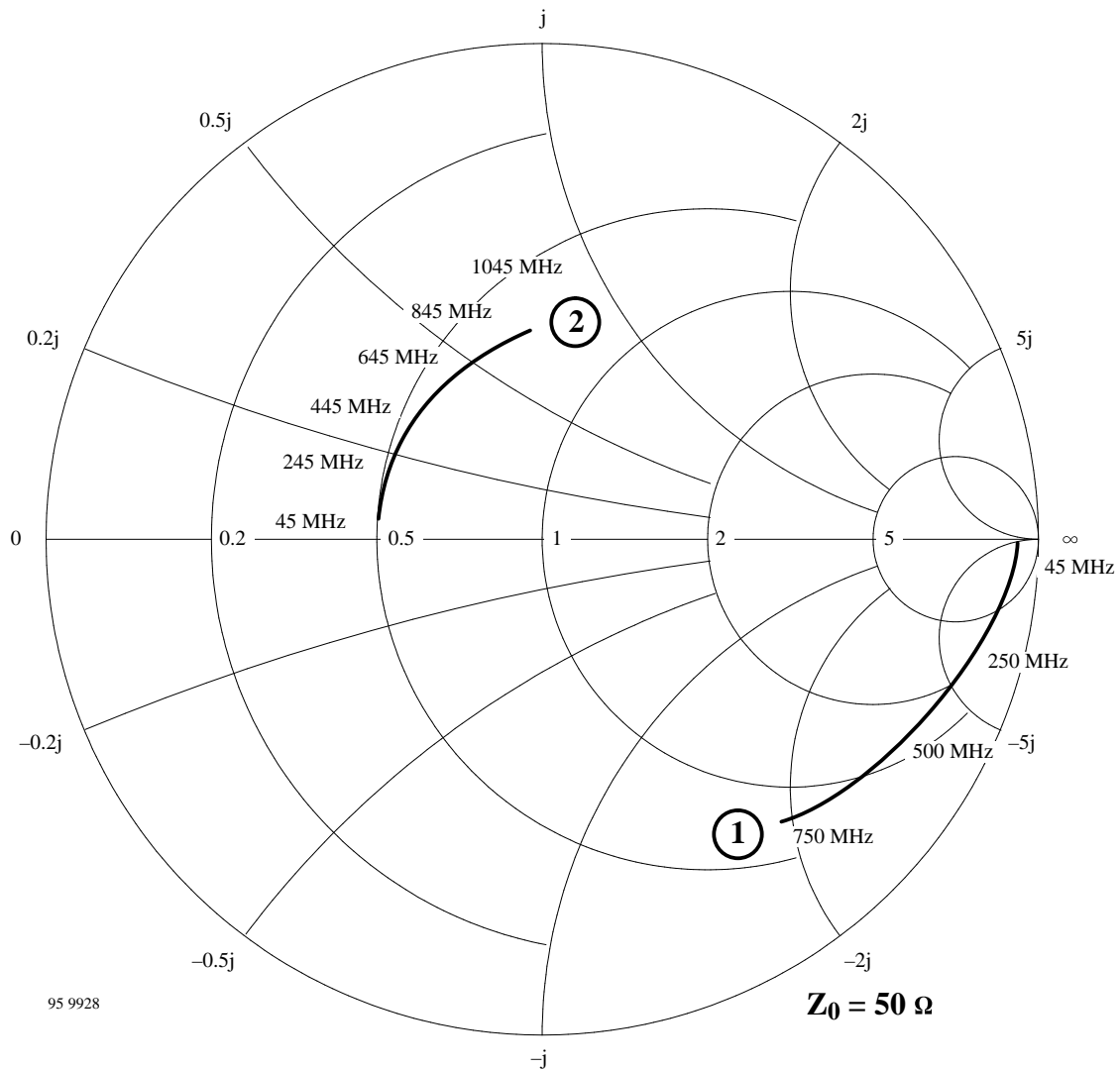
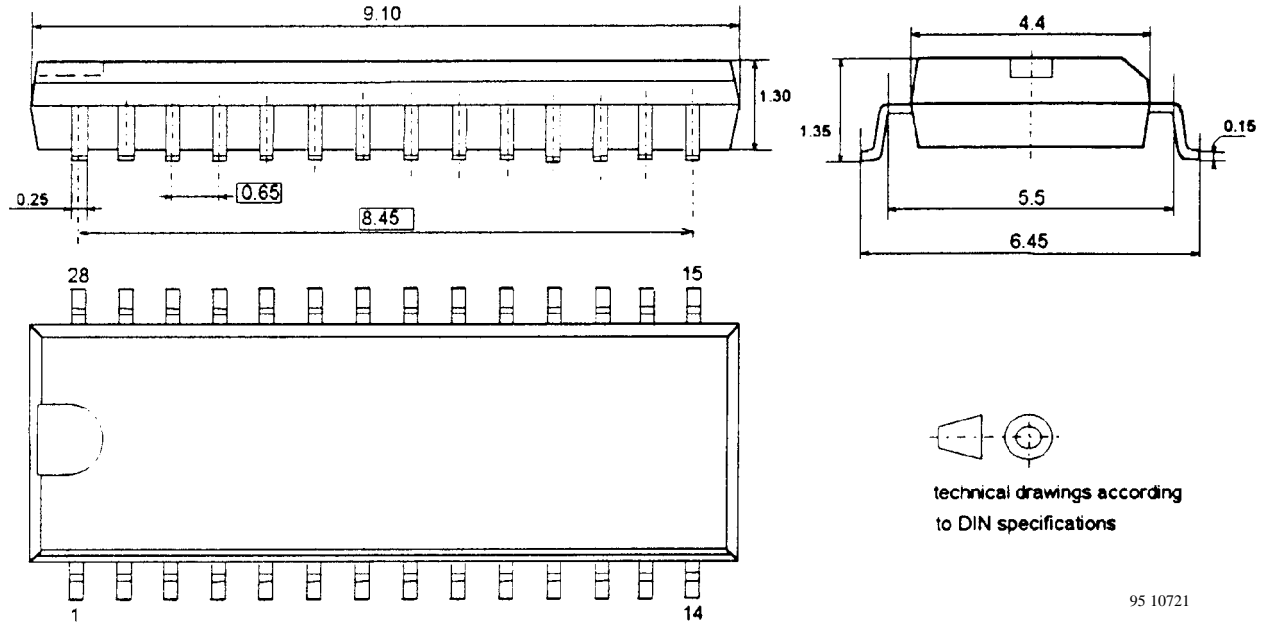


Figure 4. Input impedance mixer band A (S11A), B and C (S11B/C)

- 1) **VHF-low**  
Normalised to 50  $\Omega$ , measuring range 45 MHz to 750 MHz.
- 2) **VHF-high and UHF**  
Normalised to 50  $\Omega$ , measuring range 45 MHz to 1045 MHz. Both inputs are driven symmetrical. The output impedance of hybrid is 100  $\Omega$ , the measured levels are then calculated in reference to 50  $\Omega$ .

**Package Dimensions**

Super small outline plastic package, 28 pin – SSO28  
Dimensions in mm



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It is particular concern to control or eliminate releases of those substances into the atmosphere which are known as ozone depleting substances (ODSs).

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2. Class I and II ozone depleting substances in the Clean Air Act Amendments of 1990 by the Environmental Protection Agency (EPA) in the USA
3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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