

## VHF/UHF Tuner-IC

### Description

This tuner IC requires a power supply of 12 V and performs the function of two separate oscillators and mixers, SAW-filter driver and dual state band switch.

### Features

- Frequency range from 48 to 860 MHz
- Band A: balanced high impedance mixer input and amplitude controlled oscillator
- Band B: balanced low impedance mixer input and symmetrical oscillator
- SAW filter driver with low impedance output
- Voltage regulator for stable operating characteristics
- ESD protection on all pins except oscillator pins and RF-inputs

### Block Diagram

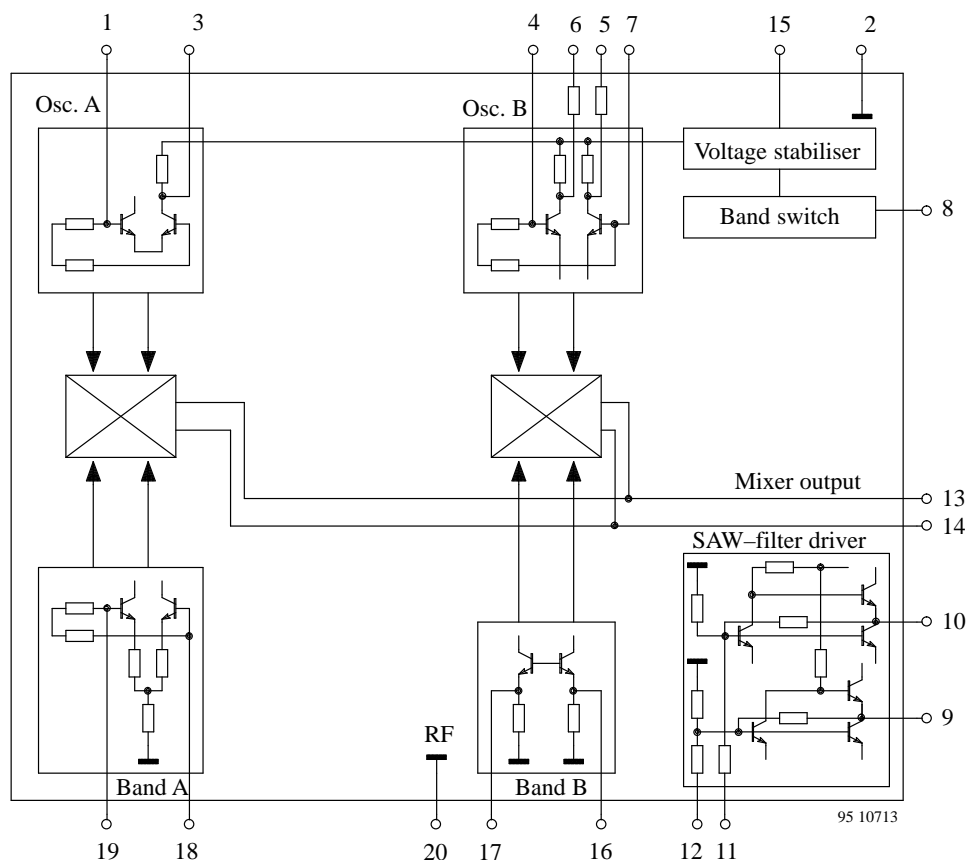
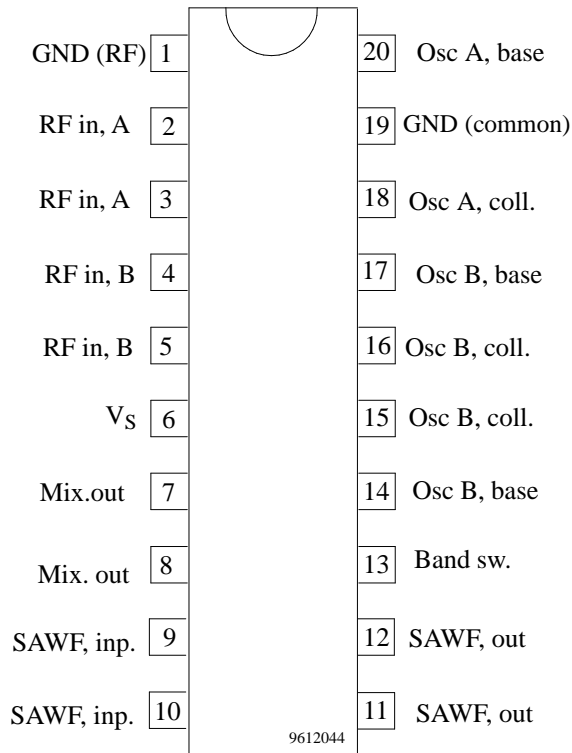


Figure 1.

### Ordering Information

Extended Type Number	Package	Remarks
U2320B-FLG3	SO20 plastic package	Taped and reeled

## 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	Band sw.	Dual-state band switch
9, 10	SAWF, out	SAW filter driver outputs
11, 12	SAWF, inp.	SAW filter driver input
13, 14	Mix, out	Mixer outputs, open collector
15	V <sub>S</sub>	Supply voltage V <sub>S</sub>
16, 17	RF in, B	RF inputs, band B
18, 19	RF in, A	RF inputs, band A
20	GND (RF)	Ground, RF part

## Absolute Maximum Ratings

All voltages are referred to GND, Pin 2

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 15	V <sub>S</sub>			13,5	V
RF inputs	Pin 16-19				5.0	V
IF outputs	Pin 13-14				13.5	V
Dual-state switch voltage	Pin 8	ViDSW			13.5	V
Junction temperature		T <sub>j</sub>			150	°C
Storage temperature		T <sub>stg</sub>	-40		150	°C

## Operating Range

All voltages are referred to GND, Pin 2

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 13-15	V <sub>S</sub>	10.8	12	13.2	V
Ambient temperature	With heat conductive glue	T <sub>amb</sub>	-25		75	°C

## Thermal Resistance

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Junction ambient	Test conditions page 4 Package soldered to PCB	R <sub>thJA</sub>		90		K/W

## Electrical Characteristics

Test conditions (unless otherwise specified):  $V_S = 12\text{ V}$ ,  $T_{\text{amb}} = 25^\circ\text{C}$ , reference point Pin 2, referred to test circuit page 5.

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage	Pin 13-15	$V_S$	10.8	12.0	13.2	V
Supply current	Pin 13-15	$I_S$		42	50	mA
<b>Band switch</b>						
Voltage band A	Pin 8	VSWA	0	0	1.0	V
Voltage band B	Pin 8	VSWB	3.4	4.0	5.0	V
Switching current	VSW = 5 V Pin 8	ISW			100	$\mu\text{A}$
<b>SAW filter driver</b>						
	$f_i = 36\text{ MHz}$					
Input impedance	Pin 11, 12	ZiSAW		450		$\Omega$
Output impedance	Pin 9, 10	ZoSAW		70		$\Omega$
Voltage gain	11, 12 $\rightarrow$ 9, 10	GvSAW		19		dB
<b>Band A (note 1)</b>						
Input frequency range	Pin18	$f_iA$	48		470	MHz
Input impedance	Figure 4 Pin18	S11A				
Gain (note 4)	I/P to O/P	GA		30		dB
Noise figure DSB (note 2)	$f_iA = 50\text{ MHz}$ I/P to O/P $f_iA = 150\text{ MHz}$	NF		11.5		dB
				12		dB
Input level for (note 3):	Each carrier					
IM3 (Interm. of 3rd order)	$f_iA = 71\text{ MHz}$ I/P	$V_iA$		-22		dBm
IM2 (Interm. of 2nd order)	$f_iA = 71\text{ MHz}$ I/P	$V_iA$		-22		dBm
<b>Band B (note 1)</b>						
Input frequency range	Pin 16, 17	$f_iB$	470		860	MHz
Input impedance	Figure 4 Pin 16, 17	S11B				
Gain (note 4)	I/P to O/P	GB		34		dB
Noise figure DSB (note 2)	$f_iB = 500\text{ MHz}$ I/P to O/P $f_iB = 800\text{ MHz}$	NF		10.5		dB
				11.5		dB
Input level for IM3 (Interm. of 3rd order, note 3)	Each carrier $f_iB = 600\text{ MHz}$ I/P	$V_iB$		-27		dBm

### Notes

- 1) The RF input B is symmetrical driven by means of a hybrid for  $180^\circ$  phase shifting, consequently the source impedance is  $100\ \Omega$ . All other impedance for RF tests is  $50\ \Omega$ .
- 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

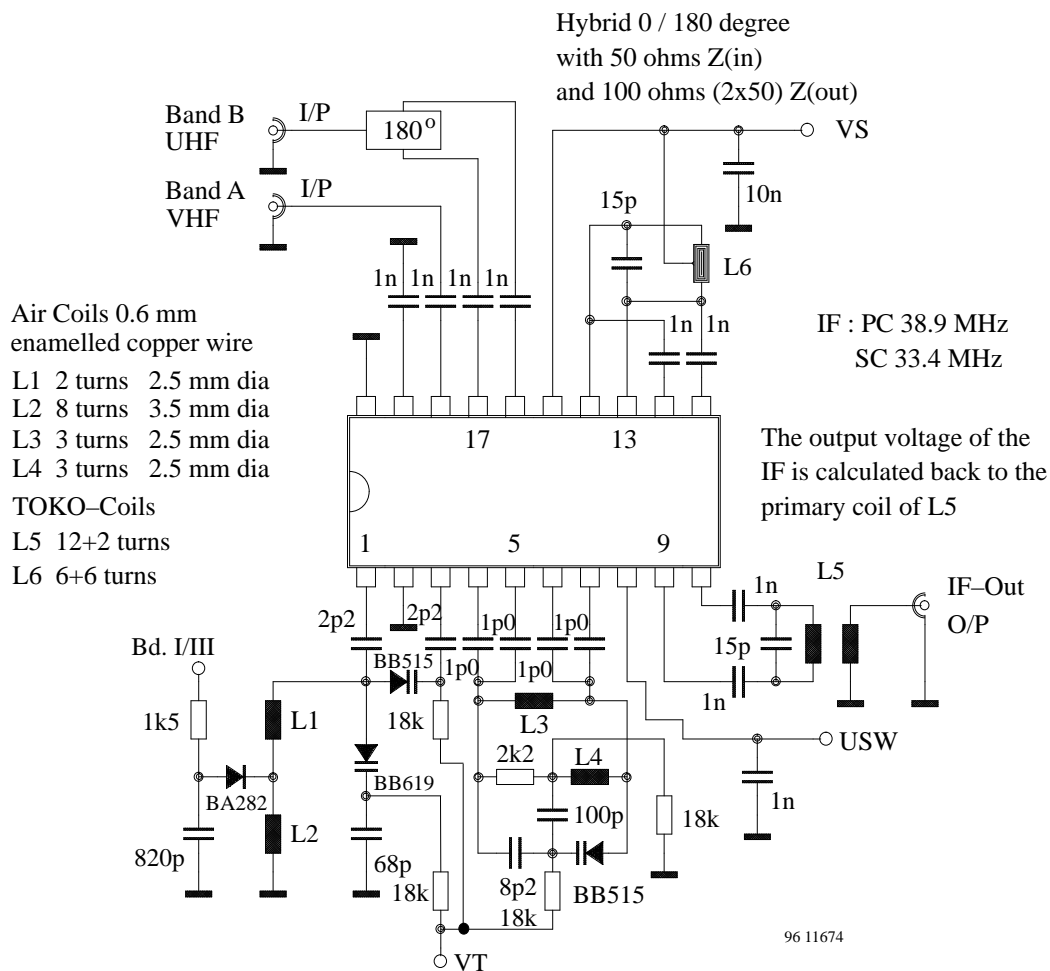


Figure 2. Test and principle application circuit

Note: All component values must be determined application specific. For more detailed information pls. request the application note "Semiconductors for TV-Tuners and The New EasyLink Concept".

## PCB for the $R_{thJA}$ -Measurement

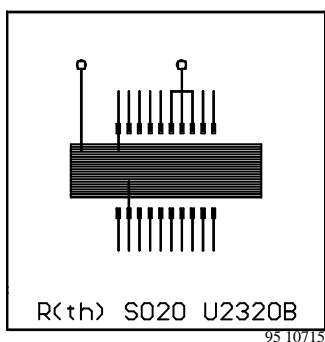


Figure 3. PCB for the  $R_{thJA}$ -measurement

35  $\mu$ m one-sided Cu-coated PCB,  
40 mm x 40 mm x 1.5 mm.

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

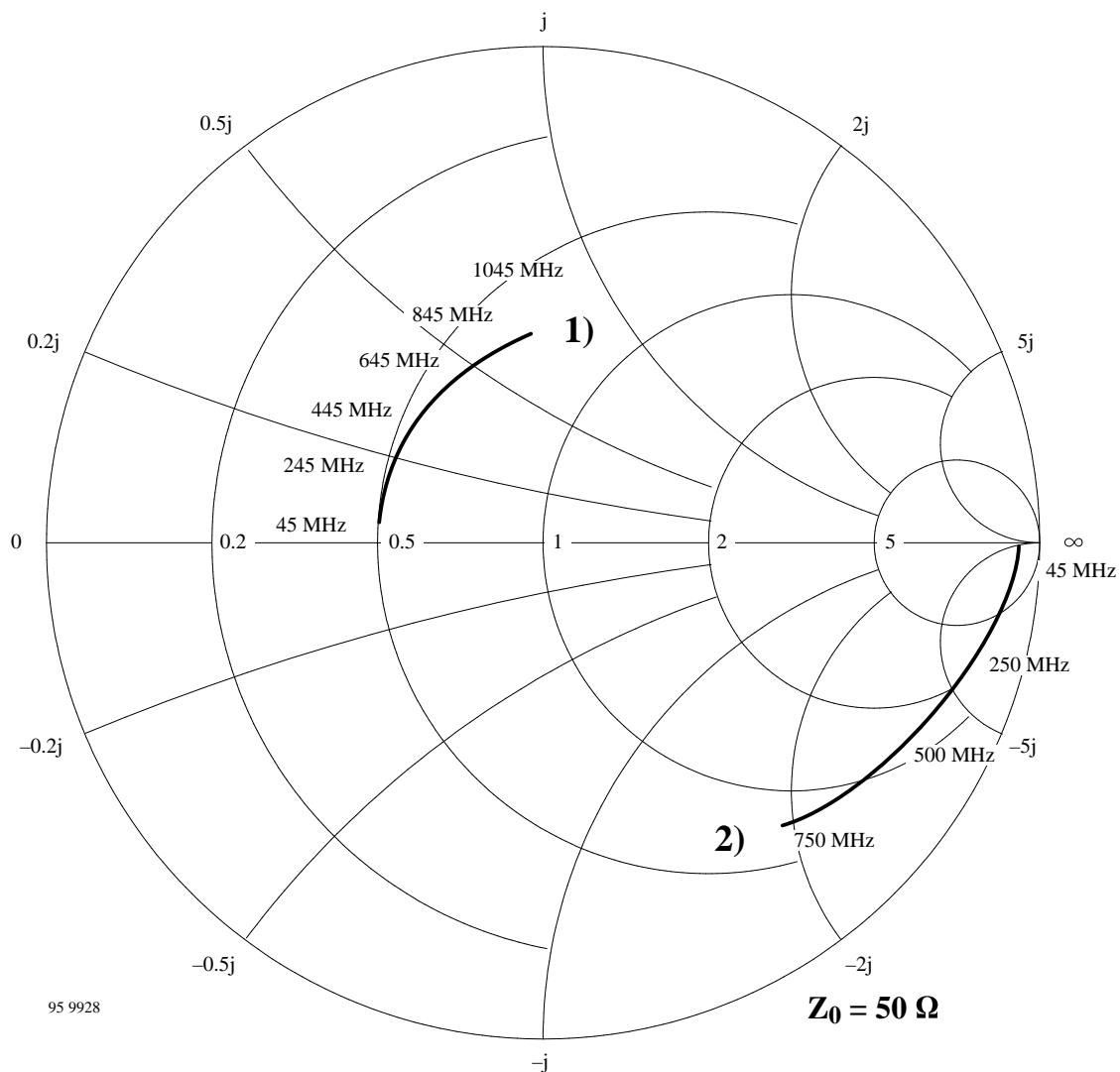
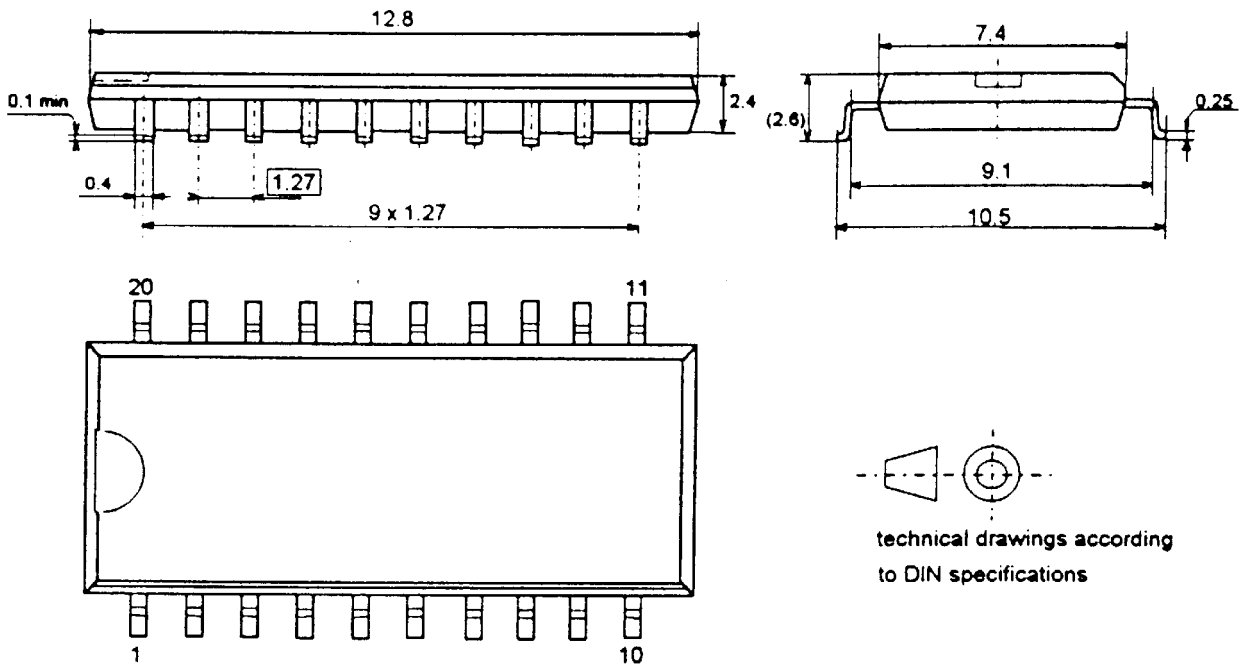


Figure 4. Input impedance mixer band A (S11A), and B (S11B)

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

## Package Dimensions

Small outline plastic package, 20 pin-SO20  
Dimensions in mm



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3. Council Decision 88/540/EEC and 91/690/EEC Annex A, B and C (transitional substances) respectively.

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