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

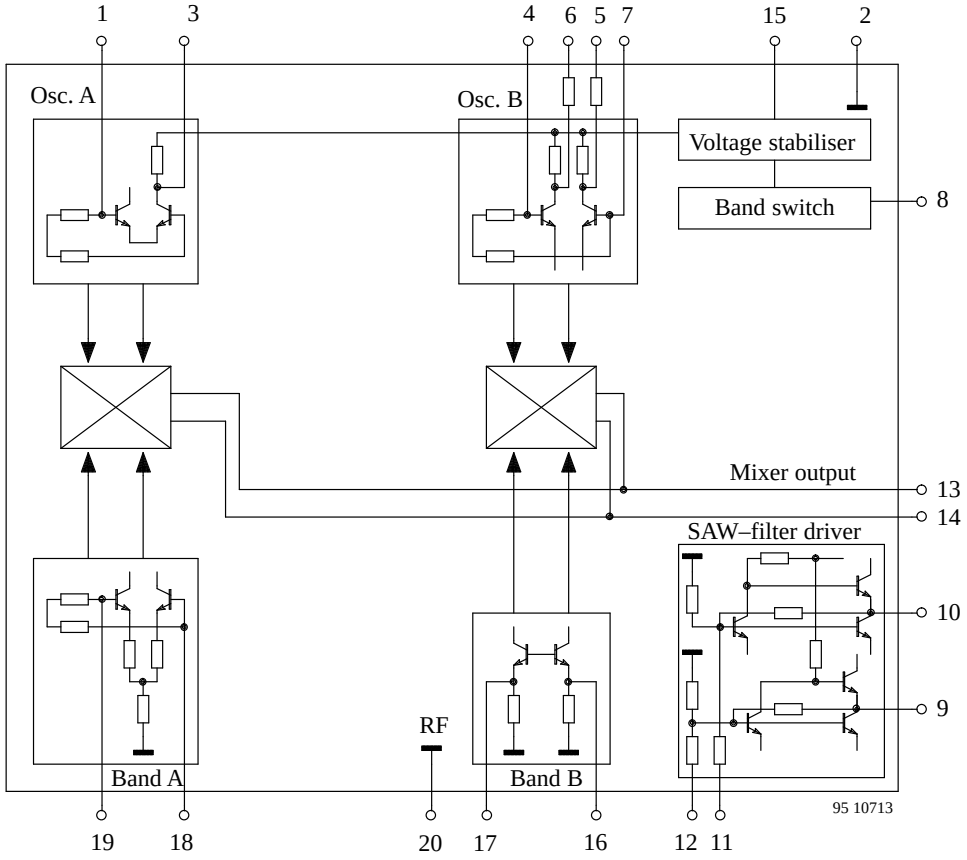
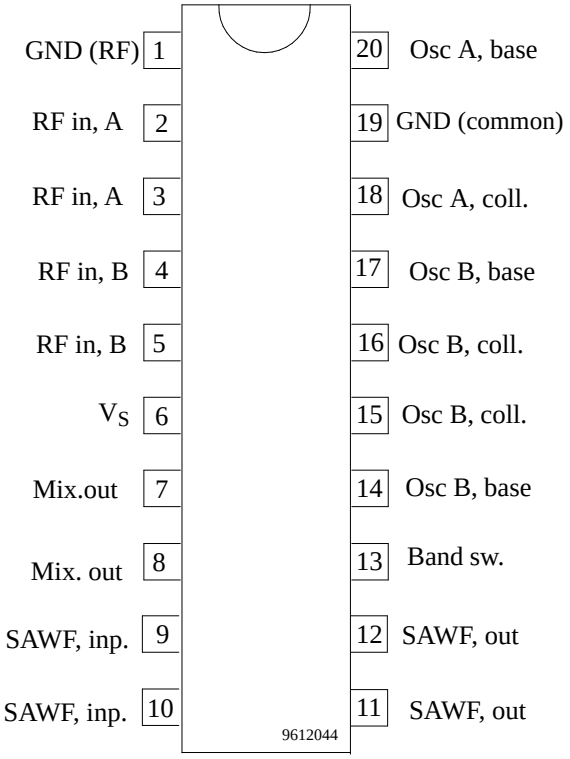


Figure 1.

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_S	Supply voltage V_s
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_S			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_j			150	˚C
Storage temperature		T_{stg}	–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_S	10.8	12	13.2	V
Ambient temperature	With heat conductive glue	T_{amb}	–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_{thJA}		90		K/W

Electrical Characteristics

Test conditions (unless otherwise specified): Vs = 12 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 13-15	V_S	10.8	12.0	13.2	V
Supply current		Pin 13-15	I_S		42	50	mA
Band switch							
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	µA
SAW filter driver	fi = 36 MHz						
Input impedance		Pin 11, 12	ZiSAW		450		Ω
Output impedance		Pin 9, 10	ZoSAW		70		Ω
Voltage gain	11, 12 → 9, 10		GvSAW		19		dB
Band A (note 1)							
Input frequency range		Pin18	fiA	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)	fiA = 50 MHz fiA = 150 MHz	I/P to O/P	NF		11.5 12		dB dB
Input level for (note 3):	Each carrier						
IM3 (Interm. of 3rd order)	fiA = 71 MHz	I/P	ViA		–22		dBm
IM2 (Interm. of 2nd order)	fiA = 71 MHz	I/P	ViA		–22		dBm
Band B (note 1)							
Input frequency range		Pin 16, 17	fiB	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)	fiB = 500 MHz fiB = 800 MHz	I/P to O/P	NF		10.5 11.5		dB dB
Input level for IM3 (Interm. of 3rd order, note 3)	Each carrier						
	fiB = 600 MHz	I/P	ViB		–27		dBm

Notes

1) The RF input B is 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

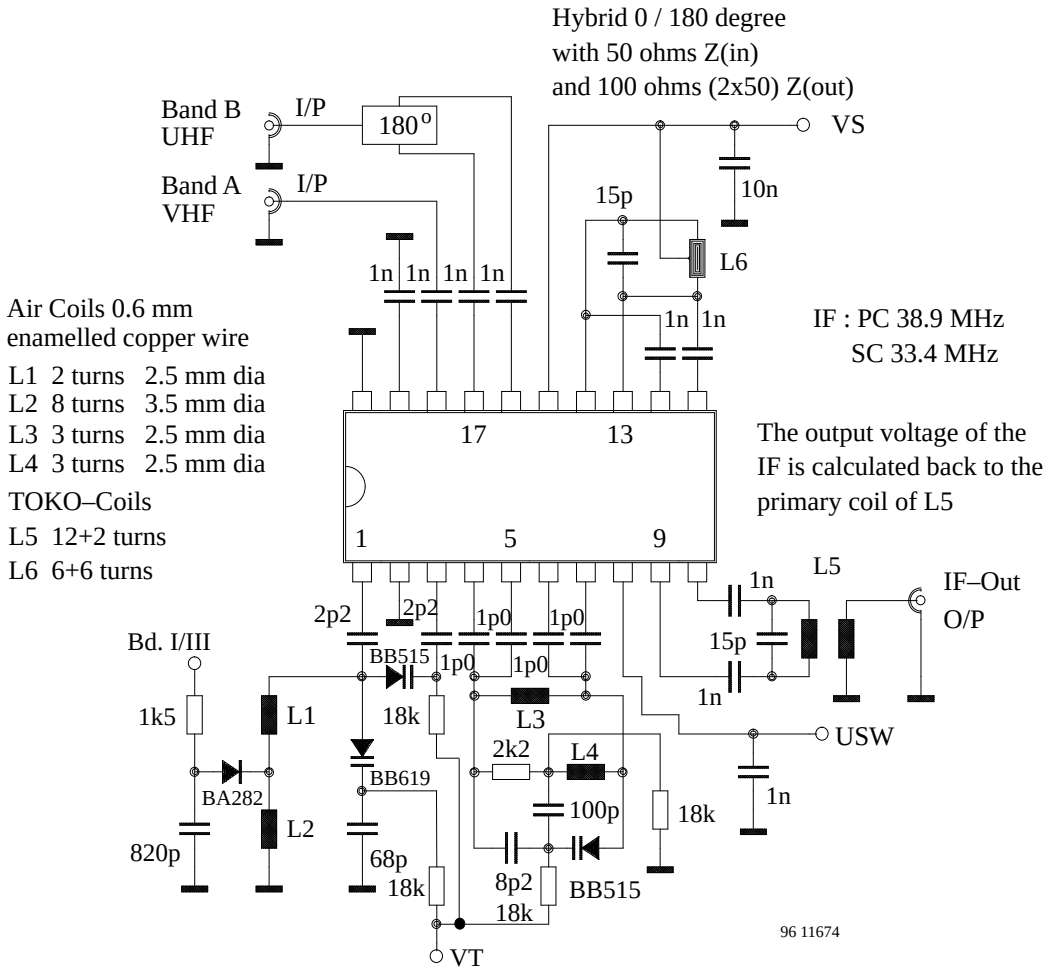
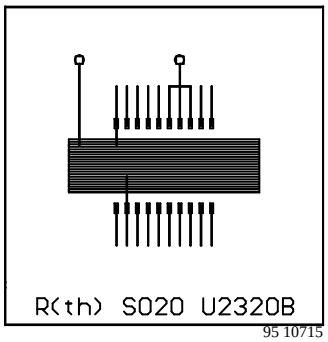


Figure 2. Test and principle application circuit

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



35 µm one-sided Cu-coated PCB,
40 mm x 40 mm x 1.5 mm.

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

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

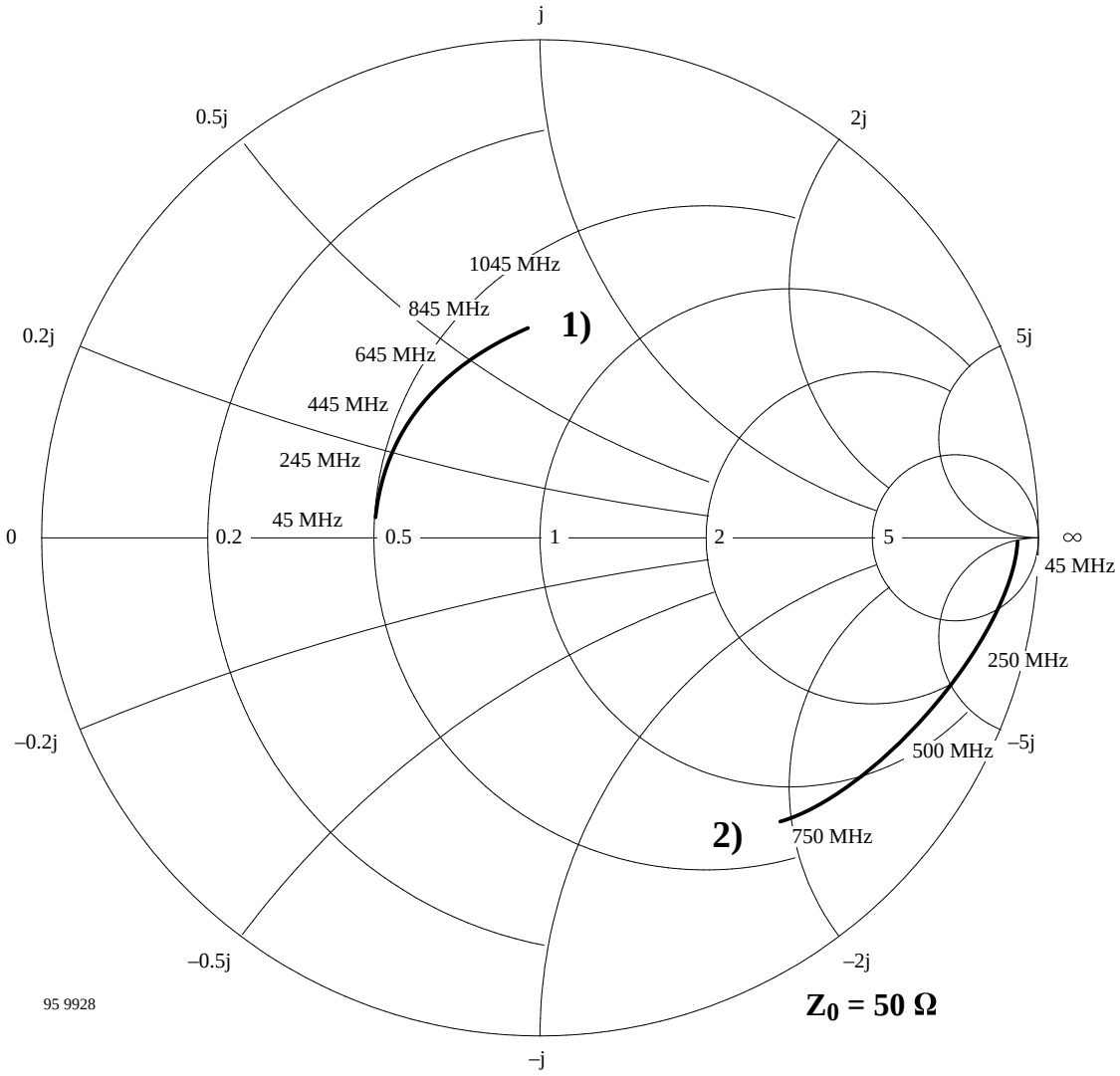


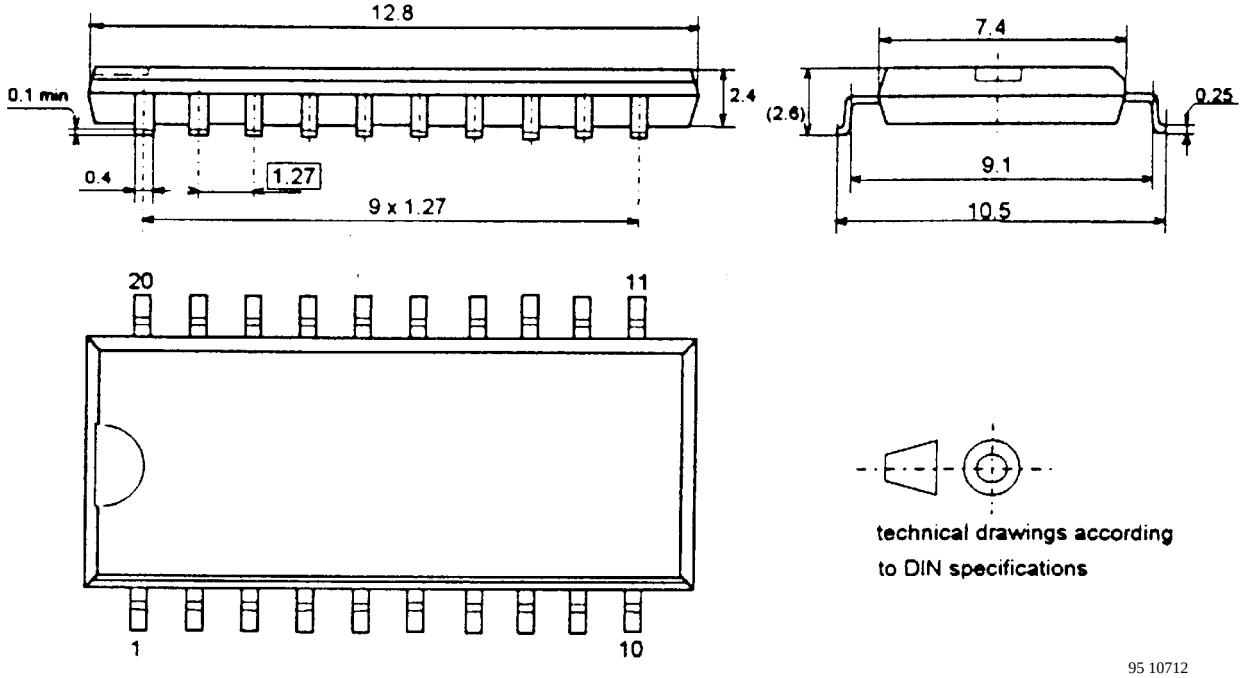
Figure 4. Input impedance mixer band A (S11A), and B (S11B)

1) **VHF-Low**
Normalized to 50 Ω, measuring range 45 MHz to 750 MHz.

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

Package Dimensions

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



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It is the policy of **TEMIC TELEFUNKEN microelectronic GmbH** to

1. Meet all present and future national and international statutory requirements.

2. Regularly and continuously improve the performance of our products, processes, distribution and operating systems with respect to their impact on the health and safety of our employees and the public, as well as their impact on the environment.

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

The Montreal Protocol (1987) and its London Amendments (1990) intend to severely restrict the use of ODSs and forbid their use within the next ten years. Various national and international initiatives are pressing for an earlier ban on these substances.

TEMIC TELEFUNKEN microelectronic GmbH semiconductor division has been able to use its policy of continuous improvements to eliminate the use of ODSs listed in the following documents.

1. Annex A, B and list of transitional substances of the Montreal Protocol and the London Amendments respectively

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.

TEMIC can certify that our semiconductors are not manufactured with ozone depleting substances and do not contain such substances.

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