IF Amplifier for Cable DVB Processing

Description

The U4459B is an integrated bipolar circuit suitable for the IF processing in cable-DVB receiver (**DVB** = **D**igital **V**ideo **B**roadcasting) and cable network application.

The circuit contains a wideband IF amplifier, mixer stage, gain control for the IF amplifier and a tuner-AGC (**A**utomatic **G**ain **C**ontrol) with adjustable take over point for an additional external preamplifier (tuner).

Features

- Input frequency range 30 to 50 MHz (1st IF)
- Wideband IF amplifier with high linearity
- Gain control of the IF amplifier by external dc voltage
- Mixer stage with local oscillator input (symmetrical or unsymmetrical)
- High output level of mixed signal (2nd IF) (up to 2.4 V, peak-to-peak value)
- Tuner-AGC with adjustable take over point for a preamplifier
- Supply voltage range 6.8 to 13.5 V

Package: DIP16

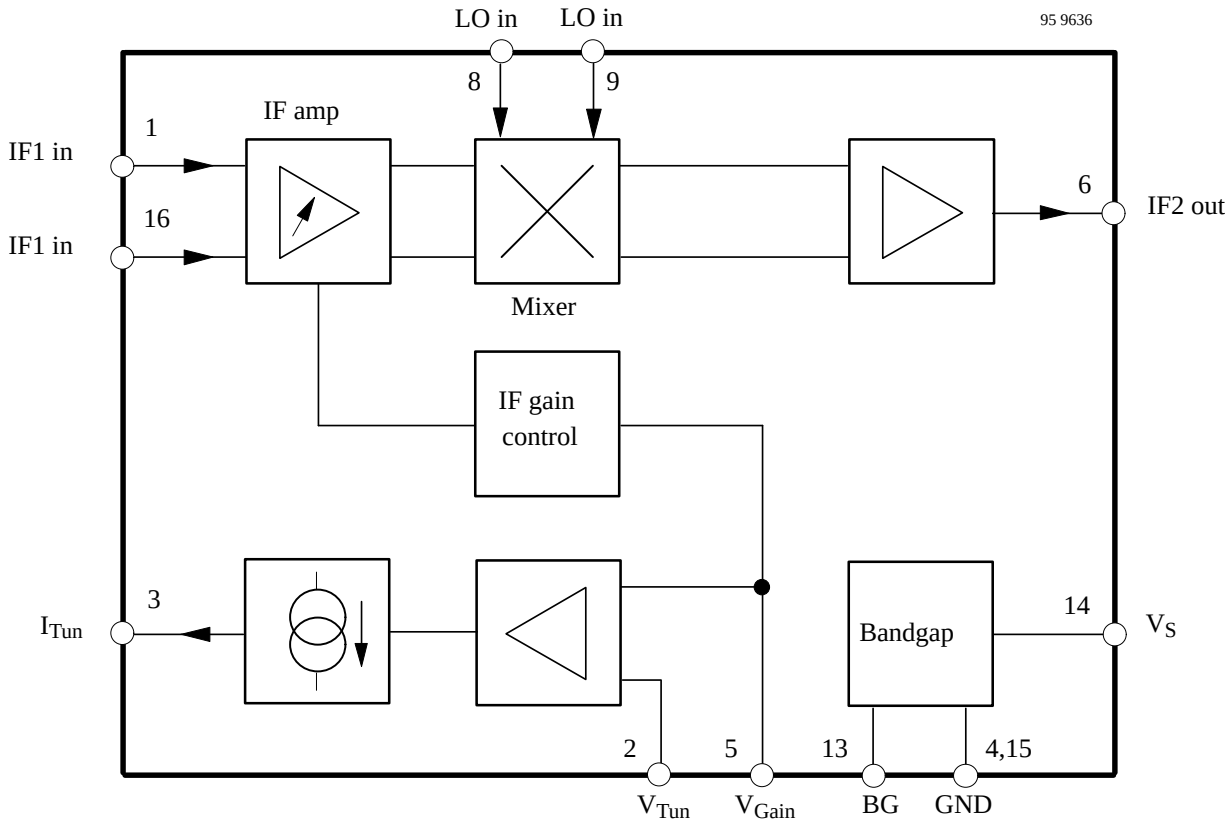


Figure 1. Block diagram

Pin Description

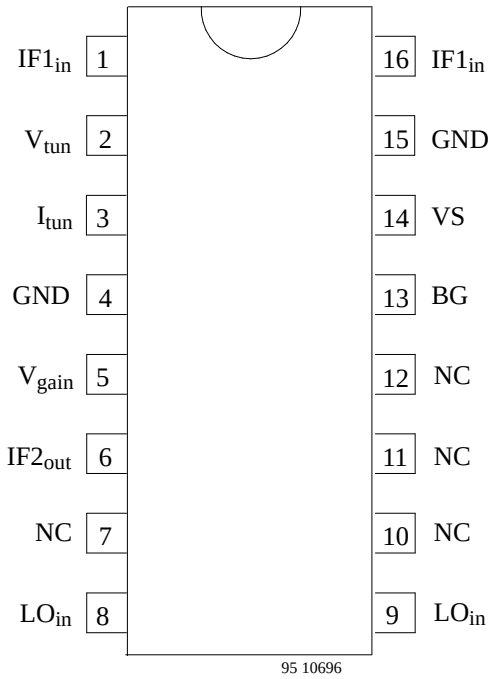


Figure 2.

Pin	Symbol	Function
1	$IF1_{in}$	IF1 input
2	V_{tun}	Take over point of tuner-AGC
3	I_{tun}	Tuner-AGC output current
4	GND	Ground
5	V_{gain}	IF gain control input
6	$IF2_{out}$	IF2 output
7	NC	Not connected
8	LO_{in}	Local oscillator input
9	LO_{in}	Local oscillator input
10	NC	Not connected
11	NC	Not connected
12	NC	Not connected
13	BG	Bandgap reference (internal use only)
14	VS	Supply voltage
15	GND	Ground
16	$IF1_{in}$	IF1 input

Circuit Description

The U4459B consists of a controllable 3-stage wideband amplifier, a mixer, IF-AGC and a tuner-AGC with adjustable take over point. The IF1 input voltage is applied at Pin 1 to 16 and it is fed via a 3-stage gain controlled wideband amplifier to the mixer. The wideband amplifier with high linearity is gain controlled by external dc voltage. The oscillator voltage (Pin 8–9) for the mixer stage can be applied symmetrically as well as unsymmetrically.

The mixed signal (2nd IF) is fed through a buffer amplifier to the output Pin 6. The control voltage can also be used for an additional external preamplifier in the tuner. This tuner-AGC with adjustable take over point protects the IF1 input against overload.

Absolute Maximum Ratings

Reference point Pin 4, unless otherwise specified

Parameters		Symbol	Value	Unit
Supply voltage	Pin 14	V_s	13.5	V
Supply current	Pin 14	I_s	55	mA
Power dissipation V_s = 13.5 V	Pin 14	P	750	mW
Junction temperature		T_j	+125	°C
Storage temperature		T_{stg}	–25 to +125	°C

Operating Range

Parameters	Symbol	Value	Unit
Supply voltage range Pin 14	V_s	6.8 to 13.5	V
Ambient temperature	T_{amb}	–10 to +80	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction ambient when soldered to PCB	R_{thJA}	60	K/W

Electrical Characteristics

V_s = +8 V, T_{amb} = +25°C; reference point Pin 4, unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
DC supply	Pin 14					
Supply voltage		V_S	6.8	8.0	13.5	V
Supply current		I_S		45	55	mA
IF1 input, 1st IF	Pin 1–16					
Input sensitivity (RMS value)	Output voltage 2 V_{pp}	V_{IF1}		80	120	μV_{RMS}
IF1 input frequency range *)		f_{in}	30		50	MHz
Input impedance		R_{in}		1.2		kΩ
Input capacitance		C_{in}		2		pF
IF gain control input	Pin 5					
IF gain control range	Output voltage 2 V_{pp}	G_v	60	66		dB
Local oscillator input	Pin 8–9					
Input voltage (RMS value)		v_{LO}		100		mV_{RMS}
Input frequency range *)		f_{LO}	30		50	MHz
IF2 output, 2nd IF	Pin 6					
DC output voltage	V_5 = 3 V	V_{DC}		3.1		V
Upper limiting level		V_{lim}		4.5		V
Lower limiting level		V_{lim}		1.7		V
IF2 signal bandwidth (– 3 dB) *)	Output voltage 2 V_{pp}	B	12			MHz
Residual carrier, fundamental wave		v_{res}			20	mV
Output current –source –sink		I_{out}	 1.5		5.0 2.5	mA
Tuner-AGC						
Available AGC current		I_{tun}	2.0	4.0	6.0	mA

*) Not measured during production

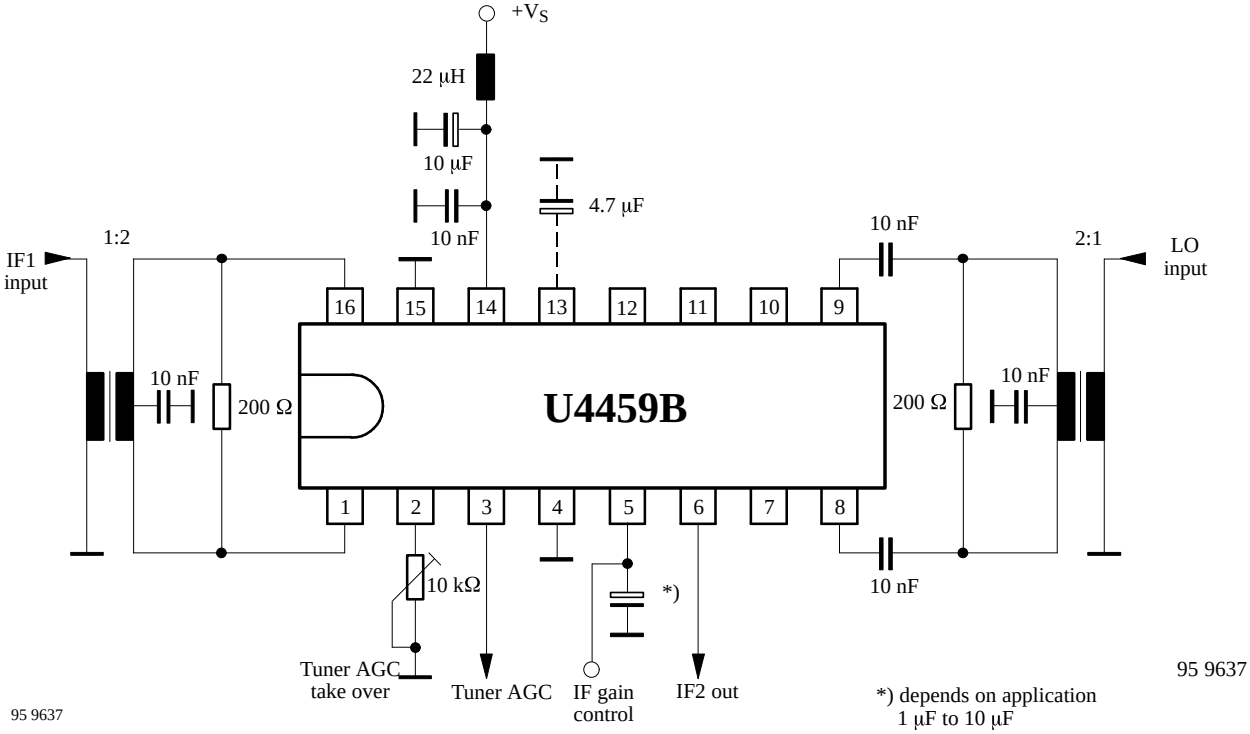


Figure 3. Test circuit

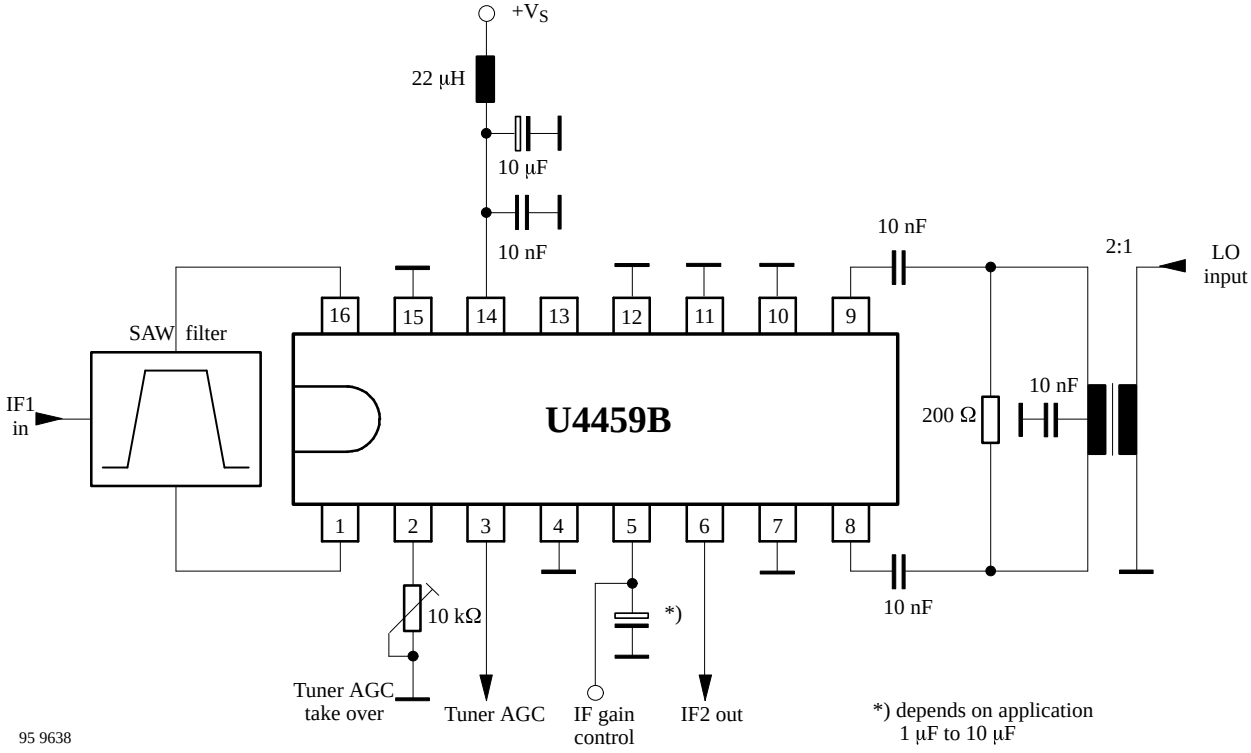


Figure 4. Basic application circuit

Internal Pin Configuration

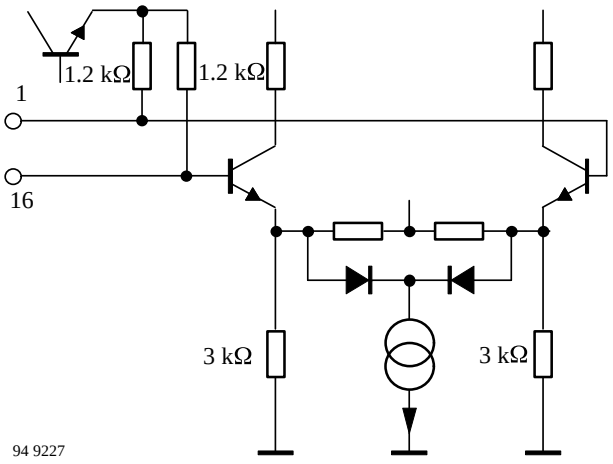


Figure 5. IF1 input

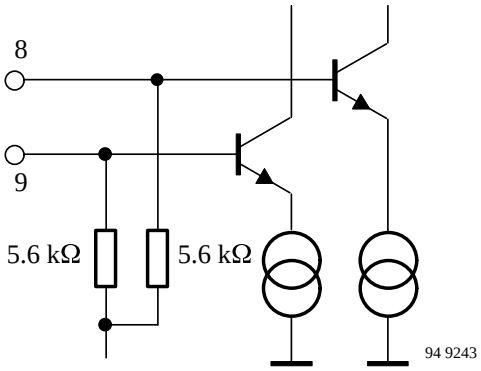


Figure 6. Local oscillator input

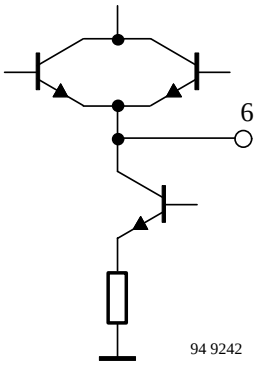


Figure 7. IF2 output

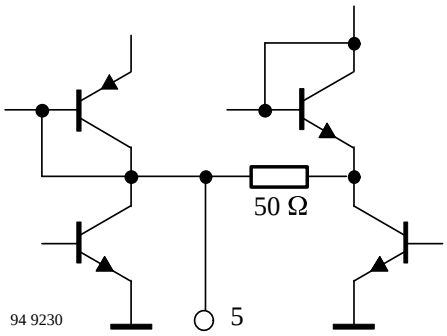


Figure 8. IF gain control input

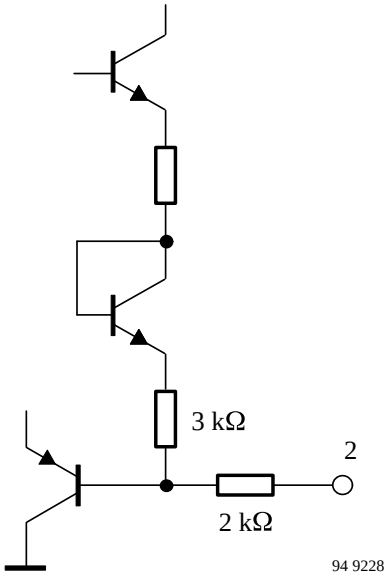


Figure 9. Tuner-AGC take over point

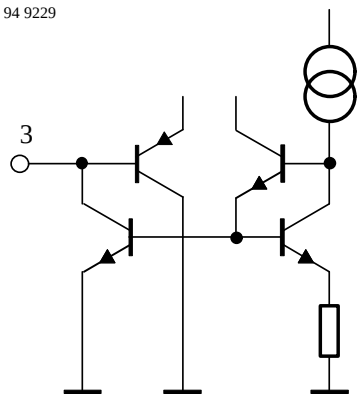
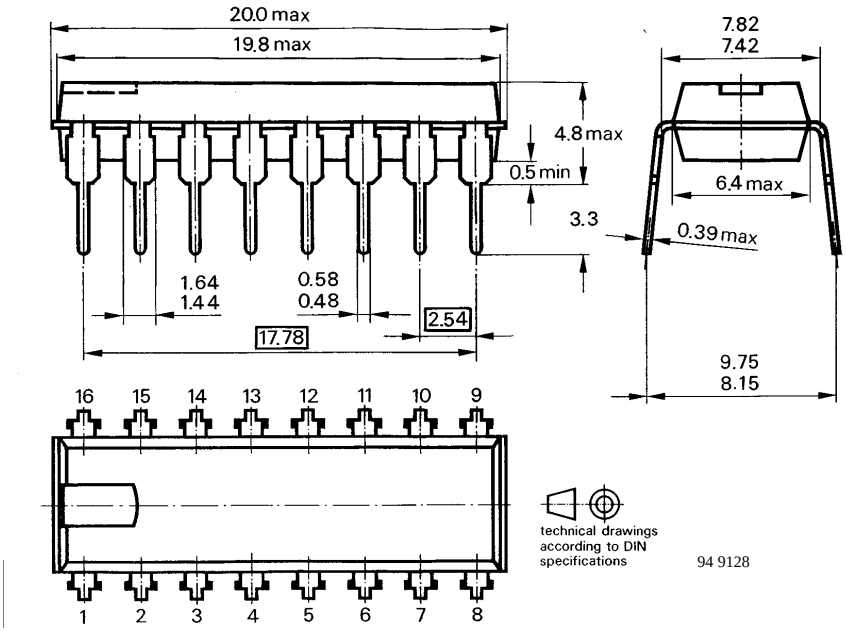


Figure 10. Tuner-AGC output

Dimensions in mm

Package: DIP16



Ozone Depleting Substances Policy Statement

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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