

## IF Amplifier for Cable DVB Processing

### Description

The U4459B is an integrated bipolar circuit suitable for the IF processing in cable-DVB receiver (**DVB = Digital Video Broadcasting**) 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

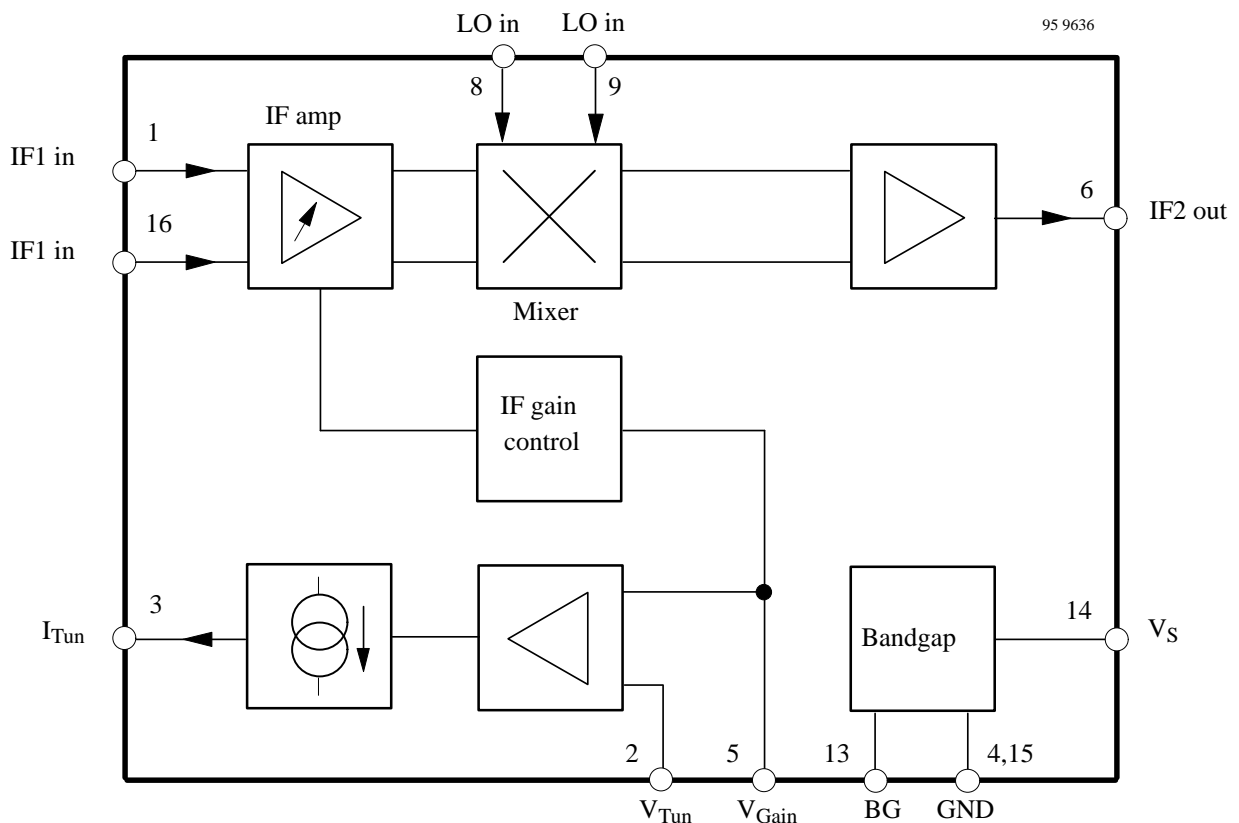


Figure 1. Block diagram

## Pin Description

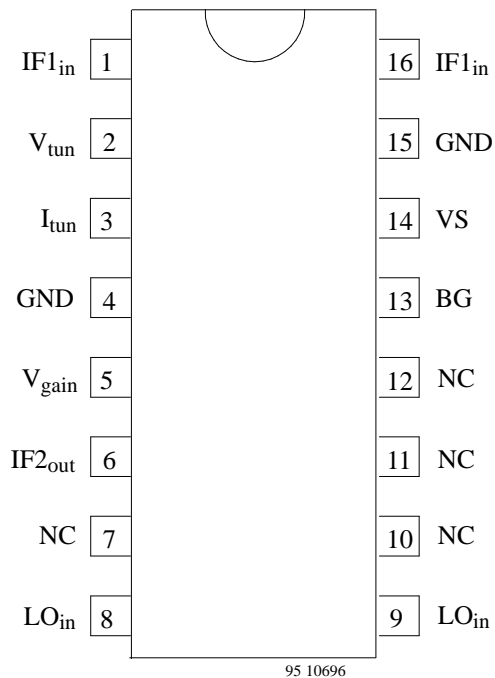


Figure 2.

Pin	Symbol	Function
1	IF1 <sub>in</sub>	IF1 input
2	V <sub>tun</sub>	Take over point of tuner-AGC
3	I <sub>tun</sub>	Tuner-AGC output current
4	GND	Ground
5	V <sub>gain</sub>	IF gain control input
6	IF2 <sub>out</sub>	IF2 output
7	NC	Not connected
8	LO <sub>in</sub>	Local oscillator input
9	LO <sub>in</sub>	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 <sub>in</sub>	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 <sub>s</sub>	13.5	V
Supply current Pin 14	I <sub>s</sub>	55	mA
Power dissipation V <sub>s</sub> = 13.5 V Pin 14	P	750	mW
Junction temperature	T <sub>j</sub>	+125	°C
Storage temperature	T <sub>stg</sub>	-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

$V_s = +8\text{ V}$ ,  $T_{amb} = +25^\circ\text{C}$ ; reference point Pin 4, unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
<b>DC supply</b> Pin 14						
Supply voltage		$V_S$	6.8	8.0	13.5	V
Supply current		$I_S$		45	55	mA
<b>IF1 input, 1st IF</b> Pin 1–16						
Input sensitivity (RMS value)	Output voltage $2 V_{pp}$	$V_{IF1}$		80	120	$\mu\text{V}_{RMS}$
IF1 input frequency range *)		$f_{in}$	30		50	MHz
Input impedance		$R_{in}$		1.2		k $\Omega$
Input capacitance		$C_{in}$		2		pF
<b>IF gain control input</b> Pin 5						
IF gain control range	Output voltage $2 V_{pp}$	$G_v$	60	66		dB
<b>Local oscillator input</b> Pin 8–9						
Input voltage (RMS value)		$v_{LO}$		100		$\text{mV}_{RMS}$
Input frequency range *)		$f_{LO}$	30		50	MHz
<b>IF2 output, 2nd IF</b> Pin 6						
DC output voltage	$V_5 = 3\text{ V}$	$V_{DC}$		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		$I_{out}$			5.0	mA
–source					2.5	
–sink			1.5			
<b>Tuner-AGC</b>						
Available AGC current		$I_{tun}$	2.0	4.0	6.0	mA

\*) Not measured during production

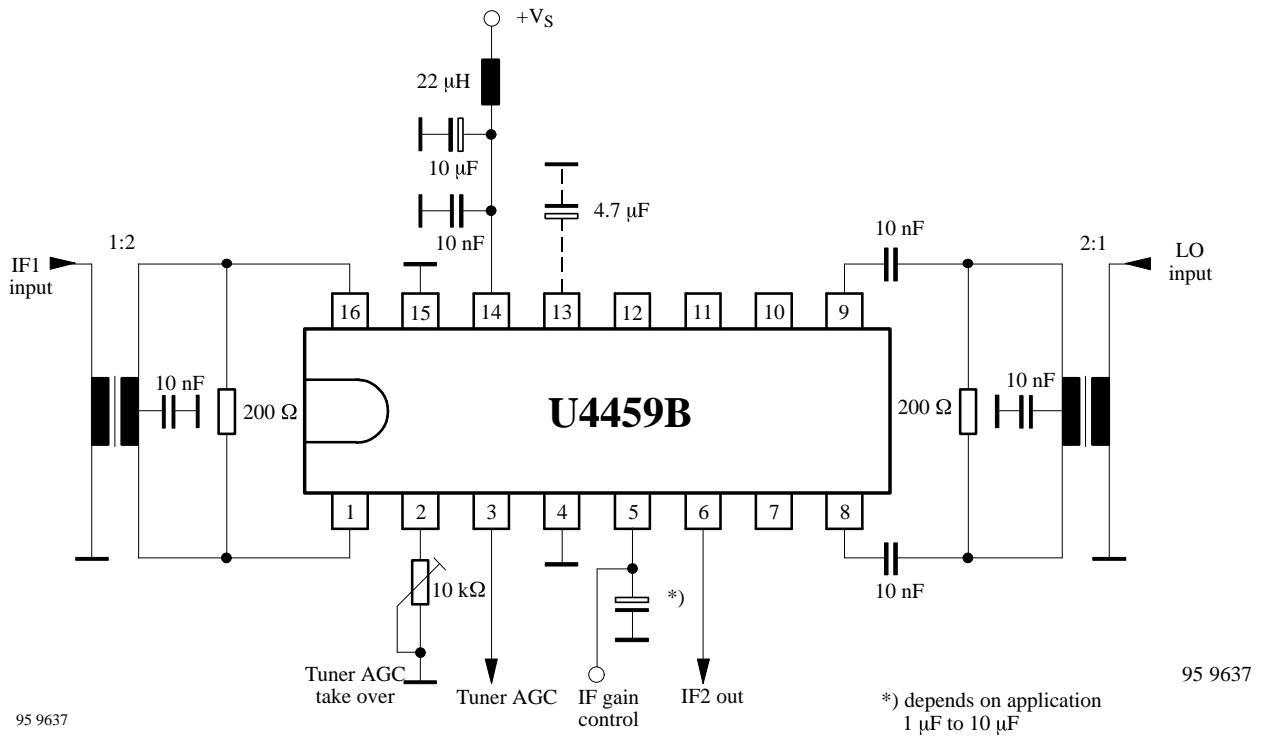


Figure 3. Test circuit

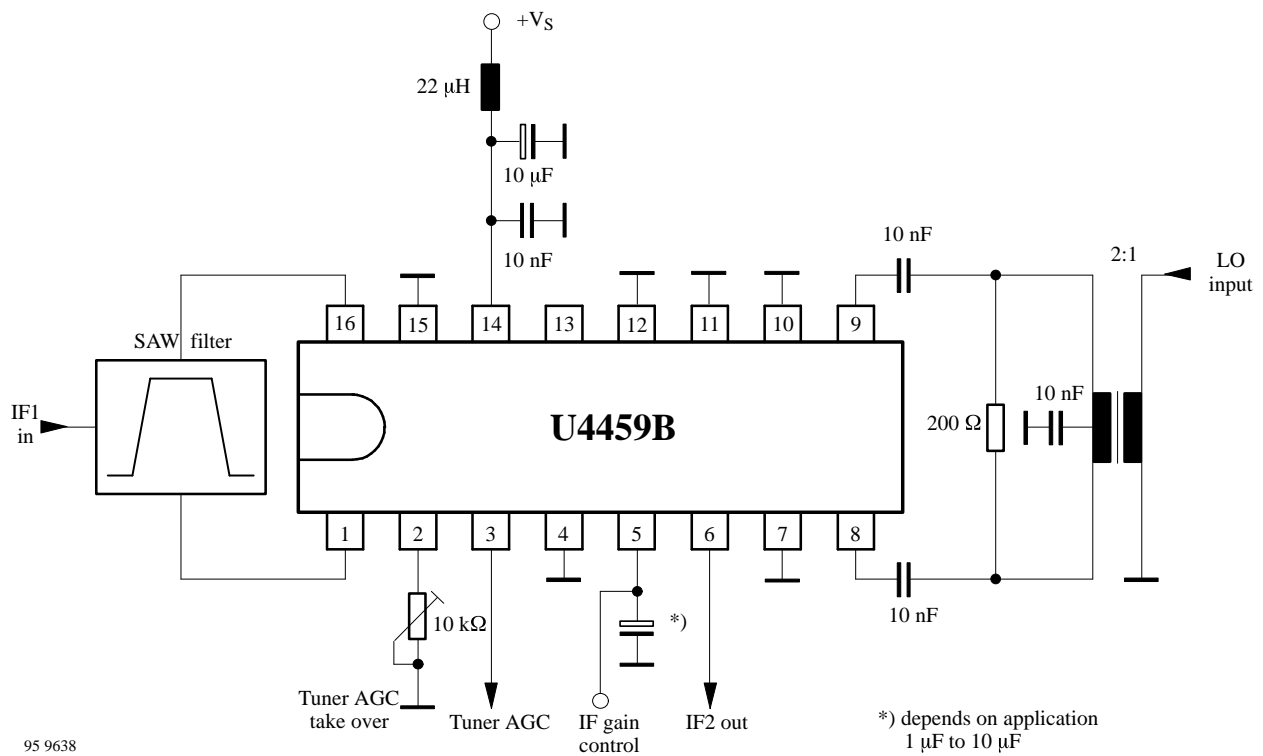


Figure 4. Basic application circuit

**Internal Pin Configuration**

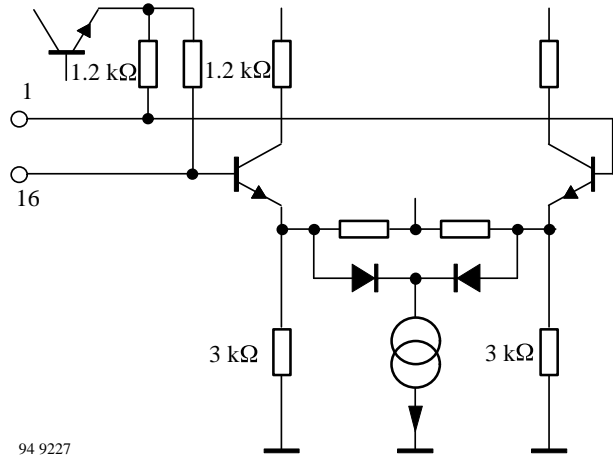


Figure 5. IF1 input

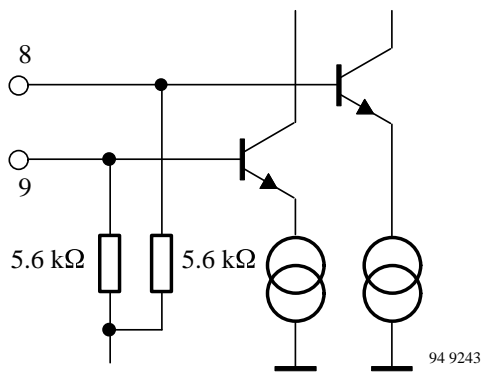


Figure 6. Local oscillator input

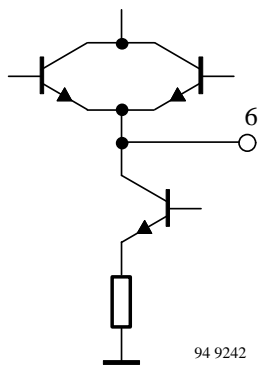


Figure 7. IF2 output

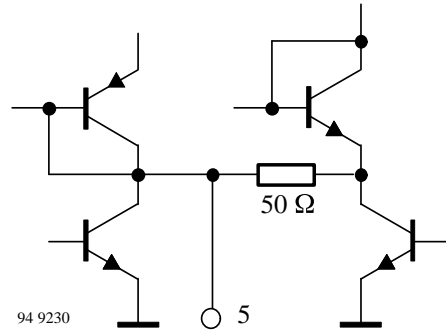


Figure 8. IF gain control input

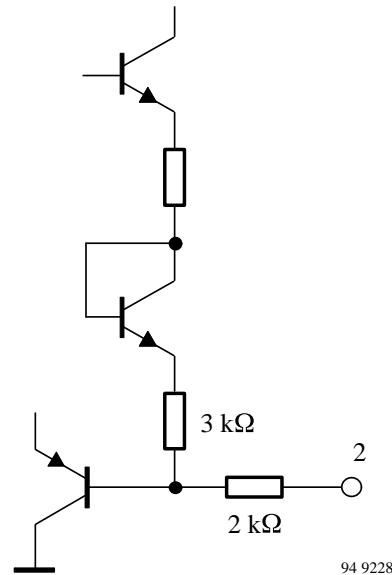


Figure 9. Tuner-AGC take over point

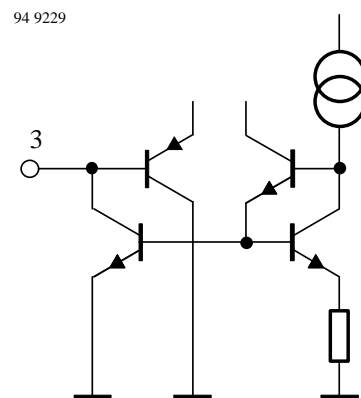
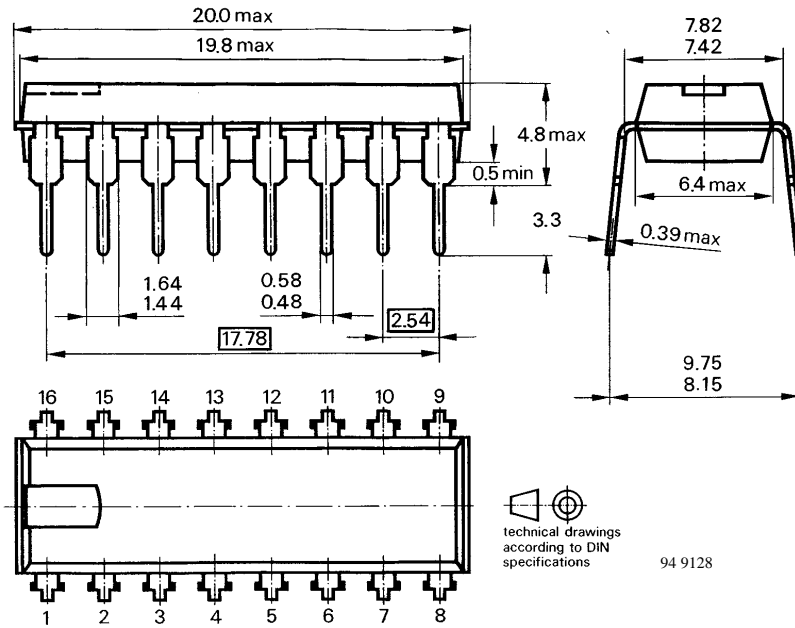


Figure 10. Tuner-AGC output

## Dimensions in mm

Package: DIP16



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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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