

TV Sound AM Demodulator

Description

The U4467B is an integrated bipolar circuit for AM sound demodulation used in the L- and L' standard (France). The IC provides the audio signal and mute switch as well.

The U4467B is designed for TV-, VCR- and Multimedia applications.

Features

- Gain-controlled 3-stage wideband IF amplifier
- Complete alignment-free AM demodulator without external reference circuit
- AGC with a mean level detector
- Mute switch
- 5-V power supply, low power consumption

Block Diagram

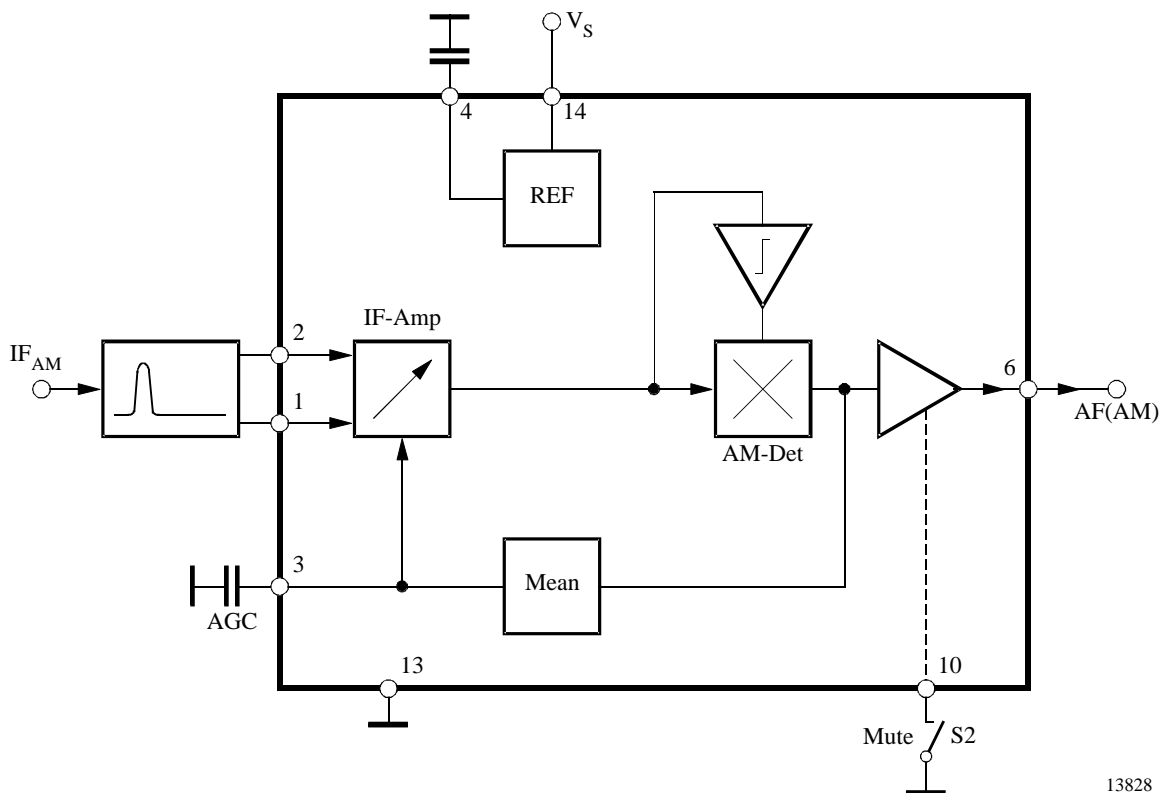


Figure 1.

Ordering Information

Extended Type Number	Package	Remarks
U4467B	DIP16	

Circuit Description

IF Amplifier and AGC

The symmetrical IF input signal from the external SAW filter is fed to the Pins 1 and 2. In L-standard, a bandpass filter with the center frequency at the L-sound carrier is used.

The amplifier consists of three AC-coupled wideband IF stages. Each differential amplifier stage is gain controlled by the AGC (Automatic Gain Control) voltage, available at Pin 3. The output signal of the IF amplifier is applied to the AM demodulator.

The IF-AGC is derived from the average level of the AM sound. It controls the three-stage wideband amplifier to provide a constant SIF signal to the AM demodulator.

AM Demodulator

The alignment-free AM demodulator is realized by a synchronous detector. The modulated IF signal from the wideband IF amplifier output is multiplied in phase with the limited IF signal to remove the AM. Then, the resulting AF signal of the demodulator output is fed to the output amplifier and to the AGC stage.

Mute Switch

The AM sound output (Pin 6) can be muted in pulling mute switch (Pin 10) to 'low'.

Internal Voltage Stabilizer

The internal bandgap reference voltage (4.25 V at Pin 4) ensures constant performance independent of supply voltage and temperature.

Pin Description

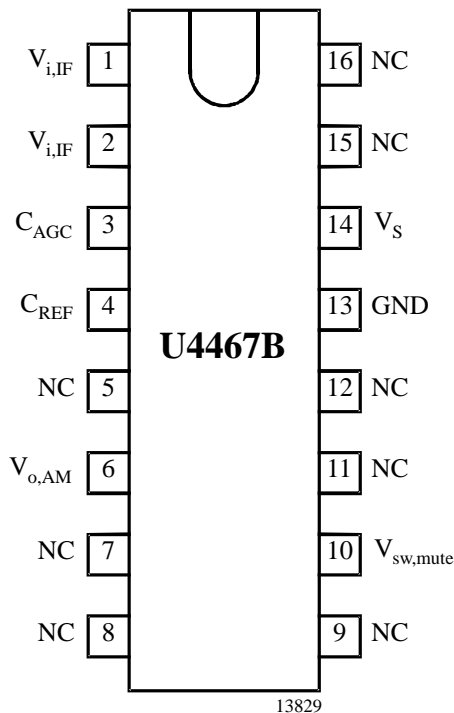


Figure 2. Pinning

Pin	Symbol	Function
1	$V_{i,IF}$	IF input (symmetrical)
2	$V_{i,IF}$	IF input (symmetrical)
3	C_{AGC}	Capacitor for AGC time constant
4	C_{REF}	Capacitor for internal reference voltage
5	NC	Not connected
6	$V_{o,AM}$	AF output (AM sound)
7	NC	Not connected
8	NC	Not connected
9	NC	Not connected
10	$V_{sw,mute}$	Mute switch
11	NC	Not connected
12	NC	Not connected
13	GND	Ground
14	V_S	Supply voltage (5 V)
15	NC	Not connected
16	NC	Not connected

Absolute Maximum Ratings

Reference point pin 13, unless otherwise specified

Parameters		Symbol	Value	Unit
Supply voltage range	Pin 14	V_S	4.5 to 9.0	V
Supply current	Pin 14	I_S	40	mA
Power dissipation ($V_S = 9\text{ V}$)		P	360	mW
Output current	Pin 6	I_{out}	5	mA
External voltages	Pins 1, 2, 3, 4 and 6	V_{ext}	+ 4.5	V
	Pin 10		V_S	V
Junction temperature		T_j	+ 125	°C
Operating temperature range		T_{amb}	0 to + 85	°C
Storage temperature		T_{stg}	-25 to +125	°C
Electrostatic handling *	all Pins	V_{ESD}	± 300	V

* Equivalent to discharging a 200 pF capacitor through a 0-Ω resistor

Thermal Resistance

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

Electrical Characteristics

$V_S = +5\text{ V}$, $T_{amb} = +25^\circ\text{C}$; reference point Pin 13, unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
DC-supply (Pin 14)						
Supply voltage		V_S	4.5	5.0	9.0	V
Supply current	$V_{in} = 10\text{ mV}$ or $V_3 = 2\text{ V}$	I_S		26		mA
IF-input (Pins 1 and 2)						
Minimum IF input signal	Output signal: -3 dB	v_{in}		50		μV_{rms}
Maximum IF input signal	Output signal: + 1 dB	v_{in}	70	100		mV_{rms}
Input impedance	See note 1	R_{in}		1.2		$\text{k}\Omega$
Input capacitance	See note 1	C_{in}		2		pF
SIF-AGC (Pin 3)						
IF gain control range		G_V	60	65		dB
AGC capacitor		C_{AGC}		4.7		μF
AM mute switch (Pin 10)						
Switching voltage	AM output active	V_{mute1}		open		
Switching voltage	AM output switched off	V_{mute2}	0		1.5	V
Switching current		I_{mute}		-100		μA

Note

- This parameter is given as an application information and not tested during production.

Electrical Characteristics (continued)

$V_s = +5\text{ V}$, $T_{\text{amb}} = +25^\circ\text{C}$; reference point Pin 13, unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
AF output – AM (Pin 6)		see note 2				
DC output voltage		V_{DC}		2.2		V
Output resistance	see note 1	R_{out}			150	Ω
AF output signal	$m = 54\%$	v_{oAF}		500		mV_{rms}
AF bandwidth	-3 dB	B		tbd		kHz
Total harmonic distortion	$m = 54\%$ $f_{\text{mod}} = 1\text{ kHz}, 12.5\text{ kHz}$	THD		1	2	%
Weighted signal-to-noise ratio (CCIR 468)	Reference: $m = 54\%$; $f_{\text{mod}} = 1\text{ kHz}$	S/N		56		dB
Ripple rejection	See note 1; tested from Pin 14 to Pin 6	RR	28			dB
Allowable AC output peak current		I_{AC}			± 0.3	mA
Allowable DC output current		I_{DC}			-1	mA

Notes

- This parameter is given as an application information and is not tested during production.
- Sound carrier $SC = 32.4\text{ MHz}$, modulated with $f_{\text{mod}} = 1\text{ kHz}$, $m = 54\%$: $v_{\text{in}} = 10\text{ mV}$

Test Circuit

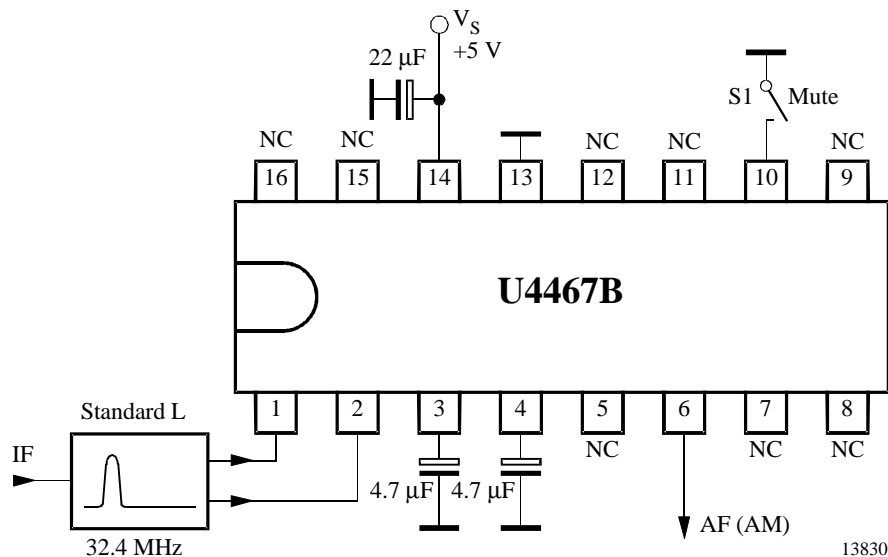


Figure 3.

Internal Pin Configuration

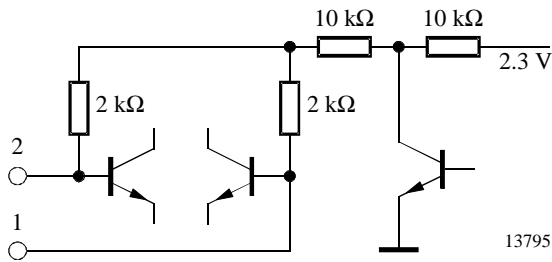


Figure 4. Sound IF inputs (Pins 1 and 2)

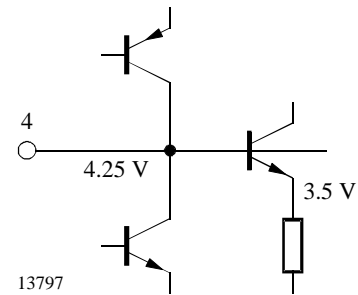


Figure 6. Internal reference voltage (Pin 4)

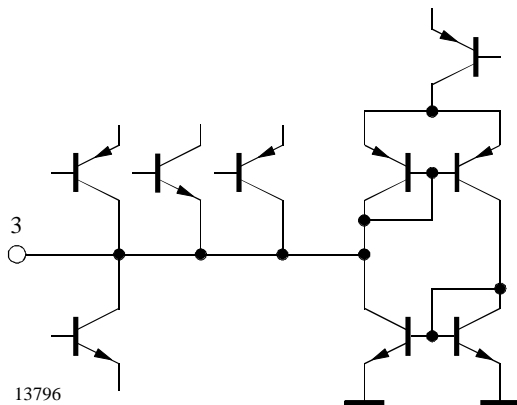


Figure 5. AGC time constant (Pin 3)

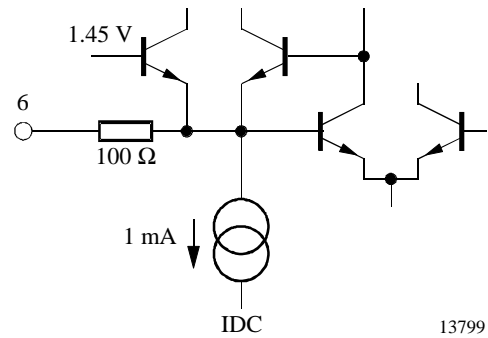


Figure 7. AM output (Pin 6)

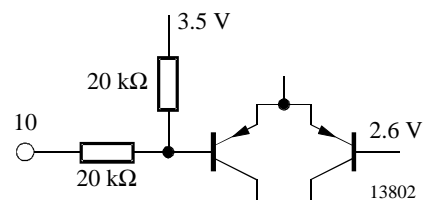
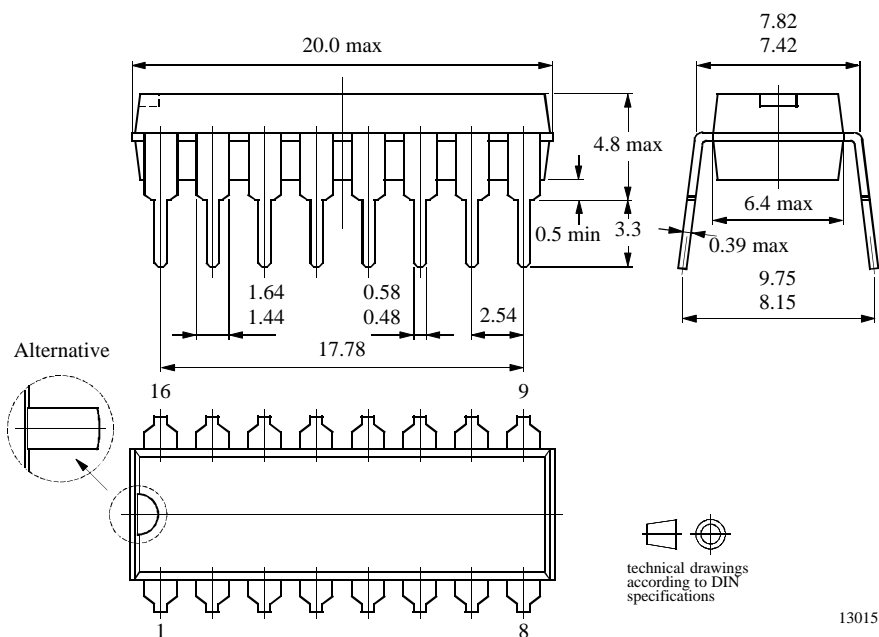


Figure 8. Mute switch (Pin 10)

Package Information

Package DIP16
Dimensions in mm



Ozone Depleting Substances Policy Statement

It is the policy of **Atmel Germany 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.

Atmel Germany GmbH 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.

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

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Data sheets can also be retrieved from the Internet: <http://www.atmel-wm.com>

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