

Intercarrier Mixer and AM-Demodulator for TV and VCR

Features

- Very high input sensitivity
 - Excellent signal-to-noise ratio
 - Intercarrier output signal gain controlled and independent from the picture carrier to sound carrier ratio
 - AM demodulator alignment free
 - Few external components
 - ESD protected
- Case: DIP14**

Block Diagram

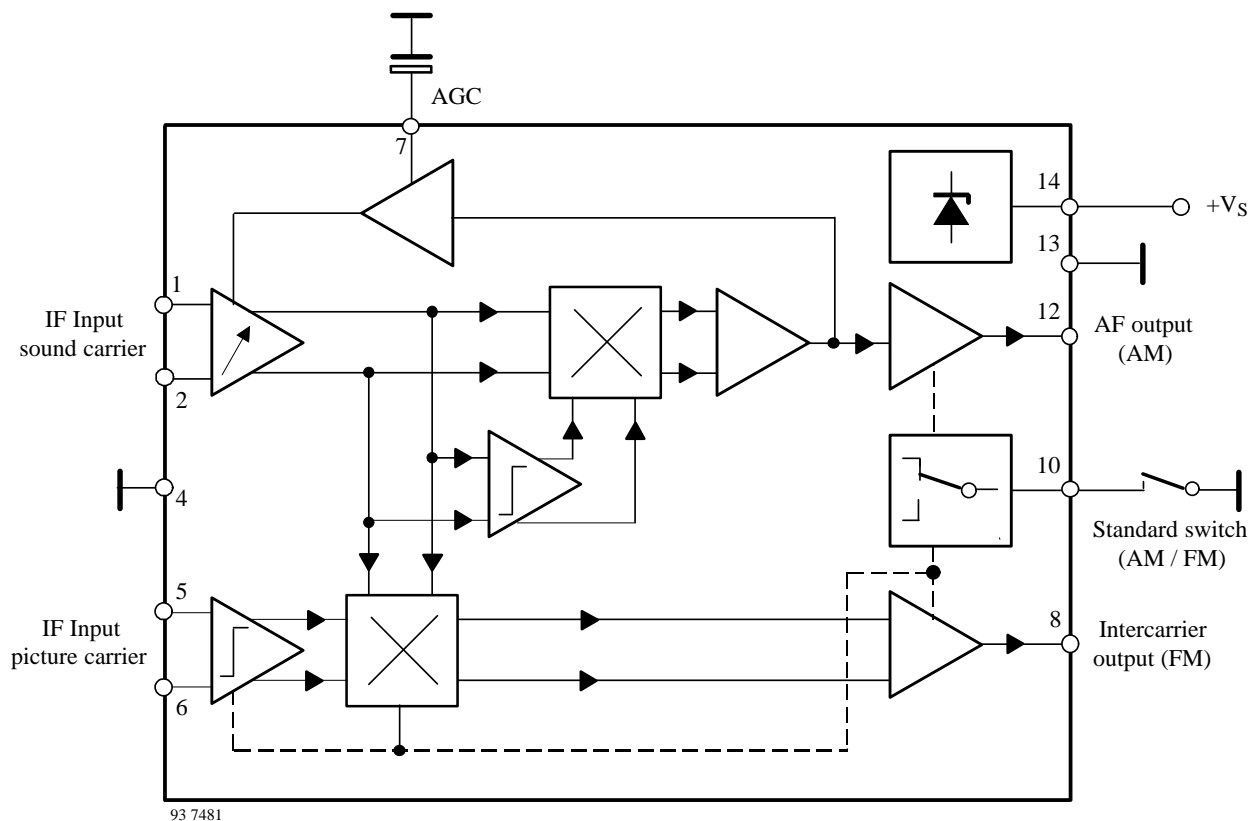
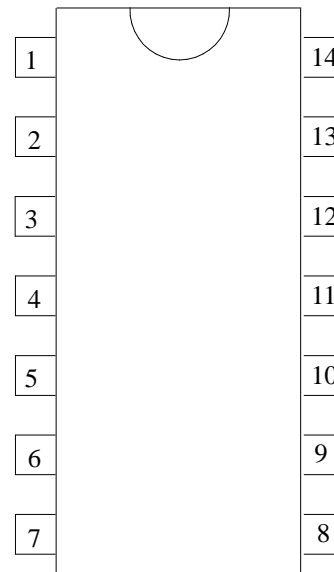


Figure 1.

Pin Description

Pin	Function
1, 2	IF input (sound carrier)
3, 9, 11	No connected
4, 13	Ground
5, 6	IF input (picture carrier)
7	AGC time constant
8	Intercarrier output
10	Standard switch
12	AF output (AM)
14	Supply voltage



Circuit Description

The bipolar circuit TDA4483 enables high quality sound IF processing for multistandard applications in TV-sets and VCR. This circuit has separate inputs for the sound and picture carrier. The sound carrier signal (single or dual carrier, modulated with AM, FM or NICAM) from the SAW filter will be fed into a 3-stage, gain controlled, IF amplifier (Pin 1 and 2).

The following two mixer stages operate using different standards. In the case of AM, the first mixer works as a quasi-synchronous detector providing the audio frequency at Pin 12. Furthermore, the first mixer supplies a regulation voltage to control the gain of the 3-stage IF amplifier (AGC).

The second mixer stage works as an intercarrier mixer in FM/NICAM mode and supplies the intercarrier signal at Pin 8 (difference signal between picture and sound carrier) independent of the picture carrier to sound carrier ratio. In standard B/G the 5.5/5.74 MHz subcarrier is

available at Pin 8. The required picture carrier for the intercarrier mixer will be coupled out from the tuned demodulator circuit of the vision-IF IC (e.g. TDA4453 or equivalent components). The selective and prelimited picture carrier has to be applied symmetrically to the picture carrier input (Pin 5 and Pin 6). An additional limiting amplifier delivers the regenerated picture carrier to the intercarrier mixer.

Possible modes of operation (FM/NICAM or AM) are determined by the voltage level that is applied to Pin 10 (standard switch). Without external control voltage at Pin 10, the FM/NICAM operation is automatically selected. In the case of AM, the intercarrier output Pin 8 is switched off, however DC output voltage remains. In corresponding with FM/NICAM operation, the AF output Pin 12 is switched off.

Absolute Maximum Ratings

Reference point Pin 13 (4), unless otherwise specified.

Parameters	Symbol	Value	Unit
Supply voltage Pin 14	V_S	13.5	V
Supply current Pin 14	I_S	50	mA
Power dissipation	P_{tot}	680	mW
Junction temperature	T_j	125	°C
Operating temperature, ambient	T_{amb}	-25 to +70	°C
Storage temperature	T_{stg}	-25 to +125	°C

Thermal Resistance

Parameters	Symbol	Value	Unit
Junction-ambient	R_{thJA}	90	K/W

Electrical Characteristics

$T_{amb} = 25^\circ\text{C}$, $V_S = 12\text{ V}$, reference point: Pin 13 (4), unless otherwise specified

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
Supply voltage range	Pin 14	V_S	10		13.5	V
Supply current	FM-mode AM-mode Pin 14	I_S		37 32		mA
DC output voltage	Pin 8 Pin 12	V_O		3.6 3.2		V
Standard switch Pin 10						
Control voltage	AM-mode FM-mode Pin 10 open	V_{CTRL}	0 2.2		1.5 V_S	V
Internal voltage FM-mode automatically selected	Pin 10 open			2.3		
Control current	$V_{CTRL} < 5\text{ V}$ Pin 10	I_{CTRL}			200	μA
FM-mode Test conditions: Picture carrier $f_{PC} = 38.9\text{ MHz}$, sound carrier $f_{SC1} = 33.4\text{ MHz}$, $f_{SC2} = 33.1587\text{ MHz}$, picture carrier to sound carriers ratio = 13/20 dB, picture carrier unmodulated (equivalent to sync peak pulse)						
Sound carrier frequency range		f_{SC}	30		40	MHz
Picture carrier input voltage	Pin 5, 6	v_{PC}	10	20	30	mV
Sound carrier minimal input voltage	5.5 MHz intercarrier signal -3 dB Pin 1, 2	v_{SC}		50		μV
Sound carrier gain control range		AGC	60	65		dB
Intercarrier output voltage	Pin 8	v_{OIC}		350		mV
Output resistance	Pin 8	R_O		15		Ω
Signal to noise ratio Test conditions: Sound carrier $V_{SC} = 10\text{ mV}$, picture carrier $v_{PC} = 20\text{ mV}$, limited carrier from TDA4453 or com- parable vision IF circuit, reference signal: frequency deviation $\Delta f = \pm 30\text{ kHz}$, sound modulation $f_{mod} = 1\text{ kHz}$. Weighted (S + N)/N ratio of the demodulated intercarrier signal in accordance with CCIR468-4, measured with FM-demodulator U2829B						
Picture carrier unmodulated	Channel 1/2	(S + N)/N		68/67		dB
Black picture	Channel 1/2	(S + N)/N		62/60		dB
Grid	Channel 1/2	(S + N)/N		50/48		dB

Parameters	Test Conditions / Pins	Symbol	Min.	Typ.	Max.	Unit
AM-mode; Test condition: sound carrier $f_{SC} = 32.4$ MHz						
Sound carrier minimal input voltage	AF output voltage -3 dB Pin 1, 2	v_{SC}		50		μV
Sound carrier gain control range		AGC	60	65		dB
AF output voltage	$m = 54\%$, $f_{mod} = 1$ kHz Pin 12	v_{AF}		500		mV
Total harmonic distortion	$m = 80\%$, $f_{mod} = 1$ kHz Pin 12	THD		1.5	3.0	%
Allowable external resistance	Pin 12	R_{ext}	3			k Ω
Output resistance	Pin 12	R_O		30		Ω

Test Circuit

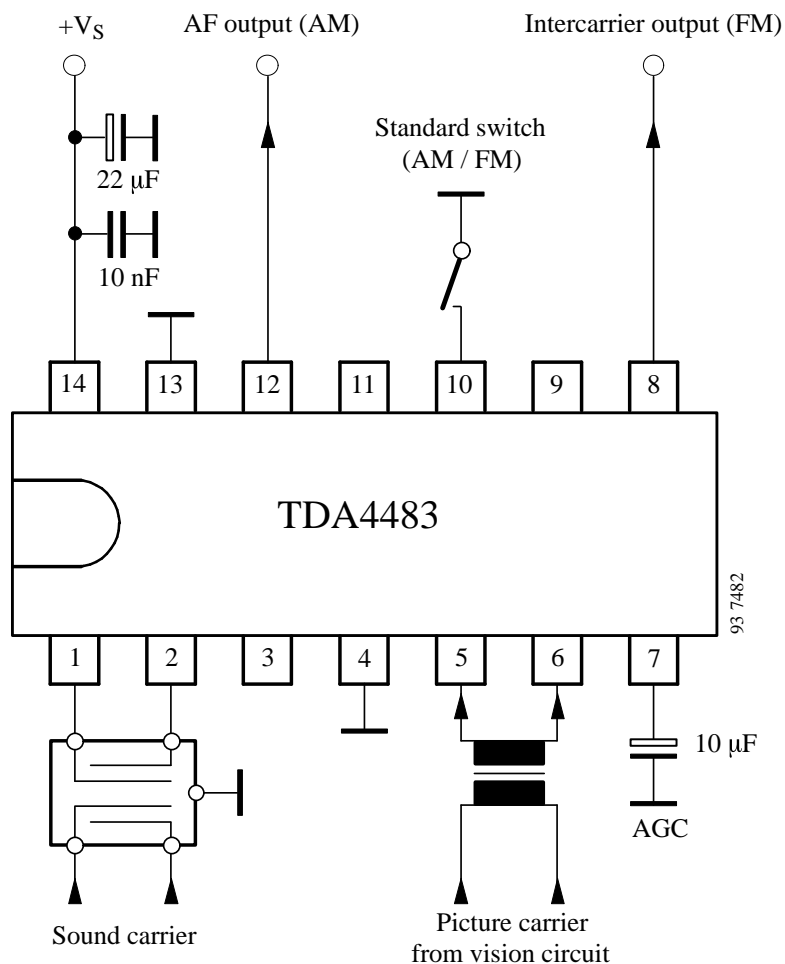
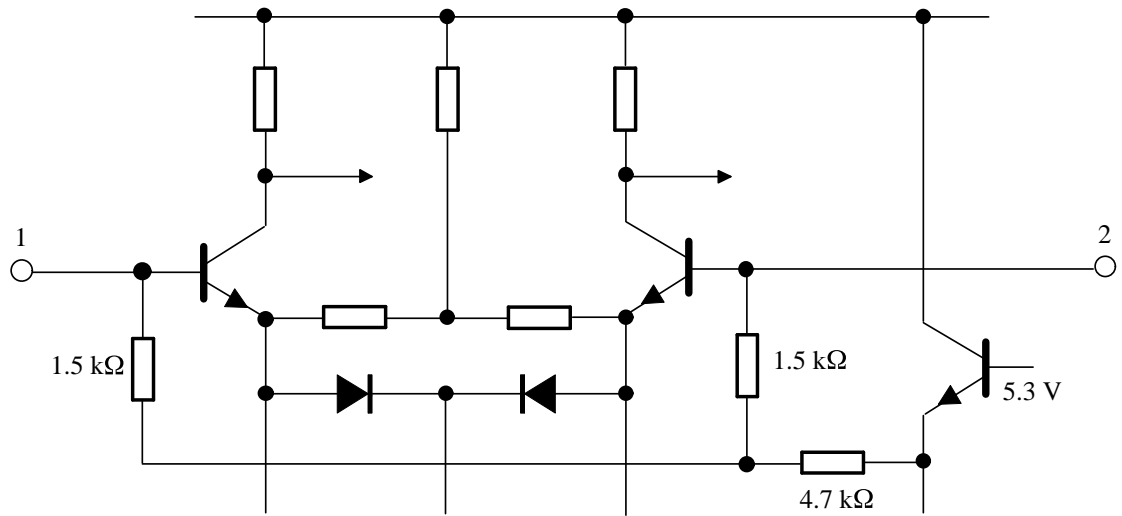


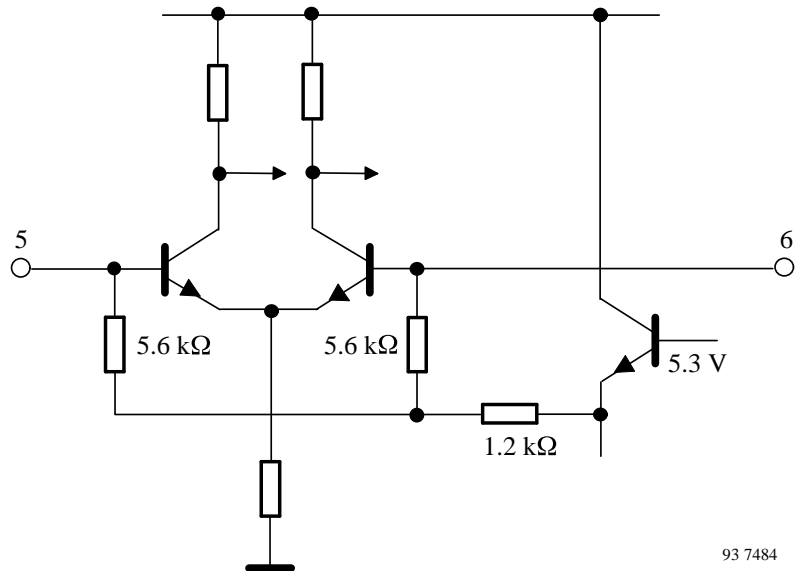
Figure 2.

Internal Pin Circuit Diagrams



93 7483

Figure 3. Pin 1, 2 - Sound carrier input



93 7484

Figure 4. Pin 5, 6 - Picture carrier input

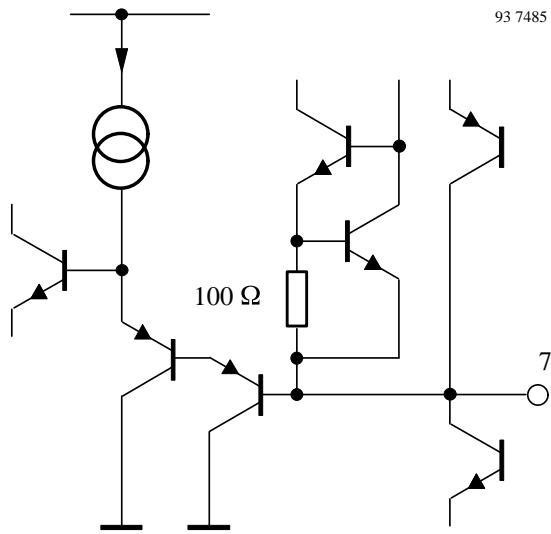


Figure 5. Pin 7 – AGC time constant

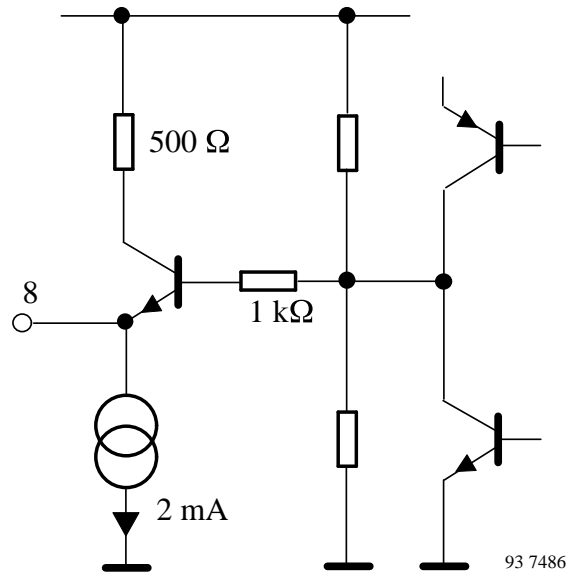


Figure 6. Pin 8 – Intercarrier output, FM-mode

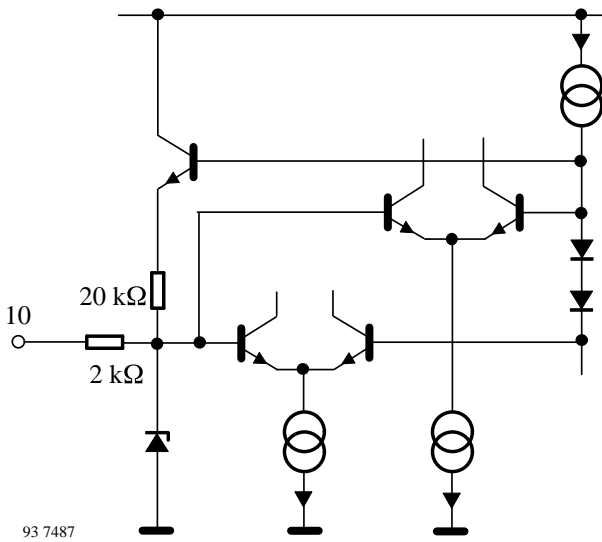
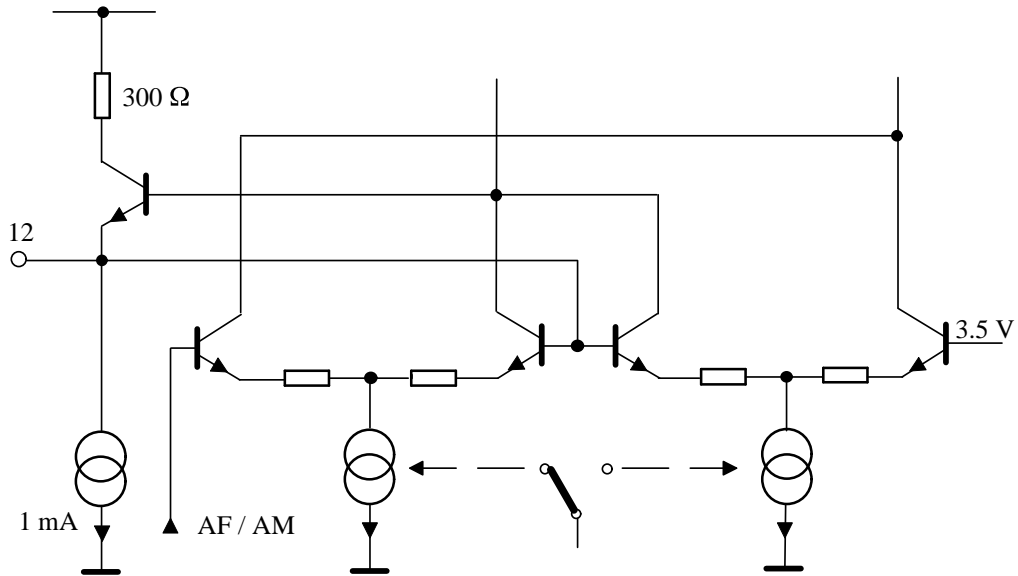


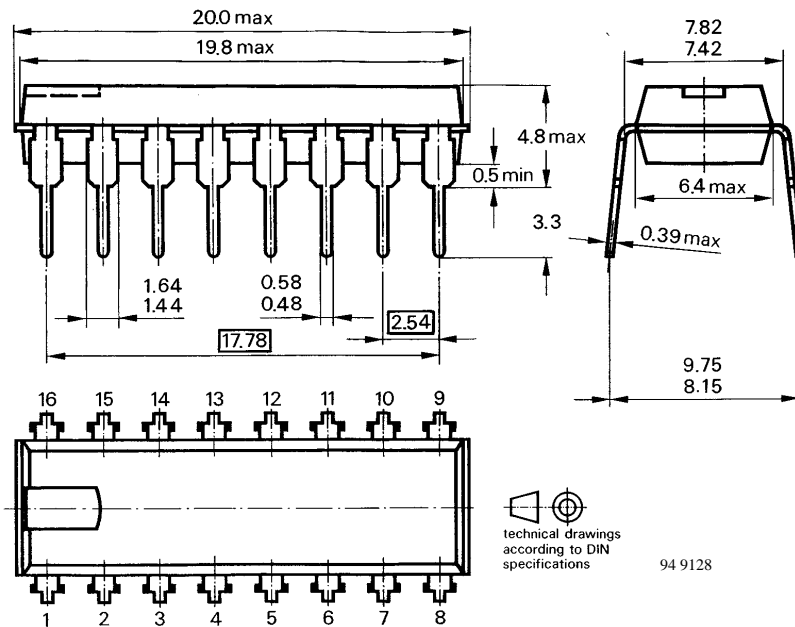
Figure 7. Pin 10 – Standard switch (AM or FM/NICAM)



93 7488

Figure 8. Pin 12 – AF output, AM mode

Dimensions in mm



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.

We reserve the right to make changes to improve technical design and may do so without further notice.

Parameters can vary in different applications. All operating parameters must be validated for each customer application by the customer. Should the buyer use TEMIC products for any unintended or unauthorized application, the buyer shall indemnify TEMIC against all claims, costs, damages, and expenses, arising out of, directly or indirectly, any claim of personal damage, injury or death associated with such unintended or unauthorized use.

TEMIC TELEFUNKEN microelectronic GmbH, P.O.B. 3535, D-74025 Heilbronn, Germany
Telephone: 49 (0)7131 67 2831, Fax number: 49 (0)7131 67 2423