SIEMENS

AM Amplifier for French Sound IF Standard

TDA 2148

Bipolar IC

Controlled AM IF amplifier with quasi-synchronous demodulator and integral mean value control for French sound IF applications.

Features

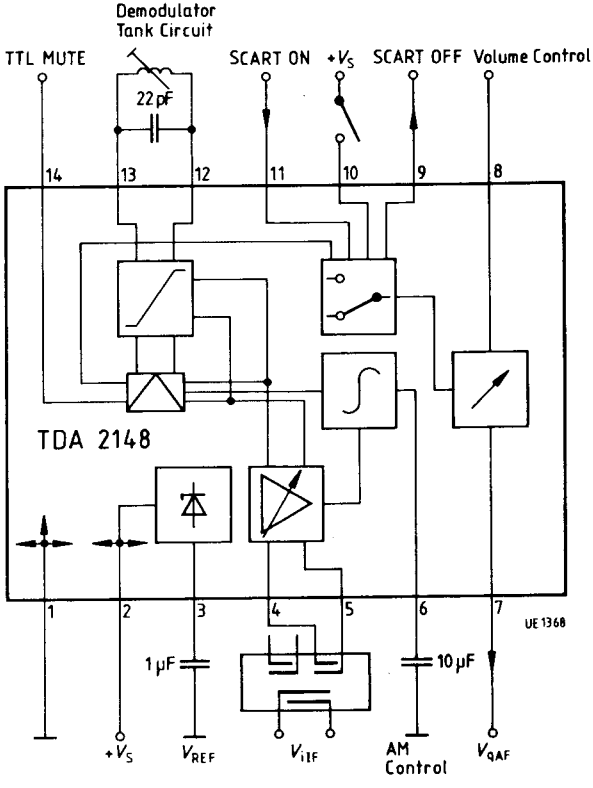
- High input sensitivity
- Few external components
- Low distortion
- Full SCART interface
- Partially compatible with TDA 2460

Type	Ordering Code	Package
TDA 2148	Q67000-A2476	P-DIP-14

Circuit Description

The component contains a four-stage, capacitatively coupled control amplifier and a quasi-synchronous demodulator according to the French sound IF standard. The control voltage is generated by means of an integral mean value control. The resulting AF signal is pre-amplified and routed to the SCART output as well as to the record / playback switch. This is followed by a volume control with a low-impedance AF output.

Block Diagram



Pin Functions

Pin No.	Function
1	GND
2	$+V_S$
3	Reference voltage
4	IF input
5	IF input
6	AGC time constant AM amplifier
7	AF output
8	Volume control for voltage AF output
9	SCART AF output
10	SCART recording/playback switch
11	SCART AF input
12	Demodulator tank circuit
13	Demodulator tank circuit
14	MUTE switch

Absolute Maximum Ratings

Parameter	Symbol	Limit Values	Unit
Supply voltage	V_S	16	V
Control voltage	V_6	4	V
DC voltages	$V_{4,5,6}$ $V_{10,11}$ $V_{12,13}$	0 to V_S 0 to V_S V_{REF} to V_S	V V V
DC currents	$I_{7,9}$	– 1 to 2	mA
Reference current	I_3	2	mA
IF input voltage m = 80%	$V_{I\,4,5\,rms}$	300	mV
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	– 40 to 125	°C
Thermal resistance (system-air)	$R_{th\,SA}$	80	K/W

Operating Range

Supply voltage	V_S	10.5 to 15.75	V
Frequency	f	15 to 45	MHz
Ambient temperature	T_A	0 to 70	°C

Characteristics

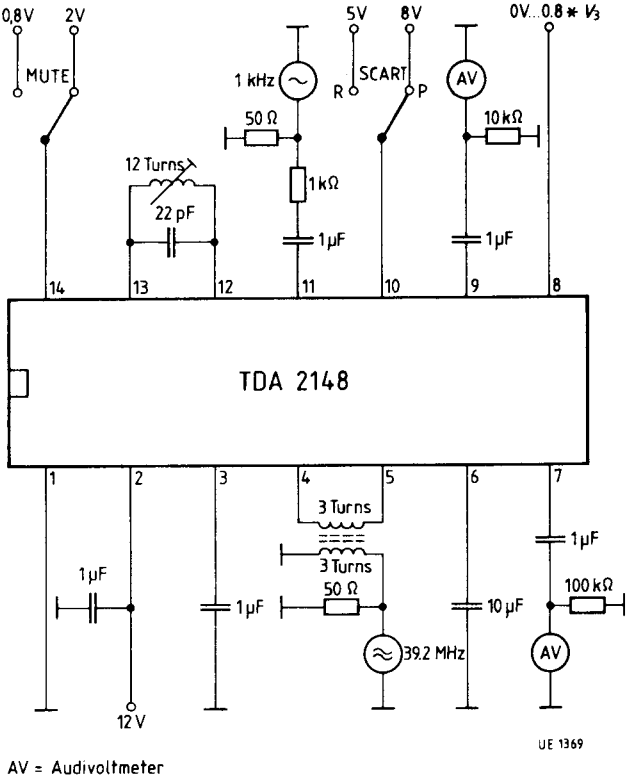
V_S = 12 V; T_A = 25 °C; f_{IIF} = 39.2 MHz; f_{mod} = 1 kHz

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Current consumption	I_S	25	38	50	mA
Reference voltage	V_3	5.4	6	6.6	V
Input voltage for control threshold V_{Q9} = ± 3 dB; m = 80%	$V_{I4,5}$	20	40	80	µV
AGC range V_{Q9} = ± 3 dB; m = 80%	ΔG	60	66		dB
SCART output voltage m = 80%; V_{IIF} = 1 mV;	V_{Q9}	700	800	900	mV
Controlled AF output voltage V_8 = 0.8 V_{REF}	V_{Q7}	650	800	950	mV
DC voltage portion V_{IIF} = 1 mV; m = 0%	V_9 V_7	3.5 5	4.0 6	4.5 7	V V
Total harmonic distortion V_{IIF} = 1 mV; V_8 = 0.8 V_{REF} m = 30% m = 80%	 THD_9 THD_7 THD_9 THD_7		 0.3 0.3 1 1	 1 1 2.5 2.5	 % % % %
Range for volume control V_8 = 0 V. . .0.8 V_{REF}	ΔG	80	85		dB
Gain SCART input/AF input V_8 = 0.8 V_{REF}	G_{11-7}	−1	0	1.5	dB
Input voltage SCART	$V_{I11\,rms}$	2			V

Characteristics (cont'd)
V_S = 12 V; T_A = 25 °C; $f_{I\,IF}$ = 39.2 MHz; f_{mod} = 1 kHz

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Design-Related Values					
Input resistance	$R_{I\,4,5}$		1.8		kΩ
Output resistance	$R_{Q\,12,13}$		6.6		kΩ
Input resistance	$R_{I\,11}$	20			kΩ
Input current	$I_{I\,8}$			15	μA
Output resistance	$R_{Q\,9}$			200	Ω
Output resistance	$R_{Q\,7}$			200	Ω
Cross-talk rejection V_{10} = 5 V; $V_{11\,rms}$ = 2 V	$\alpha_{11\text{-}7}$	60			dB
Control current ratio for high speed load circuit / integral control	Δi_6		140		
Switching Voltages					
SCART record	$V_{10\,L}$	0		5	V
playback	$V_{10\,H}$	8		V_S	V
MUTE OFF	$V_{14\,L}$	0		0.8	V
ON	$V_{14\,H}$	2		V_S	V
Switching Currents					
SCART record	$I_{10\,L}$	− 1		0	μA
playback $V_{10\,H}$ = 8 V	$I_{10\,H}$	30		150	μA
MUTE OFF	$I_{14\,L}$	0		3.5	μA
ON $V_{14\,H}$ = 2 V	$I_{14\,H}$	10		50	μA
ON $V_{14\,H}$ = 5 V	$I_{14\,H}$	80		250	μA

Test and Measurement Circuit



AV = Audivoltmeter

Simplified External Circuitry for the TDA 2148 Demodulator Circuit

The TDA 2148 AM (double side-band) demodulator circuit allows simplified external circuitry.

The new sound demodulator circuit, developed for application in television L standard and multistandard sets, provides the user with the following advantages:

Cost savings by not requiring the carrier select circuit (L, C) and the necessary tuning (time).

The circuit that is part of the carrier generation circuit, becomes unnecessary because of the excellent capture ratio features of the limiter.

Capture ratio defines the ability of a limiter amplifier, to distinguish a useable signal from an interference signal with a lower amplitude.

In this specific section, the modulation side-bands represent the interference signal and the carrier the useable signal (desired switching carrier).

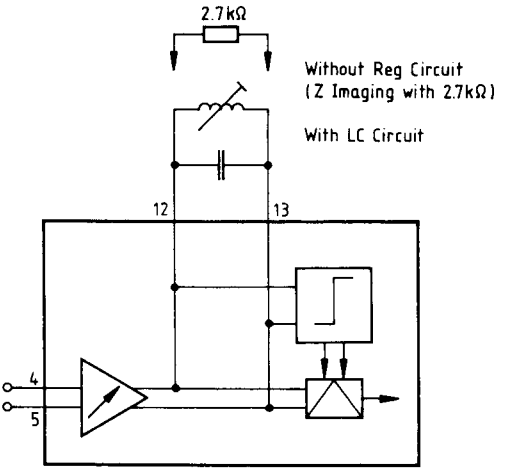
Even with a 100% modulation (France 80%) the distance from the side-bands to the carrier is 6 dB.

The system guarantees secure function. This is also shown by measurements with respect to:

harmonic distortion
noise
signal/noise ratio

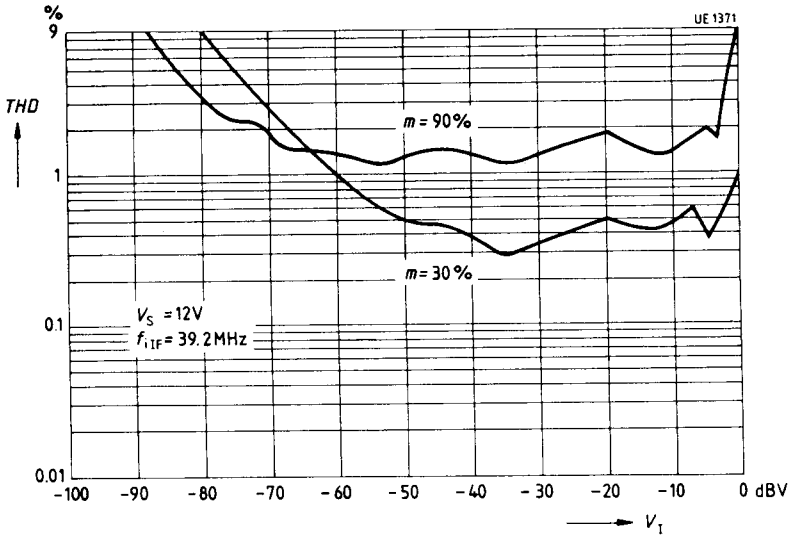
in a comparison with/without regenerative circuit. Only the control threshold shifts by 2 dB.

AM Demodulator Circuit



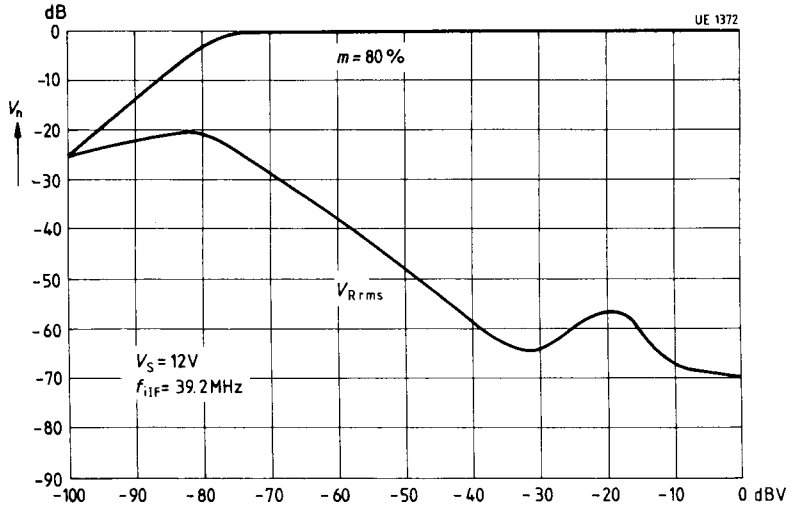
Circuit with LC Circuit

Total harmonic distortion versus input voltage
Standard circuit



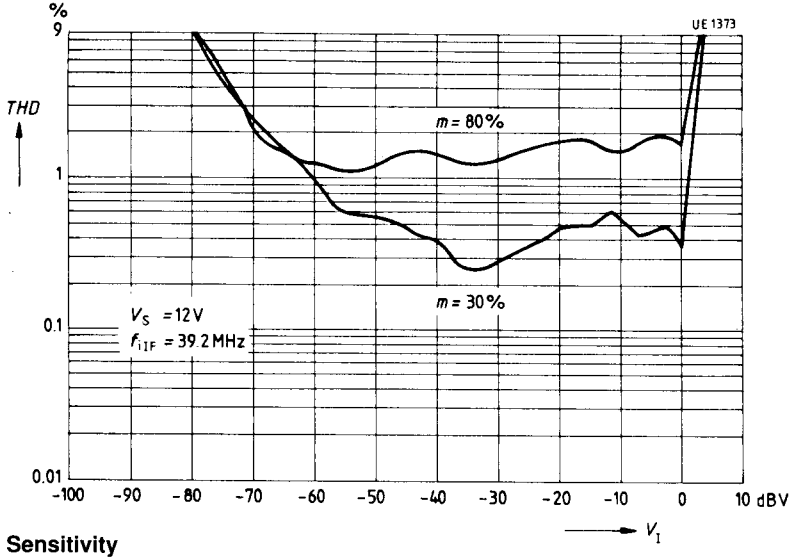
Sensitivity

Noise voltage versus input voltage
Standard circuit



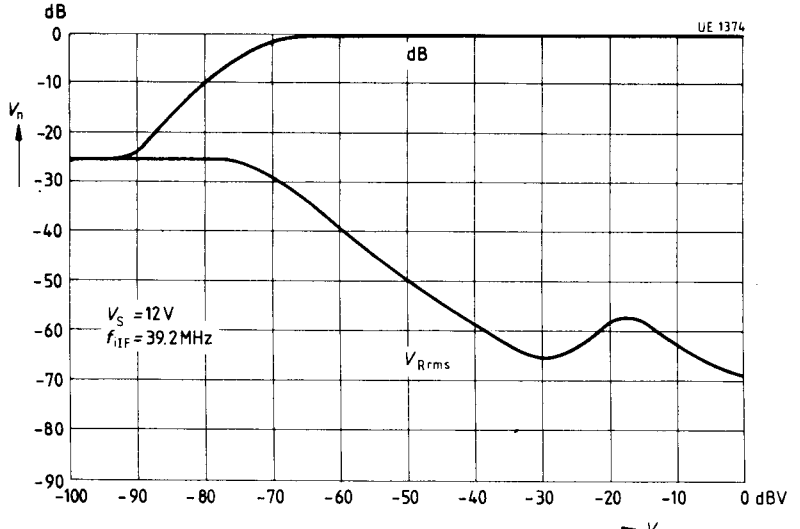
Circuit with R = 2.7 kΩ

Total harmonic distortion versus input voltage
Standard circuit



Sensitivity

Noise voltage versus input voltage
Standard circuit



Circuit with R = 2.7 kΩ

Total harmonic distortion versus input voltage