

## 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

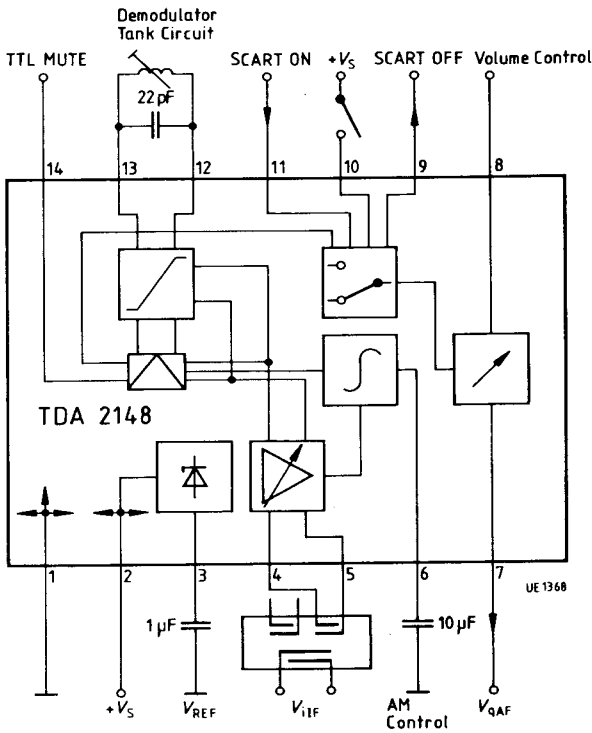
- High input sensitivity
- Few external components
- Low distortion
- Full SCART interface
- Partially compatible with TDA 2460

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 <sub>S</sub>
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 <sub>S</sub>	16	V
Control voltage	V <sub>6</sub>	4	V
DC voltages	V <sub>4, 5, 6</sub>	0 to V <sub>S</sub>	V
	V <sub>10, 11</sub>	0 to V <sub>S</sub>	V
	V <sub>12, 13</sub>	V <sub>REF</sub> to V <sub>S</sub>	V
DC currents	I <sub>7, 9</sub>	- 1 to 2	mA
Reference current	I <sub>3</sub>	2	mA
IF input voltage <i>m</i> = 80%	V <sub>14, 5 rms</sub>	300	mV
Junction temperature	T <sub>J</sub>	150	°C
Storage temperature range	T <sub>stg</sub>	- 40 to 125	°C
Thermal resistance (system-air)	R <sub>th SA</sub>	80	K/W

**Operating Range**

Supply voltage	V <sub>S</sub>	10.5 to 15.75	V
Frequency	<i>f</i>	15 to 45	MHz
Ambient temperature	T <sub>A</sub>	0 to 70	°C

**Characteristics**
 $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}; f_{\text{IF}} = 39.2\text{ MHz}; f_{\text{mod}} = 1\text{ kHz}$ 

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 $V_{Q9} = \pm 3\text{ dB}; m = 80\%$	$V_{14,5}$	20	40	80	$\mu\text{V}$
AGC range $V_{Q9} = \pm 3\text{ dB}; m = 80\%$	$\Delta G$	60	66		dB
SCART output voltage $m = 80\%; V_{\text{IF}} = 1\text{ mV};$	$V_{Q9}$	700	800	900	mV
Controlled AF output voltage $V_8 = 0.8 V_{\text{REF}}$	$V_{Q7}$	650	800	950	mV
DC voltage portion $V_{\text{IF}} = 1\text{ mV}; m = 0\%$	$V_9$	3.5	4.0	4.5	V
	$V_7$	5	6	7	V
Total harmonic distortion $V_{\text{IF}} = 1\text{ mV}; V_8 = 0.8 V_{\text{REF}}$ $m = 30\%$  $m = 80\%$	$THD_9$		0.3	1	%
	$THD_7$		0.3	1	%
	$THD_9$		1	2.5	%
	$THD_7$		1	2.5	%
Range for volume control $V_8 = 0\text{ V} \dots 0.8 V_{\text{REF}}$	$\Delta G$	80	85		dB
Gain SCART input/AF input $V_8 = 0.8 V_{\text{REF}}$	$G_{11,7}$	-1	0	1.5	dB
Input voltage SCART	$V_{111\text{ rms}}$	2			V

**Characteristics** (cont'd)
 $V_S = 12\text{ V}; T_A = 25\text{ }^\circ\text{C}; f_{\text{IF}} = 39.2\text{ MHz}; f_{\text{mod}} = 1\text{ kHz}$ 

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	

**Design-Related Values**

Input resistance	$R_{14,5}$		1.8		$\text{k}\Omega$
Output resistance	$R_{Q12,13}$		6.6		$\text{k}\Omega$
Input resistance	$R_{I11}$	20			$\text{k}\Omega$
Input current	$I_{I8}$			15	$\mu\text{A}$
Output resistance	$R_{Q9}$			200	$\Omega$
Output resistance	$R_{Q7}$			200	$\Omega$
Cross-talk rejection $V_{10} = 5\text{ V}; V_{11\text{ rms}} = 2\text{ V}$	$\alpha_{11-7}$	60			dB
Control current ratio for high speed load circuit / integral control	$\Delta i_6$		140		

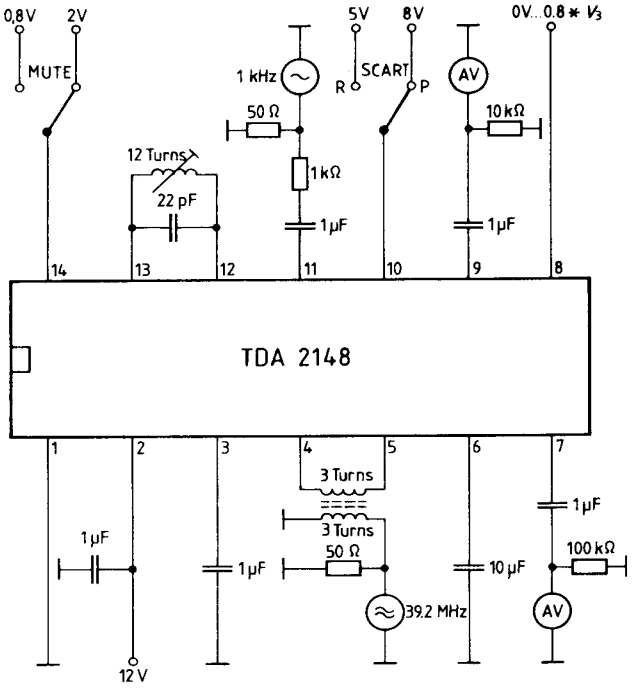
**Switching Voltages**

SCART record	$V_{10L}$	0		5	V
playback	$V_{10H}$	8		$V_S$	V
MUTE OFF	$V_{14L}$	0		0.8	V
ON	$V_{14H}$	2		$V_S$	V

**Switching Currents**

SCART record		$I_{10L}$	-1		0	$\mu\text{A}$
playback	$V_{10H} = 8\text{ V}$	$I_{10H}$	30		150	$\mu\text{A}$
MUTE OFF		$I_{14L}$	0		3.5	$\mu\text{A}$
ON	$V_{14H} = 2\text{ V}$	$I_{14H}$	10		50	$\mu\text{A}$
ON	$V_{14H} = 5\text{ V}$	$I_{14H}$	80		250	$\mu\text{A}$

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).

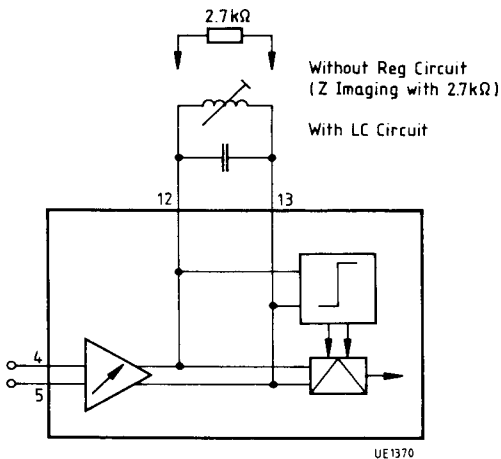
Even with a 100% modulation (France 80%) the distance from the side-bands to the carrier is 6 dB.

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

- harmonic distortion
- noise
- signal/noise ratio

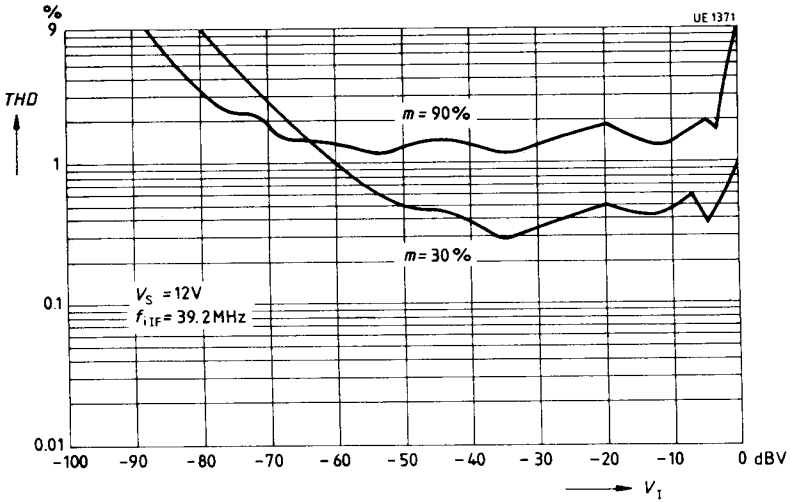
in a comparison with/without regenerative circuit. Only the control threshold shifts by 2 dB.

### AM Demodulator Circuit



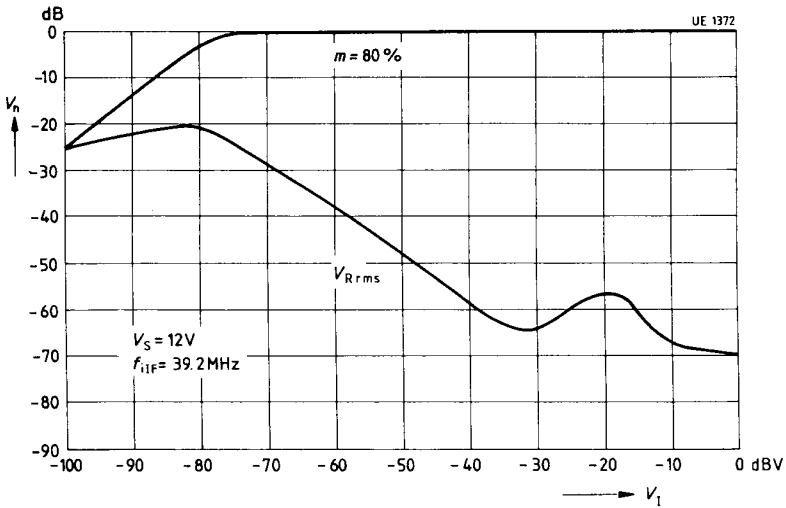
Circuit with LC Circuit

Total harmonic distortion versus input voltage  
Standard circuit



Sensitivity

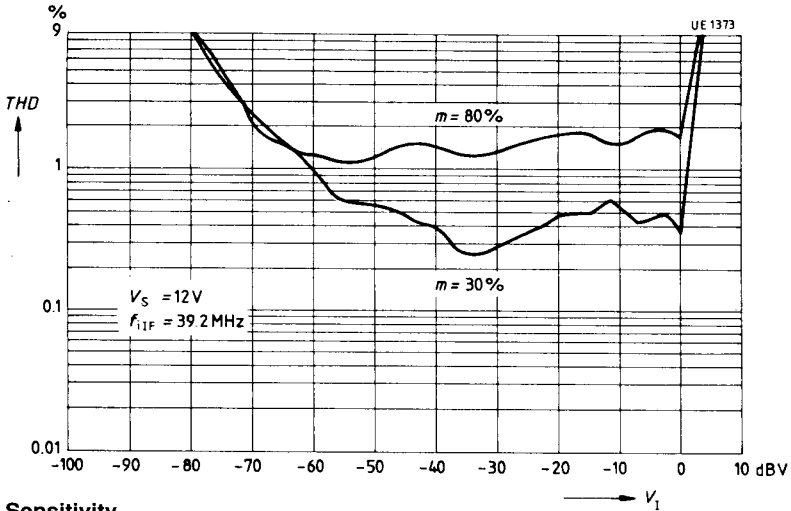
Noise voltage versus input voltage  
Standard circuit



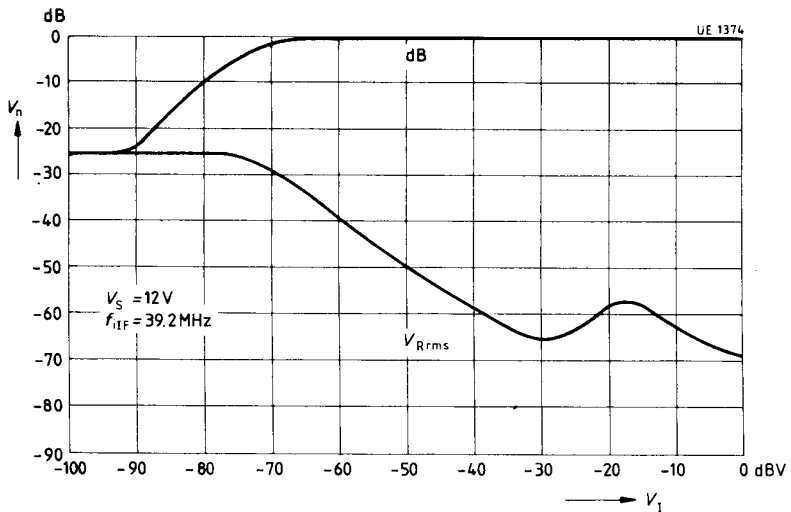


Circuit with  $R = 2.7 \text{ k}\Omega$

Total harmonic distortion versus input voltage  
Standard circuit



Sensitivity  
Noise voltage versus input voltage  
Standard circuit



Circuit with  $R = 2.7 \text{ k}\Omega$

Total harmonic distortion versus input voltage

