

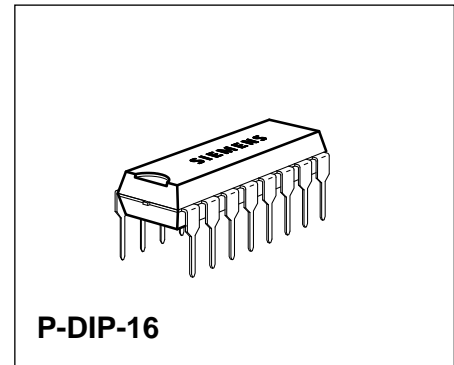
## FM-Sound IF with SCART Switch and Volume Control

TBA 121-5

Bipolar IC

### Features

- Outstanding limiting qualities
- Few external components
- Integrated de-emphasis resistor
- Low harmonic distortion factor



Type	Ordering Code	Package
TBA 121-5	Q67000-A5137	P-DIP-16

### Functional Description

FM-IF amplifier, consisting in a limiter amplifier with FM demodulator. The AF section contains a SCART-record/playback switch as well as AF output with volume control. The control of the volume is controlled via an analog control input, and the SCART switch is controlled via a switch input.

### Application

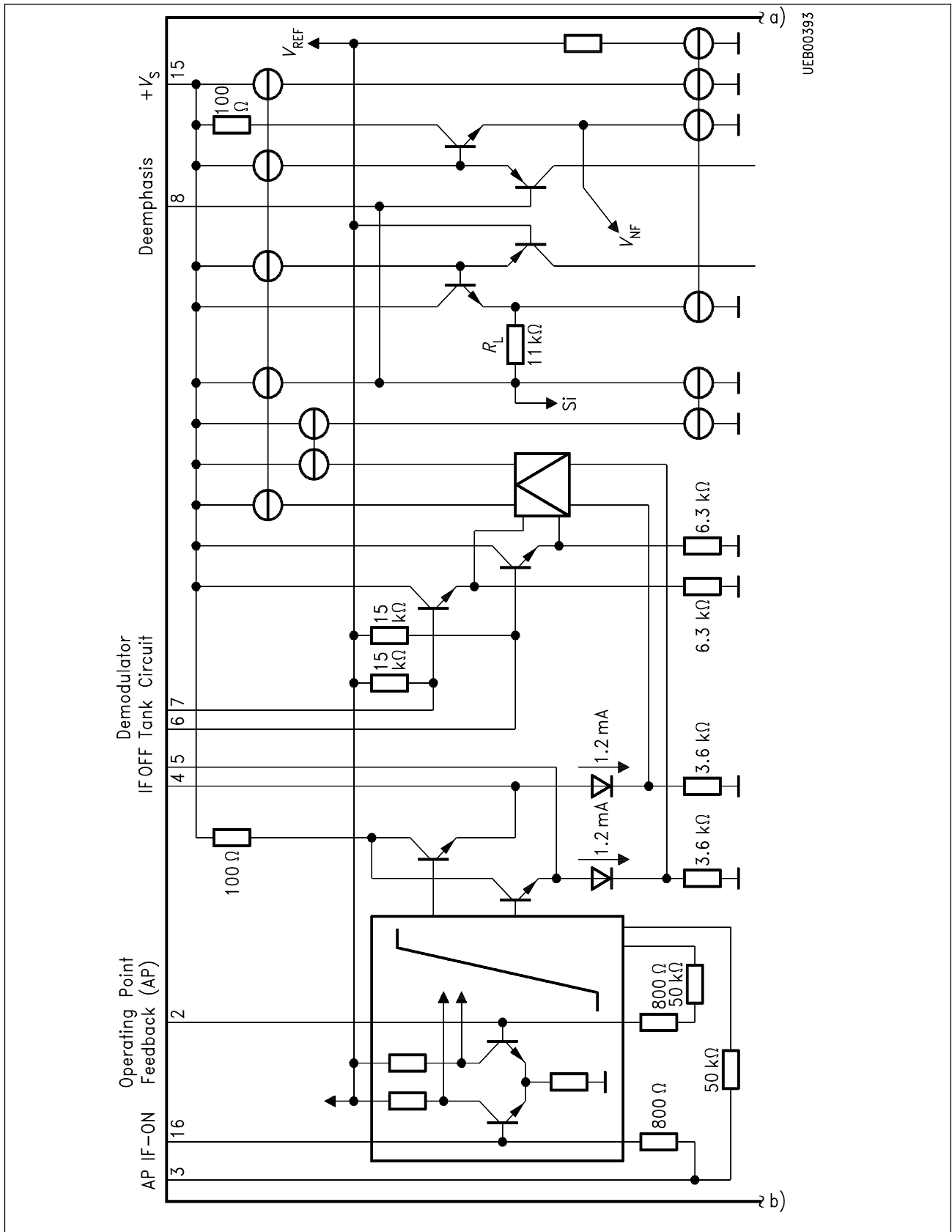
Application of the IC is intended in mono TV sets.

### Circuit Description

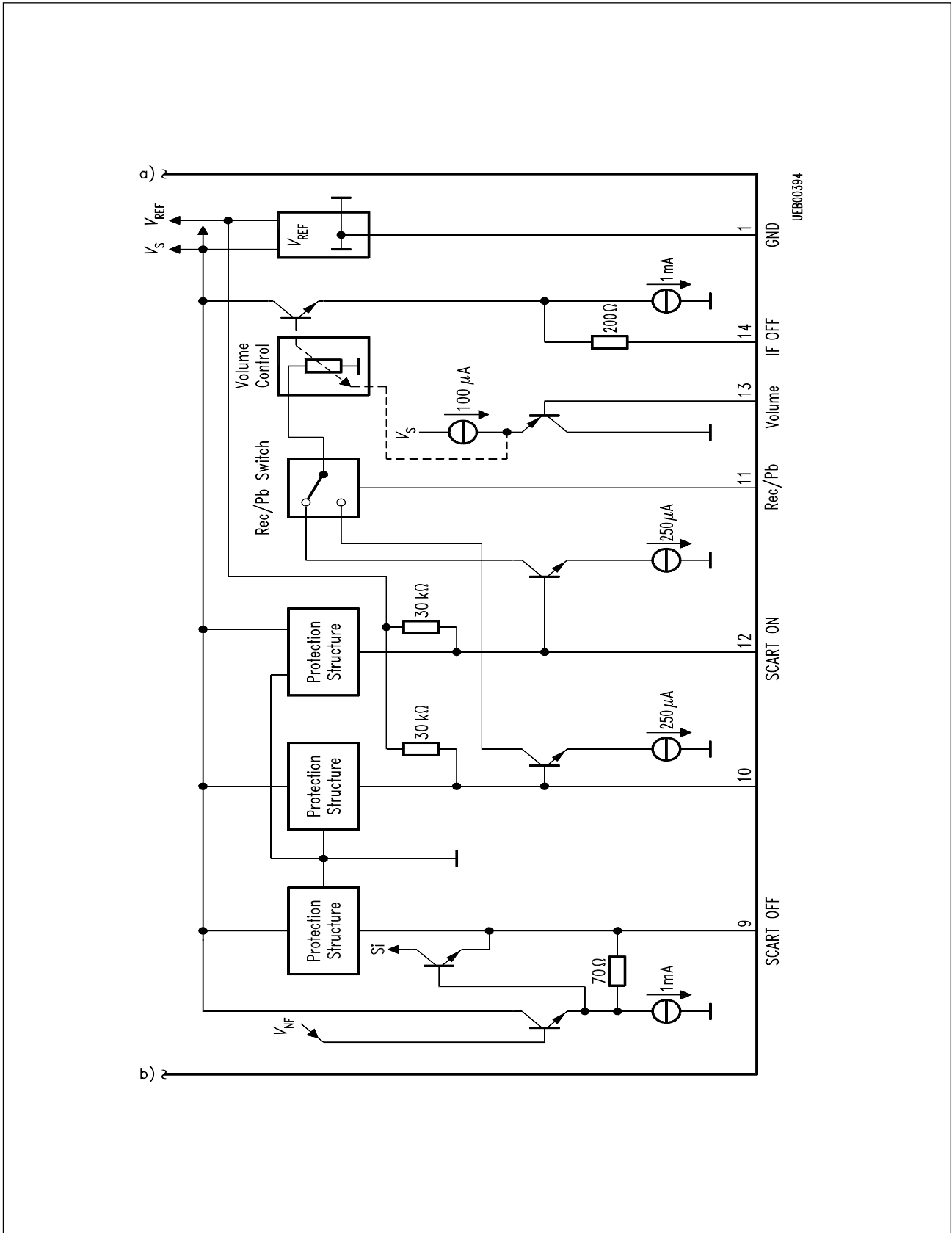
In its FM section, the component contains an eight stage, symmetrical limiter amplifier with subsequent coincidence demodulator. The AF section contains an analog switch for the SCART-recording / playback function as well as an analog volume control with AF output.

## Pin Functions

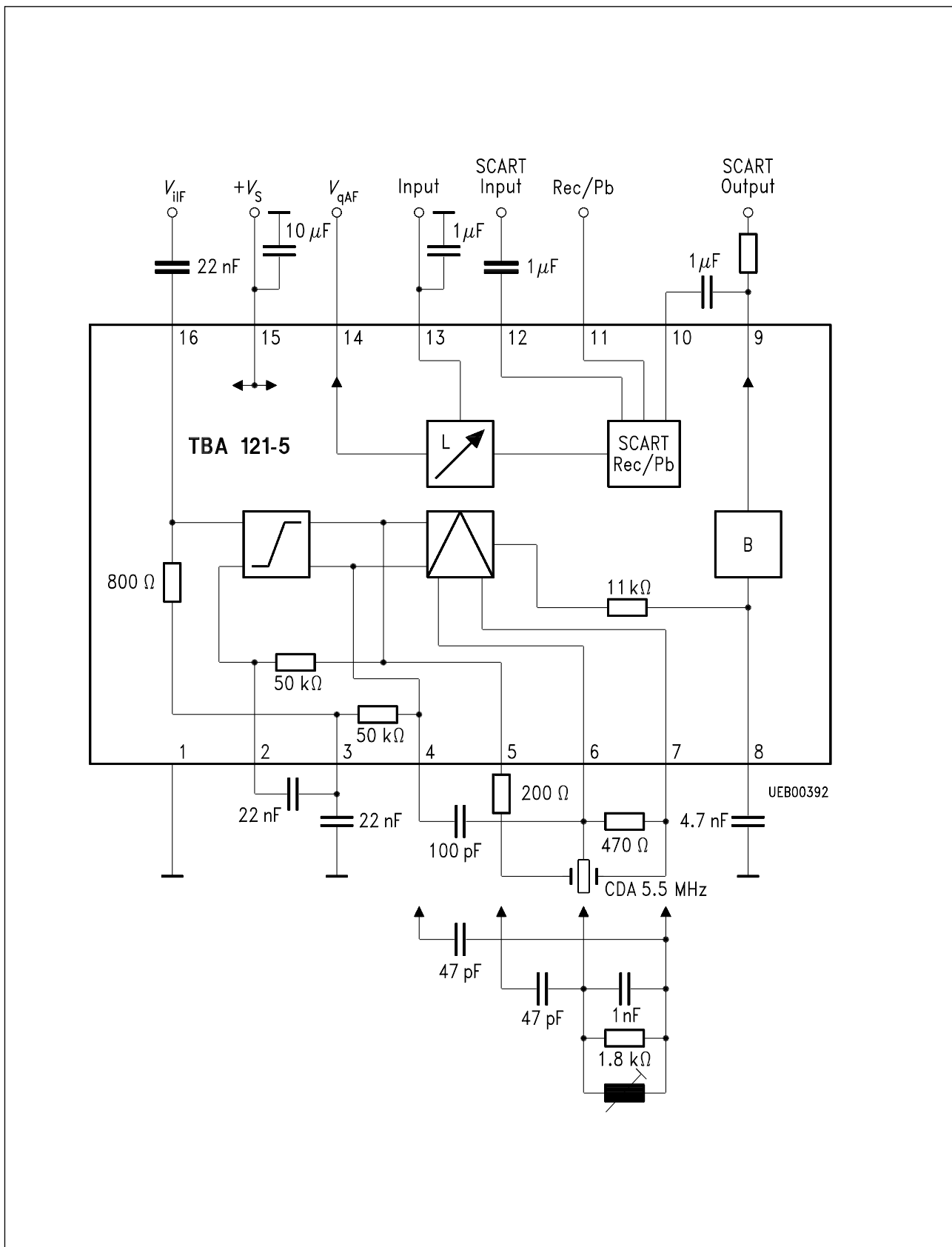
Pin No.	Function
1	Ground
2	Limiter amplifier operating point feedback (RF decoupling of IF amplifier with appropriate capacitors is required!)
3	Limiter amplifier operating point feedback and low end (RF decoupling of IF amplifier with appropriate capacitors is required!)
4	IF-amplifier output (emitter follower)
5	IF-amplifier output (emitter follower)
6	Demodulator input with high impedance input and internal 15 k $\Omega$ supply resistor (if an LC circuit is used, the $Q$ is determined by the damping resistance across pins 6 and 7)
7	Demodulator input with high impedance input and internal 15 k $\Omega$ supply resistor (if an LC circuit is used, the $Q$ is determined by the damping resistance across pins 6 and 7)
8	Connection for de-emphasis capacitor (a series resistor of 11 k $\Omega$ is integrated)
9	AF output of the SCART interface (emitter follower with short circuit limiter)
10	AF input 1 of the SCART interface (IF branch)
11	Rec/Pb switch input
12	AF input 2 of the SCART interface (SCART input)
13	Volume control
14	IF output (emitter follower)
15	+ $V_S$ supply voltage
16	IF input (limiter amplifier input; internal resistor between pin 16 and 3 typ. 800 $\Omega$ )



Expanded Block Diagram, Part 1



Expanded Block Diagram, Part 2



Block Diagram

## Absolute Maximum Ratings

$T_A = 0$  to  $70$  °C

Parameter	Symbol	Limit Values		Unit
		min.	max.	
Supply voltage	$V_S$	0	16	V
IF-input voltage	$V_{I\ 16\ rms}$	0	600	mVrms
DC voltage	$V_2$	0	$V_{REF}$	V
DC voltage	$V_3$	0	$V_{REF}$	V
DC voltage	$V_6$	0	$V_S$	V
DC voltage	$V_7$	0	$V_S$	V
DC voltage	$V_8$	0	$V_S-2$	V
DC voltage	$V_9$	0	$V_{REF}$	V
DC voltage	$V_{11}$	0	$V_S$	V
DC voltage	$V_{12}$	0	$V_S$	V
DC voltage	$V_{13}$	0	$V_S$	V
DC voltage	$V_{16}$	0	$V_{REF}$	V
DC current	$I_4$	0	2	mA
DC current	$I_5$	0	2	mA
DC current	$I_9$	- 1	2	mA
DC current	$I_{14}$	- 1	2	mA
Junction temperature	$T_j$		150	°C
Storage temperature	$T_{stg}$	- 55	125	°C
Thermal resistance (system-air)	$R_{th\ SA}$		80	K/W

## Operating Range

Supply voltage	$V_S$	10.5	15.75	V
Frequency range	$f$	0.1	12	MHz
Ambient temperature in operation	$T_A$	0	70	°C

## Characteristics

$T_A = 0$  to  $70$  °C;  $V_S = 10.5$  to  $15.5$  V; refer to test circuit

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Current consumption	$I_S$	21	29	37	mA	
Input voltage for limiting response ( $V_{Q9,14} = -3$ dB)	$V_{I16\text{ rms}}$		60	100	$\mu\text{V}$	$f_{I16} = 5.5$ MHz; $\Delta f = 30$ kHz; $f_{\text{mod}} = 1$ kHz
SCART-output voltage	$V_{Q9}$	500	650		mV	$V_{I16} = 10$ mV; $\Delta f = 30$ kHz; $f_{\text{mod}} = 1$ kHz $f_{I16} = 5.5$ MHz
AF-output voltage	$V_{Q14}$	450	650		mV	$V_{13} = 4.8$ V; $\Delta f = 30$ kHz; $f_{\text{mod}} = 1$ kHz; $f_{I16} = 5.5$ MHz
DC component	$V_{Q9}$		4.8		V	$V_{I16} = 10$ mV; $\Delta f = 0$ $THD = THD_{\text{min}}$
	$V_{Q14}$		6		V	
Total distortion factor	$THD_9$ $THD_{14}$			1	%	$\Delta f = 30$ kHz; $V_{I16} = 10$ mV; $f_{\text{mod}} = 1$ kHz $f_{I16} = 5.5$ MHz $V_{13} = 4.8$ V
				1.1	%	
AM suppression (test conditions for reference point)	$a_{AM9,14}$	50	60		dB	$V_{I16} = 500$ $\mu\text{V}$ ; $m = 30\%$ ; $f_{\text{mod}} = 1$ kHz; $f_{I16} = 5.5$ MHz; $\Delta f = 30$ kHz; $V_{I16} = 10$ mV
Volume control range	$V_{14}$	80			dB	$V_{13} = 5-0$ V
Maximum SCART-input voltage	$V_{I12}$	2			V <sub>rms</sub>	
Gain between SCART input (pin 10) and AF output (pin 14)	$G_{SC}$		0		dB	$V_{11} \geq 8$ V $\leq 12$ V $V_{13} = 4.8$ V

## Switching Voltage, Muting

ON (AF OFF)	$V_3$	8		$V_S$	V	
OFF	$V_3$	0		3	V	

### Characteristics (cont'd)

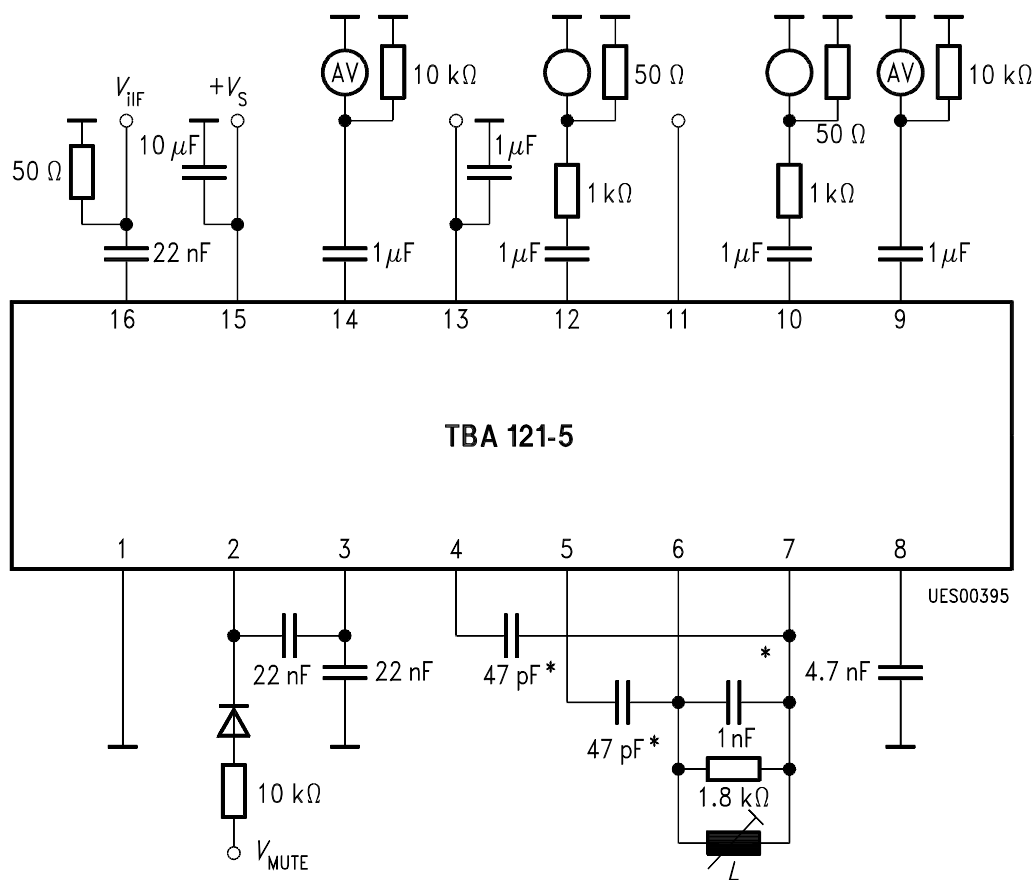
$T_A = 0$  to  $70$  °C;  $V_S = 10.5$  to  $15.5$  V; refer to test circuit

Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		

### Design Notes

Input resistance	$R_{I\ 6,7}$	10			k $\Omega$	
Output resistance	$R_{Q\ 9}$			100	$\Omega$	
Output resistance	$R_{Q\ 14}$			200	$\Omega$	
Input resistance	$R_{I\ 10,12}$	20			k $\Omega$	
Input impedance	$Z_{I\ 16}$		800		$\Omega$	
Residual IF voltage	$V_{Q\ 9,14}$ (IF)			10	mV	
Hum suppression $V_S/V_{Q\ 9,14}$ (without de-emphasis C)	$a_{qh}$		30		dB	$\Delta V_S = 500$ mVrms $f_S = 100$ Hz
Crosstalk attenuation (test conditions for reference point)	$a_{12-14}$	60			dB	$V_{12} = 2$ Vrms; RF mode: $\Delta f = 30$ kHz; $f_{mod} = 1$ kHz; $f_{I\ 16} = 5.5$ MHz $V_{I\ 16} = 10$ mV
Attenuation IF MUTE	$a_{14}$	80			dB	$f_{I\ 16} = 5.5$ MHz; $V_{13} = 4.8$ V; $V_{I\ 16} = 300$ mV; $f_{mod} = 1$ kHz; $\Delta f = 30$ kHz; IF MUTE = ON; measured selectively at 1 kHz

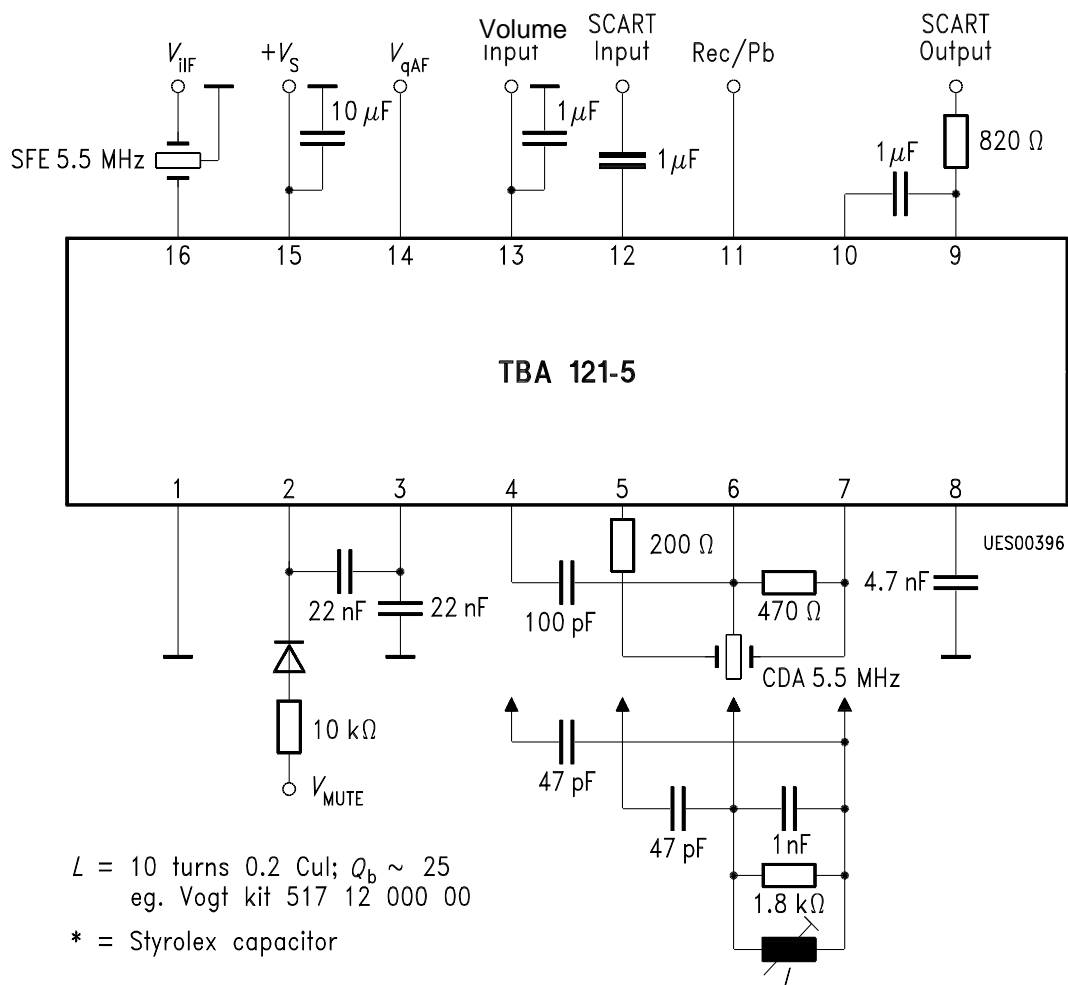




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$L = 10$  turns  $0.2$  CuI;  $Q_b \sim 25$   
 eg. Vogt kit 517 12 000 00  
 \* = Styrolex capacitor

**Test Circuit**



Application Circuit