SIEMENS

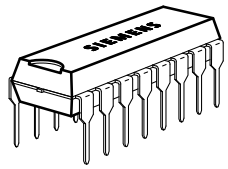
FM-Sound IF with SCART Switch and Volume Control

TBA 121-5

Bipolar IC

Features

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



P-DIP-16

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

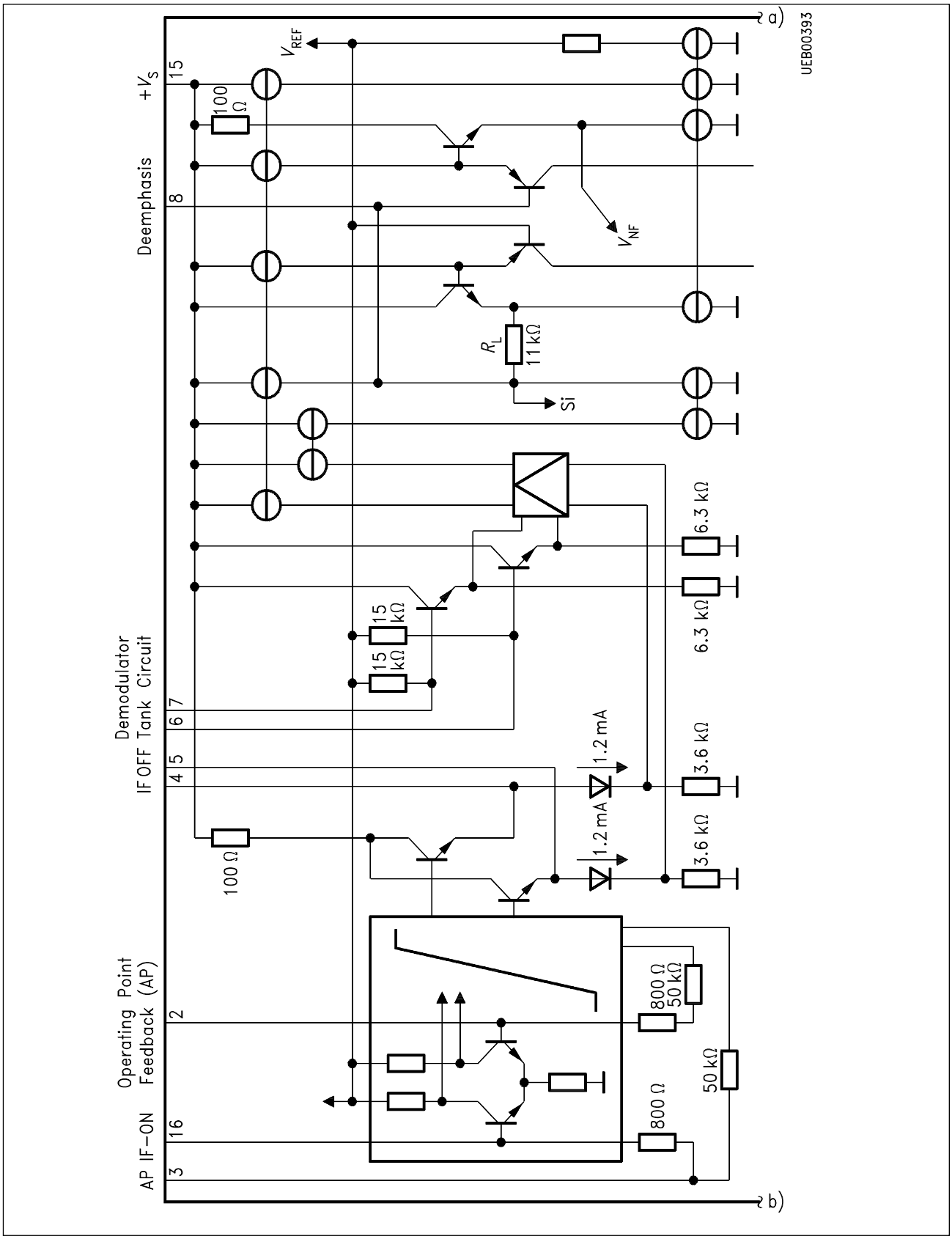
Application of the IC is intended in mono TV sets.

Circuit Description

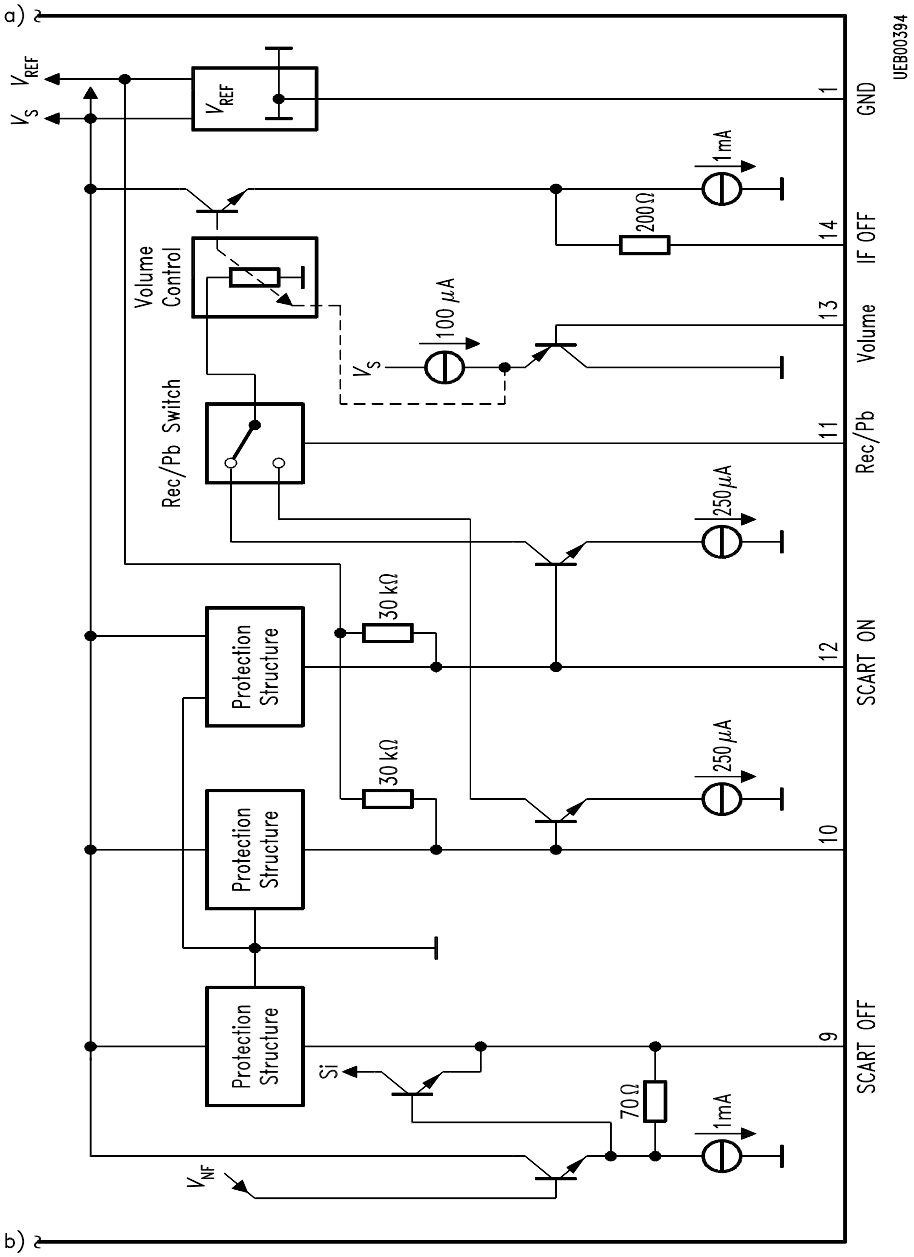
In its FM section, the component contains an eight stage, symmetrical limiter amplifier with subsequent coincidence demodulator. The AF section contains an analog switch for the SCART-recording / playback function as well as an analog volume control with AF output.

Pin Functions

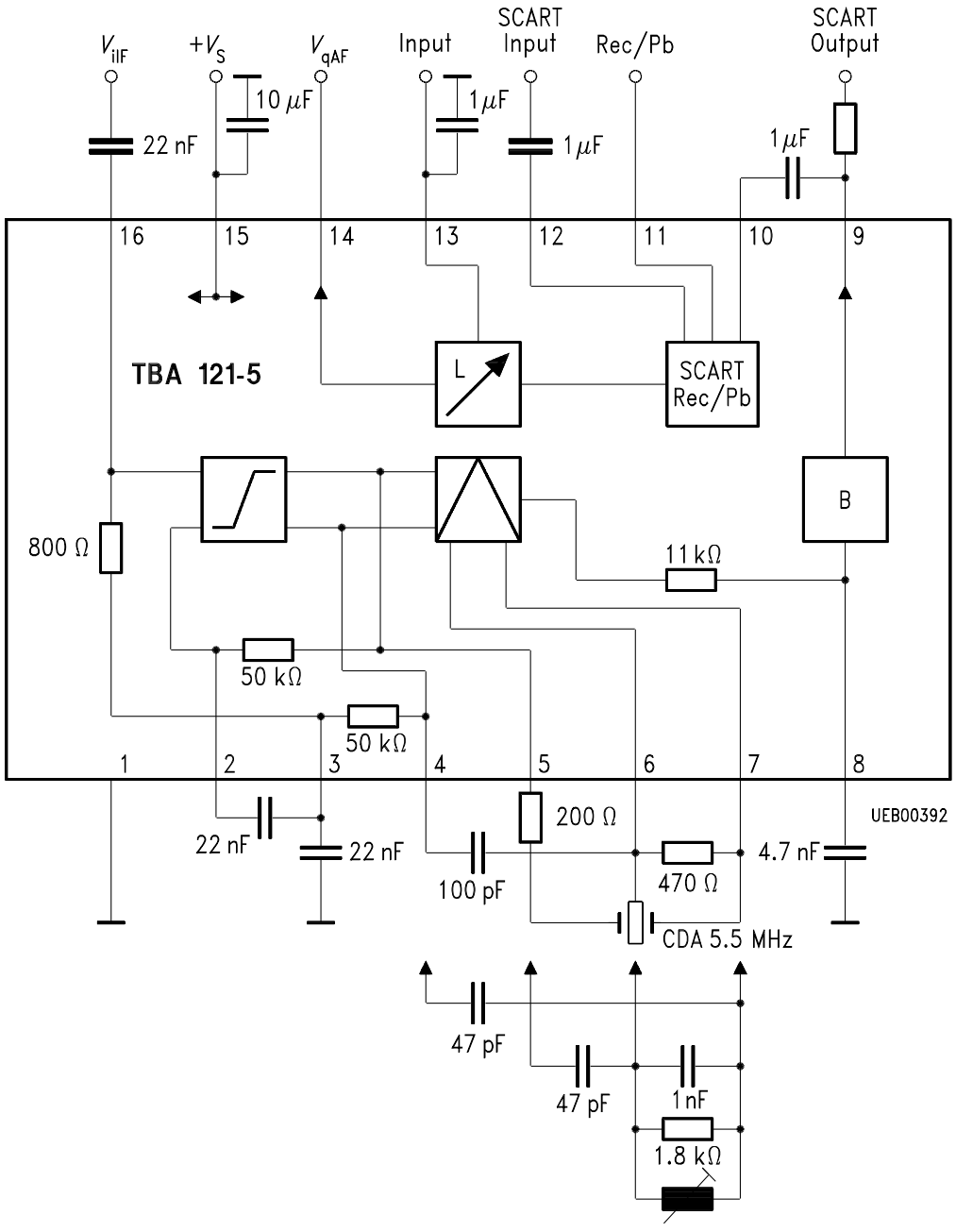
Pin No.	Function
1	Ground
2	Limiter amplifier operating point feedback (RF decoupling of IF amplifier with appropriate capacitors is required!)
3	Limiter amplifier operating point feedback and low end (RF decoupling of IF amplifier with appropriate capacitors is required!)
4	IF-amplifier output (emitter follower)
5	IF-amplifier output (emitter follower)
6	Demodulator input with high impedance input and internal 15 kΩ 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 kΩ 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 kΩ 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 Ω)



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

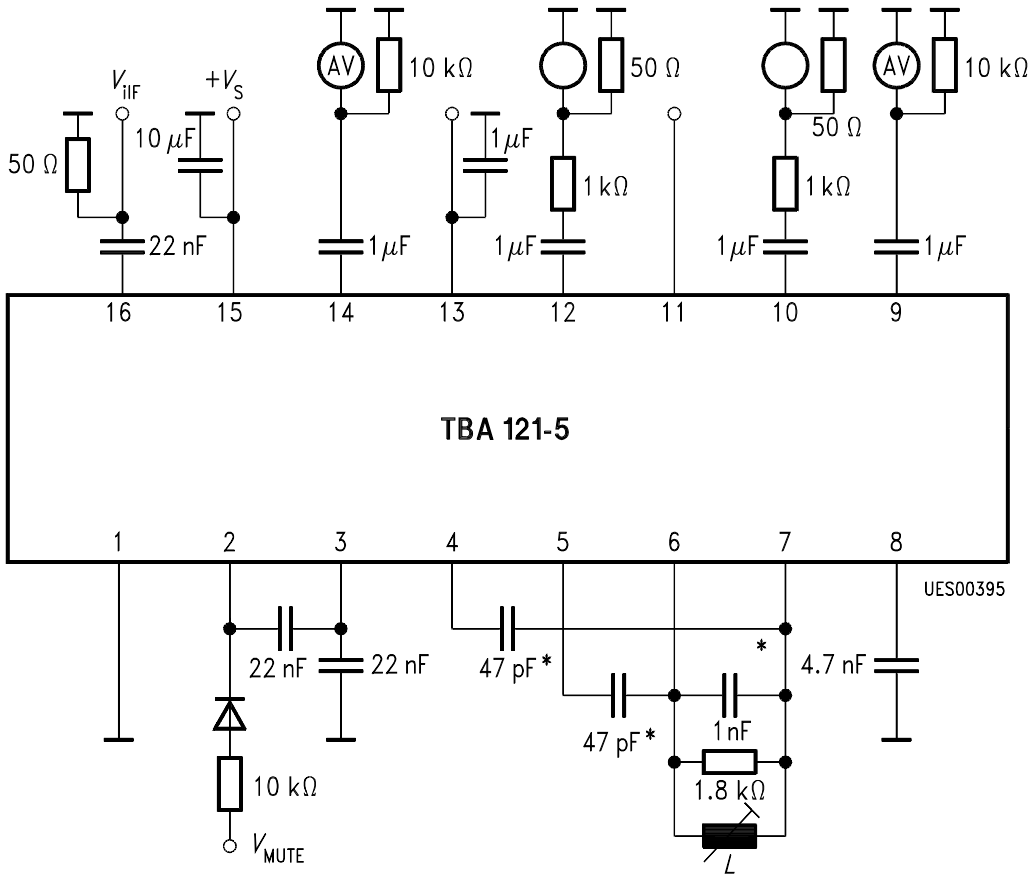
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Current consumption	I_S	21	29	37	mA	
Input voltage for limiting response ($V_{Q\ 9,\ 14}$ = – 3 dB)	$V_{I\ 16\ rms}$		60	100	µV	$f_{I\ 16}$ = 5.5 MHz; Δf = 30 kHz; f_{mod} = 1 kHz
SCART-output voltage	$V_{Q\ 9}$	500	650		mV	$V_{I\ 16}$ = 10 mV; Δf = 30 kHz; f_{mod} = 1kHz $f_{I\ 16}$ = 5.5 MHz
AF-output voltage	$V_{Q\ 14}$	450	650		mV	V_{13} = 4.8 V; Δf = 30 kHz; f_{mod} = 1 kHz; $f_{I\ 16}$ = 5.5 MHz
DC component	$V_{Q\ 9}$ $V_{Q\ 14}$		4.8 6		V V	$V_{I\ 16}$ = 10 mV; Δf = 0 $THD = THD_{min}$
Total distortion factor	$THD_{\ 9}$ $THD_{\ 14}$			1 1.1	% %	Δf = 30 kHz; $V_{I\ 16}$ = 10 mV; f_{mod} = 1 kHz $f_{I\ 16}$ = 5.5 MHz V_{13} = 4.8 V
AM suppression (test conditions for reference point)	$a_{AM9,\ 14}$	50	60		dB	$V_{I\ 16}$ = 500 µV; m = 30%; f_{mod} = 1 kHz; $f_{I\ 16}$ = 5.5 MHz; Δf = 30 kHz; $V_{I\ 16}$ = 10 mV
Volume control range	V_{14}	80			dB	V_{13} = 5-0 V
Maximum SCART-input voltage	$V_{I\ 12}$	2			Vrms	
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) OFF	V_3 V_3	8 0		V_S 3	V V	

Characteristics (cont'd)
T_A = 0 to 70 ˚C; V_S = 10.5 to 15.5 V; refer to test circuit

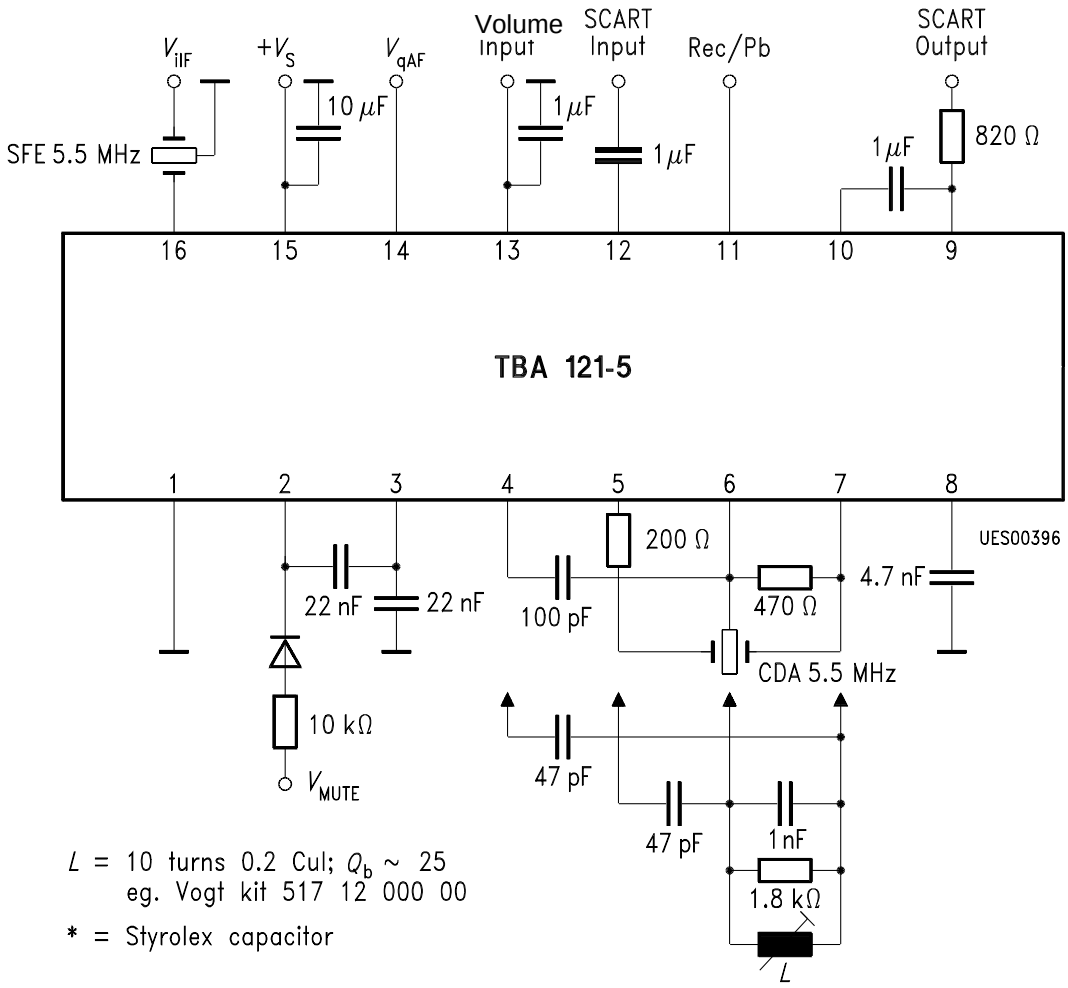
Parameter	Symbol	Limit Values			Unit	Test Condition
		min.	typ.	max.		
Design Notes						
Input resistance	$R_{I\ 6,\ 7}$	10			kΩ	
Output resistance	$R_{Q\ 9}$			100	Ω	
Output resistance	$R_{Q\ 14}$			200	Ω	
Input resistance	$R_{I\ 10,\ 12}$	20			kΩ	
Input impedance	$Z_{I\ 16}$		800		Ω	
Residual IF voltage	$V_{Q\ 9,\ 14\ (IF)}$			10	mV	
Hum suppression $V_S/V_{Q\ 9,\ 14}$ (without de-emphasis C)	a_{qh}		30		dB	ΔV_S = 500 mVrms f_S = 100 Hz
Crosstalk attenuation (test conditions for reference point)	$a_{12\text{-}14}$	60			dB	V_{12} = 2 Vrms; RF mode: Δf = 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; Δf = 30 kHz; IF MUTE = ON; measured selectively at 1 kHz



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

* = Styrolex capacitor

Test Circuit



Application Circuit