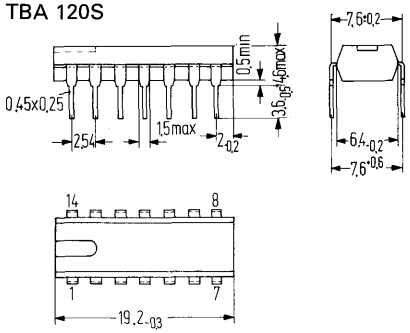
Symmetrical 8-stage amplifier with symmetrical coincidence demodulator for amplification, limiting and demodulation of frequency-modulated signals, especially suited for the sound IF units in TV sets and FM IF amplifiers in radio sets. The circuit is directly interchangeable with TBA 120/A (pin-compatible).

- Outstanding limiting qualities
- Very good frequency stability of converter characteristic
- Wide range of operation (6 to 18V)
- Very low external component requirement
- Voltage for AFT

Type	Ordering codes
TBA 120S	Q67000-A490
TBA 120AS	Q67000-A525

Package outlines

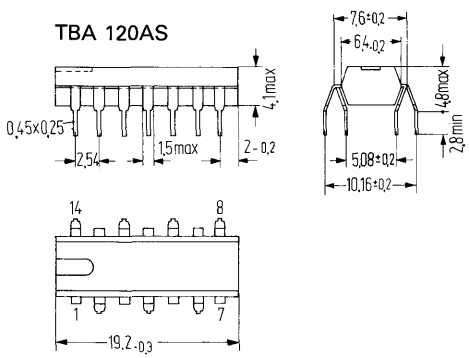
TBA 120S



Plastic plug-in package
20 A 14 DIN 41866 14 pins, dual-in-line,
Weight approx. 1.1 g

Dimensions in mm

TBA 120AS



Plastic plug-in package
20 A 14 DIN 4186 (similar) 14 pins,
quad-in-line
Weight approx. 1.1 g

Absolute maximum ratings

Supply voltage[1])		V_{cc}	18	V
Storage temperature		T_S	–40 to +125	°C
Z current		I_{12}	15	mA
	(for max. 1 min)	I_{12}	20	mA
Voltage		V_5	4	V
Current		I_3	5	mA
Current		I_4	2	mA
Junction temperature		T_j	150	°C
Thermal resistance (system-air)		R_{thsa}	≤120	K/W

Range of operation

Supply voltage	V_{cc}	6 to 18	V
Ambient temperature in operation	T_{amb}	–15 to +70	°C
Frequency range	f	0 to 12	MHz

[1]) The circuit must not plugged in or out when supply voltage is switched on.

Electrical characteristics (V_{cc} = 12 V, T_{amb} = 25° C, f = 5.5 MHz and 10,7 MHz)

		min	typ	max	
Total current consumption $R_5 = \infty$	I_{cc}	10	14	18	mA
$R_5 = 0$	I_{cc}	11	15.2	20	mA
IF voltage gain	G_v		68		dB
IF output voltage at limiting (each output)	V_{qpp}	170	250		mV
Output resistance (pin 8)	R_q	1.9	2.6	3.3	kΩ
Shunt resistance	R_{13-14}			1	kΩ
Range of volume control	$\frac{V_{AF\ max}}{V_{AF\ min}}$	70	75		dB
DC level of output signal	V_8	6.2	7.4	8.5	V
Potentiometer resistance					
– 1 dB down	R_5		3.7	4.7	kΩ
–70 dB down	R_5	1.0	1.4		kΩ
Voltage					
– 1 dB down	V_5		2.4		V
–70 dB down	V_5		1.3		V
Signal-to-noise distance (V_i = 10 mV, Δf = ±50 kHz)	$a_{S/N}$	75	85		dB
Harmonic distortion (V_i = 10 mV, Δf = ±25 kHz)	k		1.3	2.5	%
Noise voltage (according to DIN 45405)	V_n		80	140	μVs
Operation at 5.5 MHz (Δf = ±50 kHz, f_{mod} = 1 kHz)					
AF output voltage (V_i = 10 mV)	$V_{AF\ eff}$	.7	1.0		V
Input voltage for –3 dB limiting	$V_{i\ lim}$		30	60	μV
AM suppression (m = 30%)					
V_i = 500 μV	a_{AM}	45	55		dB
V_i = 10 mV	a_{AM}	60	68		dB
Input impedance	Z_i		40/4.5		kΩ/pF
Operation at 10.7 MHz (Δf = ±75 kHz, f_{mod} = 1 kHz, m = 30%, $Q_B \approx 45$)					
AF output voltage (V_i = 10 mV)	$V_{AF\ eff}$	.4	.7		V
Input voltage for –3 dB limiting	$V_{i\ lim}$		50	100	μV
AM suppression V_i = 500 μV	a_{AM}	40	50		dB
V_i = 10 mV	a_{AM}	60	68		dB
Input impedance	Z_i		20/4		kΩ/pF

Characteristics of the additive circuit

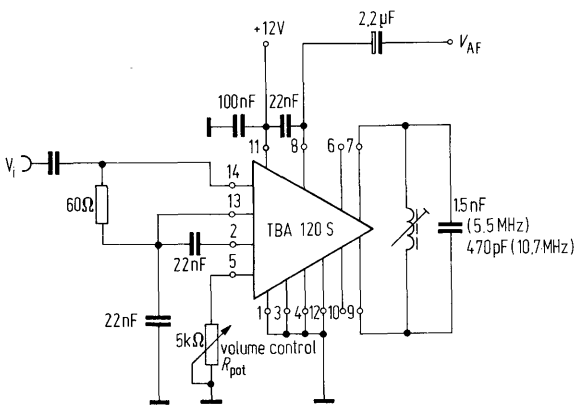
		min	typ	max	
Z-voltage (I_{12} = 5 mA)	V_{12}	11.2	12	13.2	V
Z-resistance	R_Z		30	55	Ω
Breakdown voltage	V_{CBO}	26	40		V
Breakdown voltage (I_3 = 500 µA)	V_{CEO}	13			V
Current gain (V_{CE} = 5V, I_C = 1 mA)	G_C	25	80		

Pins 3 and 4 are connected to collector and base of a transistor, respectively, which may be used as an AF preamplifier ($I_C \leq 5$ mA) or as a bass/treble switch (dc on- or off-switching of a RC-circuit).
At pin 12 a Z diode (12 V) is accessible which can be used to stabilize the supply voltage of this integrated circuit or the voltage of other circuit elements in the set ($I_Z \leq 15$ mA).

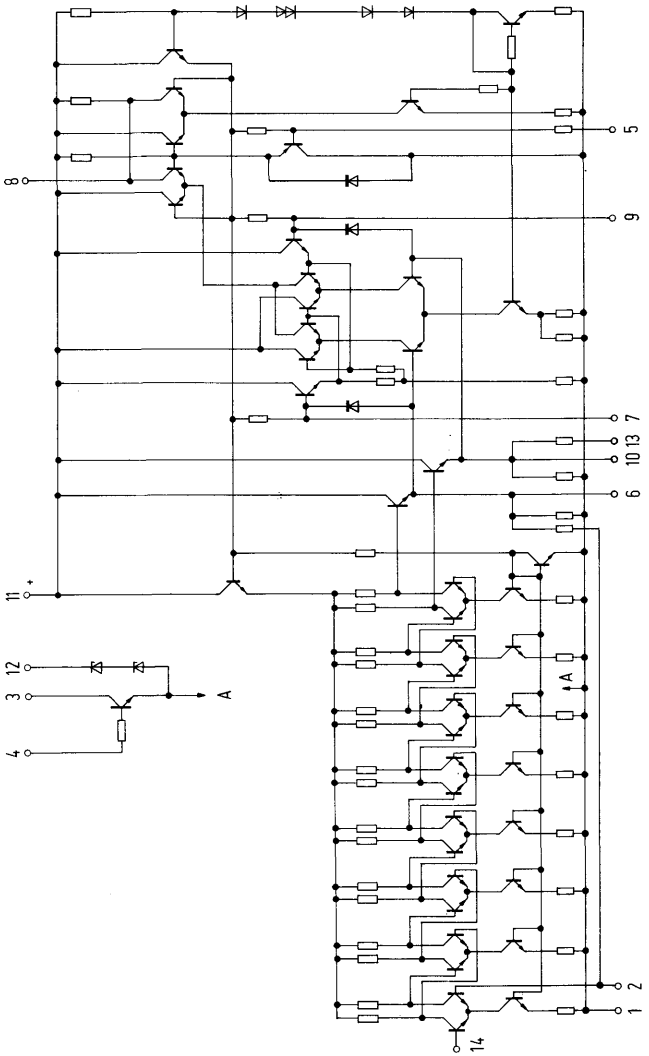
The integrated circuit TBA 120S is supplied in different groups. Parameter is the volume. A decrease of 30 dB requires a resistor between pin 5 and ground with a resistance value depending on the group number as shown below. The group number is imprinted on the plastic package.

Group	II	III	IV	V	
R 5	1.9 to 2.2	2.1 to 2.5	2.4 to 2.9	2.8 to 3.3	kΩ

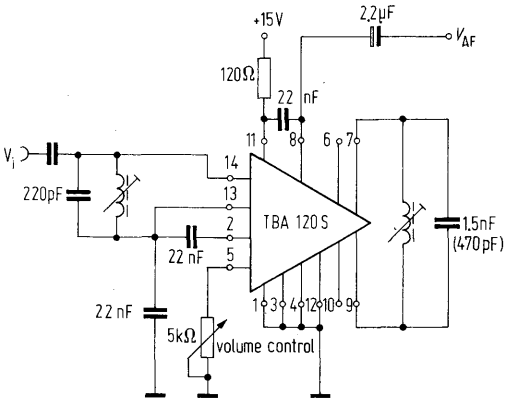
Test circuit



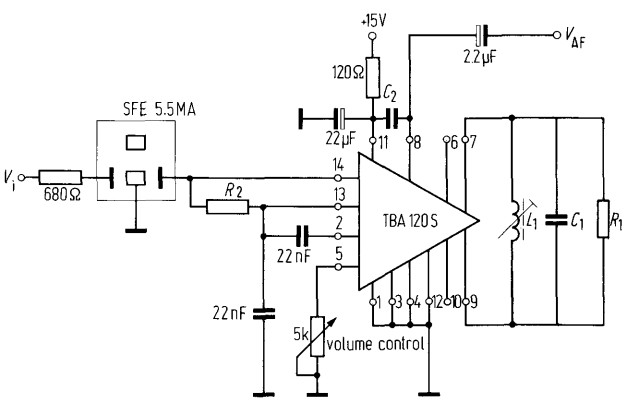
Circuit diagram



Recommended application circuit 5.5 MHz (10.7 MHz)

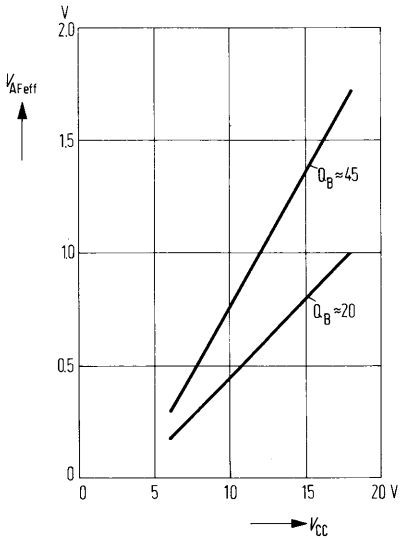


TBA 120S with ceramic filter (Murata)
For a good far-away-selectivity the ceramic filter should be combined with a LC circuit

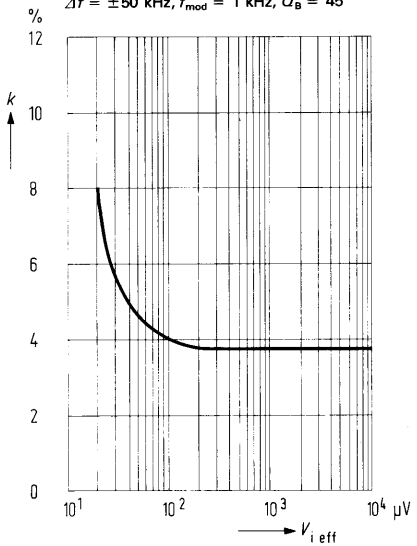


	Sound IF in TV sets	Sound IF in TV sets of American Std.	FM-IF in radio mono sets	FM-IF in radio stereo sets
C_1	1.5 nF	2.2 nF	470 pF	330 pF
C_2	22 nF	22 nF	22 nF	470 pF
L_1	8 turns	8 turns	8 turns	12 turns
R_1	∞	∞	∞	1 kΩ
R_2	680 Ω	1 kΩ	330 Ω	330 Ω
Filter (Murata)	SFE 5.5 MA	SFE 4.5 MA	SFE 10.7 MA	SFE 10.7 MA

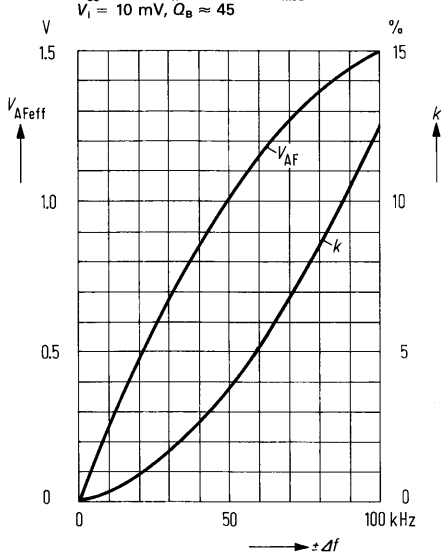
AF output voltage versus supply voltage
f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, V_i = 10 mV



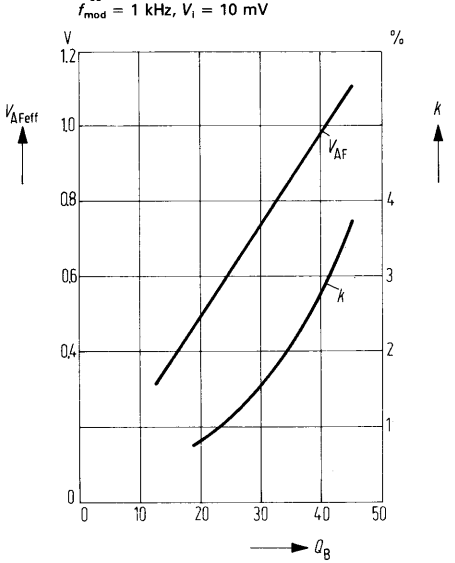
Total harmonic distortion v. input voltage
V_{cc} = 12 V, f_{IF} = 5.5 MHz,
Δf = ±50 kHz, f_{mod} = 1 kHz, Q_B = 45



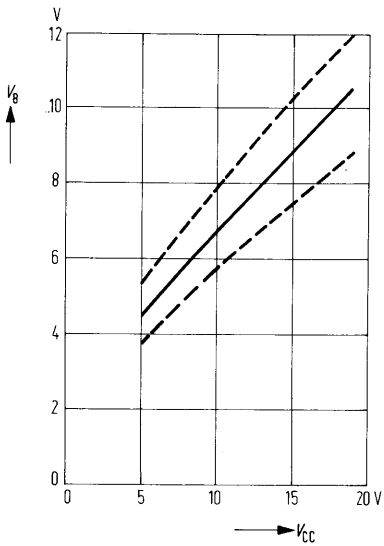
AF output voltage and harmonic distortion v. frequency deviation
V_{cc} = 12 V, f_{IF} = 5.5 MHz, f_{mod} = 1 kHz,
V_i = 10 mV, $Q_B \approx 45$



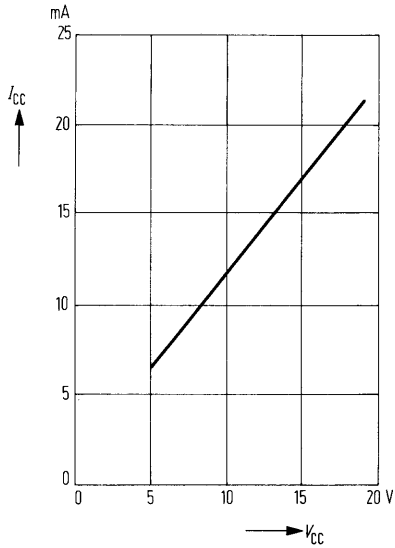
AF output voltage and harmonic distortion v. Q_B-factor
V_{cc} = 12 V, Δf = ±50 kHz,
f_{mod} = 1 kHz, V_i = 10 mV



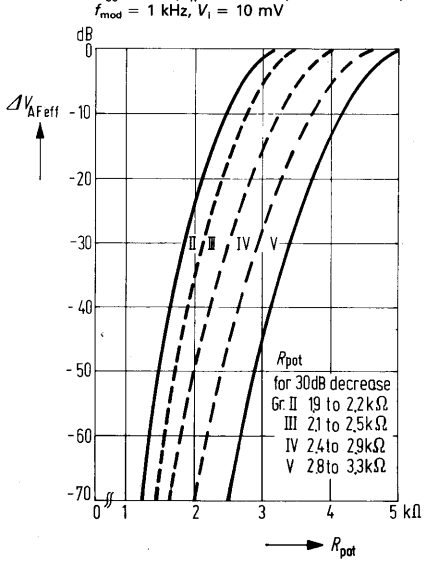
DC output voltage versus supply voltage



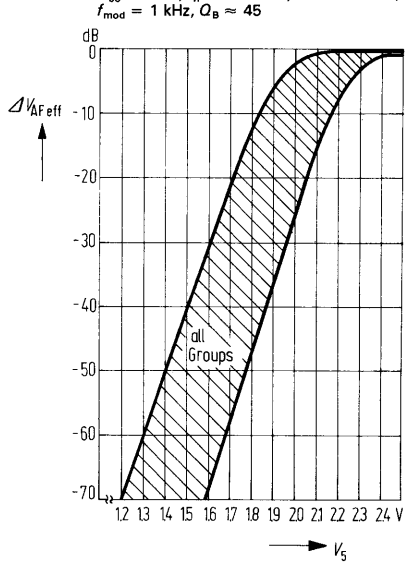
Current consumption versus supply voltage



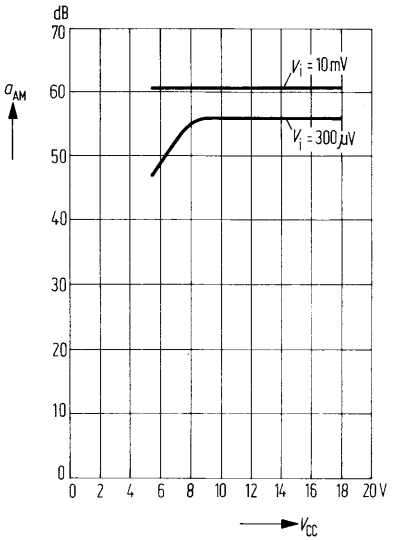
Volume control v. potentiometer resistance
V_{cc} = 12 V, f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, V_i = 10 mV



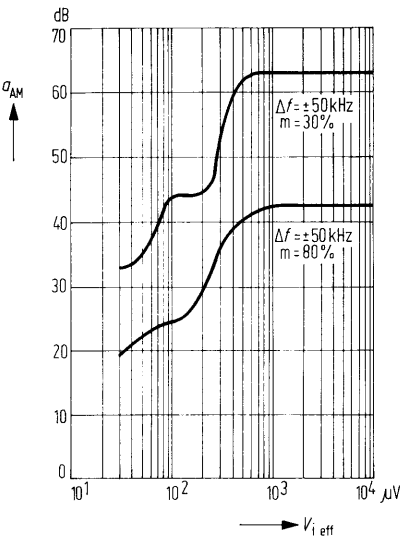
Volume control versus voltage to pin 5
V_{cc} = 12 V, f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, $Q_B \approx 45$



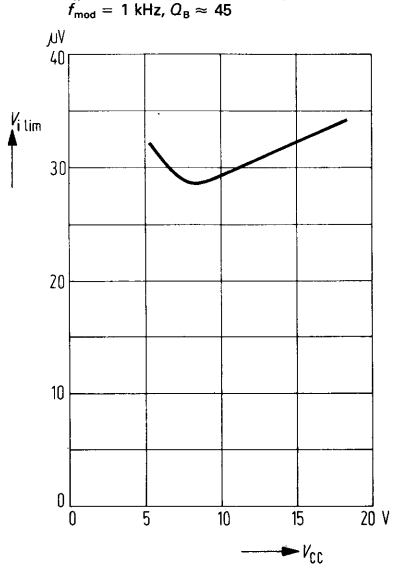
AM suppression versus supply voltage
f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, m = 30%, $Q_B \approx 45$



AM suppression versus input voltage
V_{CC} = 12 V, f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, $Q_B \approx 45$



Input voltage for – 3 dB limiting versus supply voltage
f_{IF} = 5.5 MHz, Δf = ±50 kHz,
f_{mod} = 1 kHz, $Q_B \approx 45$



AF output voltage versus input voltage
V_{CC} = 12 V, f_{mod} = 1 kHz, $Q_B \approx 45$