DIP 14

The symmetrical 8-stage amplifier with symmetrical coincidence demodulator for amplifying, limiting, and demodulating frequency-modulated signals is especially suited for the sound IF section in TV sets and FM IF amplifiers in radio sets.

Features

- Outstanding limiting characteristics
- Wide range of operation (6 to 18 V)
- Few external components
- Voltage for AFC

Maximum ratings

Supply voltage[1])	V_S	18	V
Z current	I_{12}	15	mA
$t \leqq 1$ min	I_{12}	20	mA
Voltage	V_5	4	V
Current	I_3	5	mA
	I_4	2	mA
Storage temperature range	T_{stg}	−40 to 125	°C
Junction temperature	T_j	150	°C
Thermal resistance (system-air)	$R_{th\,SA}$	90	K/W

Operating range

Supply voltage range	V_S	6 to 18	V
Ambient temperature range	T_{amb}	−15 to 70	°C
Frequency range	f	0 to 12	MHz

1) The IC is not allowed to be plugged in or out when the supply voltage is switched on.

Characteristics (T_{amb} = 25 °C, V_S = 12 V; f_{IF} = 5.5 MHz or 10.7 MHz, respectively)

		min	typ	max	
Current consumption $R_5 = \infty$	I_S	10	14	18	mA
$R_5 = 0$	I_S	11	15.2	20	mA
IF voltage gain	G_V		68		dB
IF output voltage at limiting (each output)	$V_{q\,pp}$	170	250		mV
Output resistance (pin 8)	$R_{q\,8}$	1.9	2.6	3.3	kΩ
Bridging resistance	$R_{13\text{-}14}$			1	kΩ
AGC 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 attenuation	R_5		3.7	4.7	kΩ
− 70 dB attenuation	R_5	1.0	1.4		kΩ
Voltage					
− 1 dB attenuation	V_5		2.4		V
− 70 dB attenuation	V_5		1.3		V
Signal-to-noise ratio (V_i = 10 mV, $\Delta f = \pm 50$ kHz)	$a_{S/N}$	75	85		dB
Total harmonic distortion (V_i = 10 mV, $\Delta f = \pm 25$ kHz)	THD		1.3	2.5	%
Noise voltage (in accordance with DIN 45405)	V_n		80	140	µV
Output resistance	$R_{q\,7\text{-}9}$		5.4		kΩ

Characteristics for f_{IF} = 5.5 MHz (T_{amb} = 25 °C, V_S = 12 V, f_{IF} = 5.5 MHz, $\Delta f = \pm 50$ kHz, f_{mod} = 1 kHz, Q_B approx. 45)

AF output voltage (V_i = 10 mV)	$V_{AF\,rms}$	0.7	1		V
Input voltage for limiting	$V_{i\,lim}$		30	60	µV
AM suppression V_i = 500 µV, m = 30%	a_{AM}	45	55		dB
V_i = 10 mV, m = 30%	a_{AM}	60	68		dB
Input impedance	Z_i		40/4.5		kΩ/pF

Characteristics for 10.7 MHz (T_{amb} = 25 °C, V_S = 12, V, f_{IF} = 10.7 MHz, $\Delta f = \pm 75$ kHz, f_{mod} = 1 kHz, Q_B approx. 45)

AF output voltage (V_i = 10 mV)	$V_{AF\,rms}$	0.4	0.7		V
Input voltage for limiting	$V_{i\,lim}$		50	100	µV
AM suppression V_i = 500 µV, m = 30%	a_{AM}	40	50		dB
V_i = 10 mV, m = 30%	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 ($V_{CE} = 5$ V, $I_C = 1$ mA)	G_i	25	80		

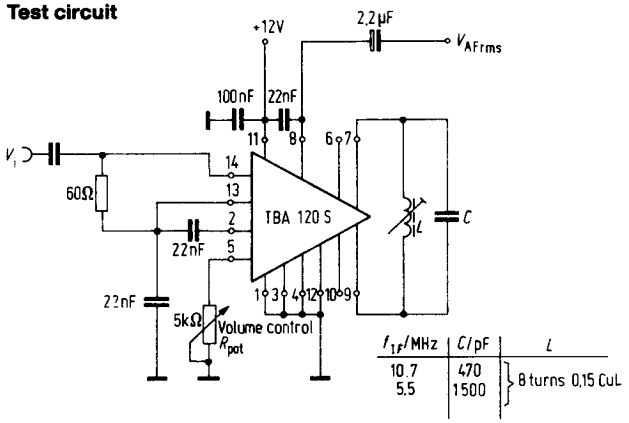
Pins 3 and 4 are connected to the collector or the base of a transistor, which may be used as an AF preamplifier ($I_C < 5$ mA) or as a bass/treble switch (dc on or off-switching of an *RC* circuit).

At pin 12, a Z diode (12 V) is accessible which can be used to stabilize the supply voltage of this IC or the voltage of other included circuit elements ($I_Z \leqq 15$ mA).

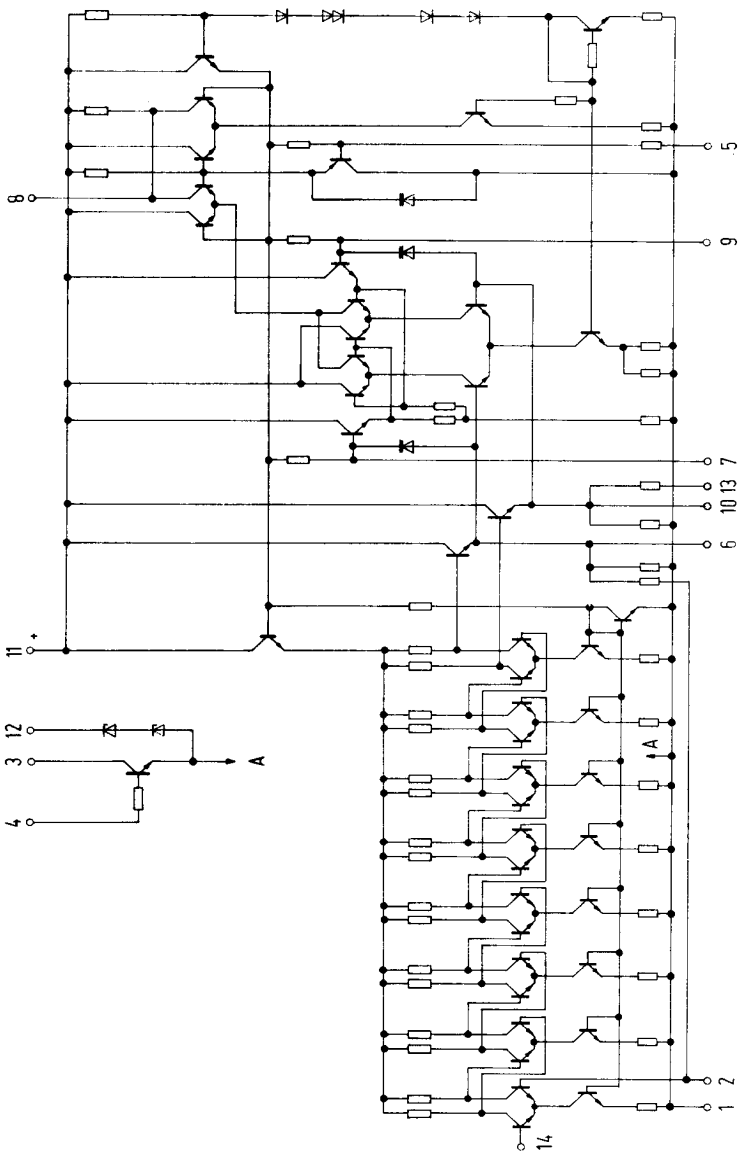
The IC TBA 120 S is manufactured in different groups according to the volume specifications. An attenuation of 30 dB requires a resistor to be switched to ground at pin 5 with a resistance value as allocated to the groups listed below. The group number is imprinted on the plastic package.

Group	II	III	IV	V
R_{pot}	1.9 to 2.2	2.1 to 2.5	2.4 to 2.9	2.8 to 3.3

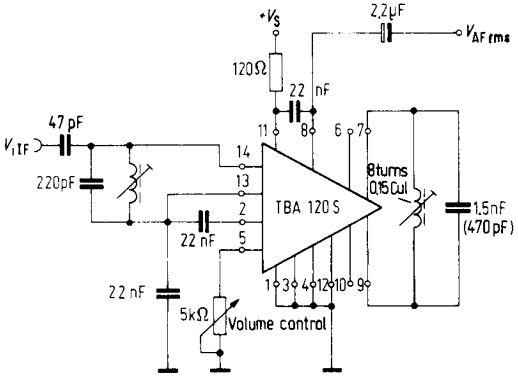
Test circuit



Circuit diagram



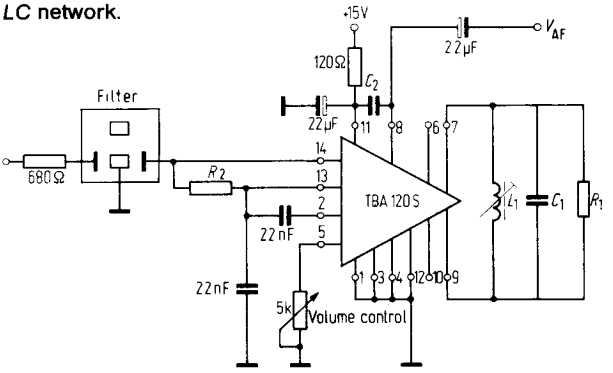
Application circuit 5.5 MHz (10.7 MHz)



Values in parentheses apply to 10.7 MHz

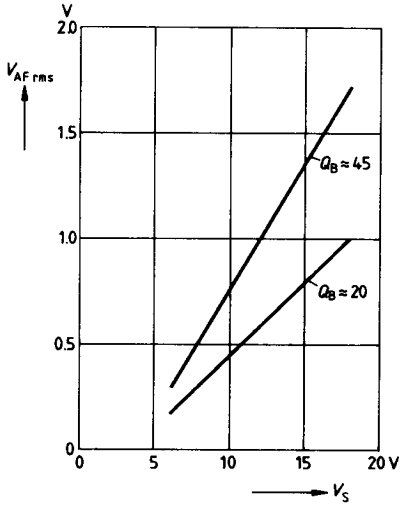
Application circuit with ceramic filter (Murata)

For good adjacent channel suppression the ceramic filter should be combined with an *LC* network.

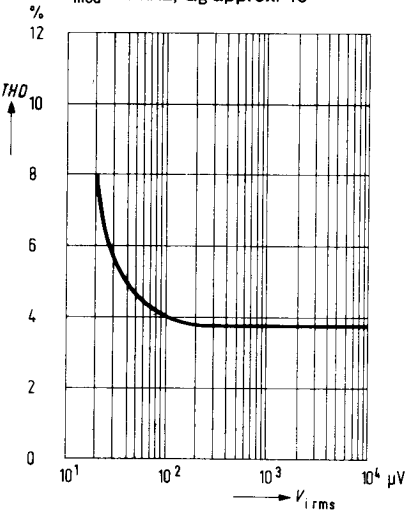


	Sound IF in TV sets	Sound IF in TV sets of American Std.	FM IF in radio mono sets	FM IF in RF stereo sets
C_1	1.5 nF	2.2 nF	470 pF	330 pF
C_2	22 nF	22 nF	22 nF	470 pF
L_1	8 turns, 0.15 CuL	8 turns, 0.15 CuL	8 turns, 0.15 CuL	12 turns, 0.15 CuL
R_1	∞	∞	∞	1 kΩ
R_2	680 Ω	1 kΩ	330 Ω	330 Ω
Filter (Murata)	SFE 5.5 MA	SFE 4.5 MA	SFE 10.7	SFE 10.7

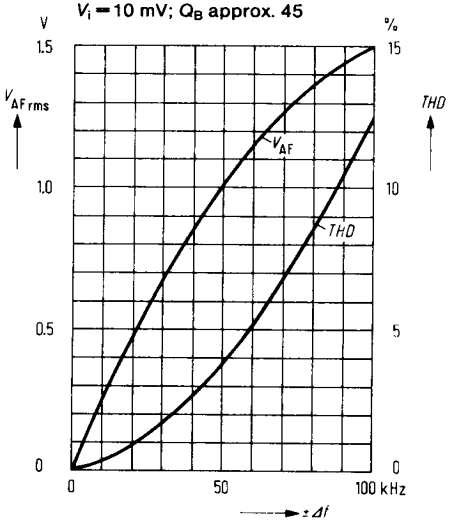
AF output voltage versus supply voltage
$f_Z = 5.5$ MHz; $\Delta f = \pm 50$ kHz,
$f_{mod} = 1$ kHz; $V_i = 10$ mV



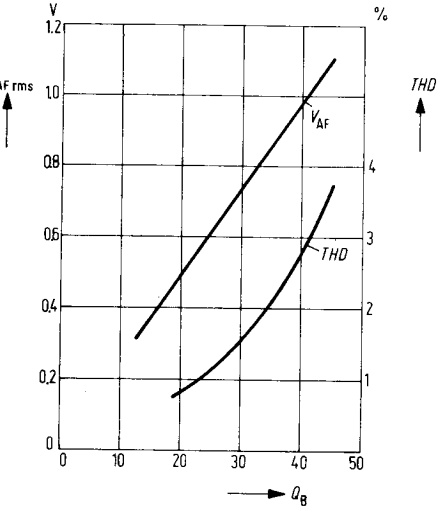
Total harmonic distortion versus input voltage
$V_S = 12$ V; $f_Z = 5.5$ MHz; $\Delta f = \pm 50$ kHz;
$f_{mod} = 1$ kHz; Q_B approx. 45



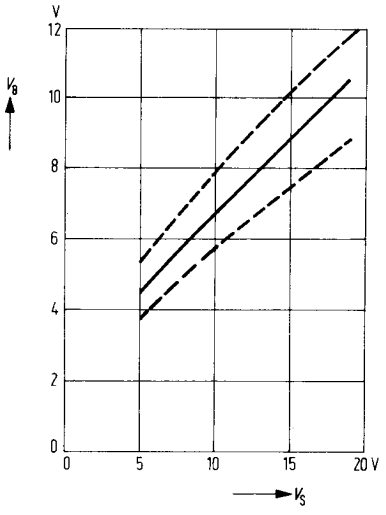
AF output voltage and total harmonic distortion v. frequency deviation
$V_S = 12$ V; $f_Z = 5.5$ MHz; $f_{mod} = 1$ kHz
$V_i = 10$ mV; Q_B approx. 45



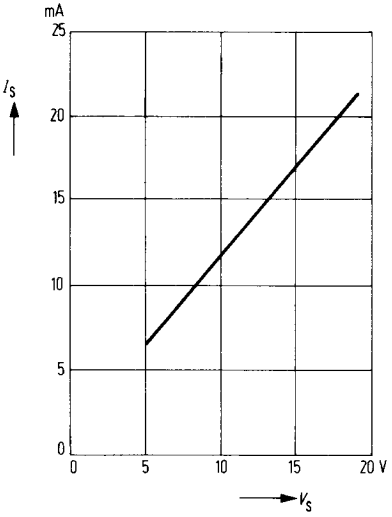
AF output voltage and total harmonic distortion versus Q_B factor
$V_S = 12$ V; $\Delta f = \pm 50$ kHz;
$f_{mod} = 1$ kHz; $V_i = 10$ mV



DC output voltage versus supply voltage

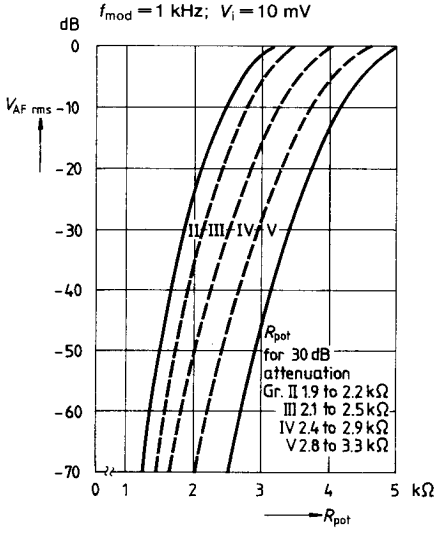


Current consumption versus supply voltage



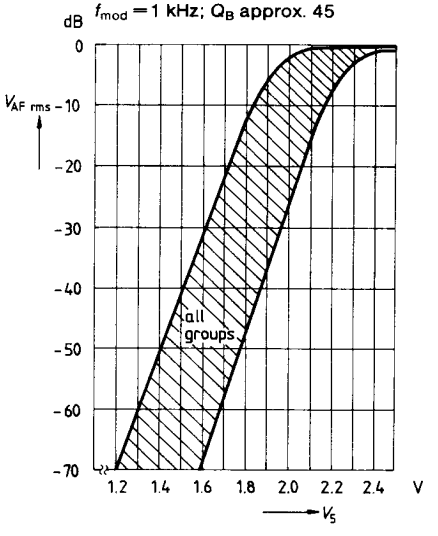
Volume control versus potentiometer resistance

$V_S = 12$ V; $f_Z = 5.5$ MHz; $\Delta f = \pm 50$ kHz
$f_{mod} = 1$ kHz; $V_i = 10$ mV

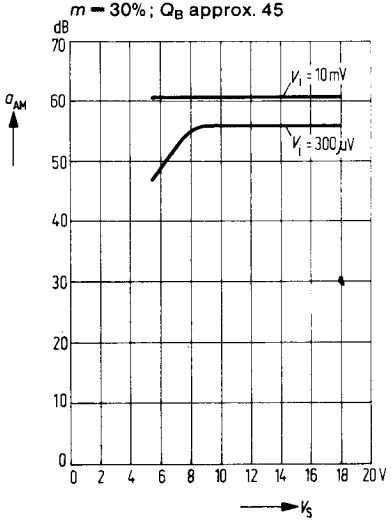


Volume control versus voltage to pin 5

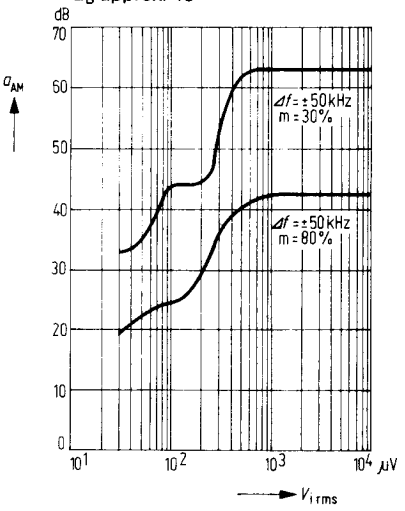
$V_S = 12$ V; $f_Z = 5.5$ MHz; $\Delta f = \pm 50$ kHz
$f_{mod} = 1$ kHz; Q_B approx. 45



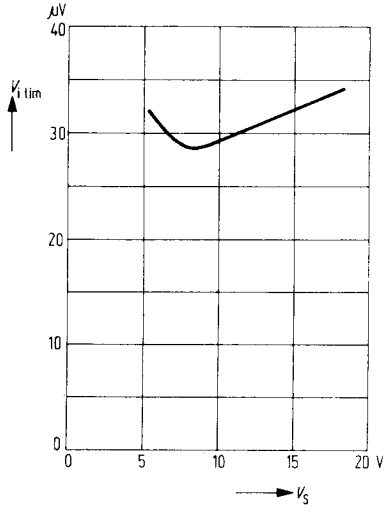
AM suppression versus supply voltage
f_Z = 5.5 MHz; Δf = ± 50 kHz; f_{mod} = 1 kHz
m = 30%; Q_B approx. 45



AM suppression versus input voltage
V_S = 12 V; f_Z = 5.5 MHz; f_{mod} = 1 kHz
Q_B approx. 45



Input voltage for limiting versus supply voltage
f_Z = 5.5 MHz; Δf = ± 50 kHz;
f_{mod} = 1 kHz; Q_B approx. 45



AF output voltage versus input voltage
V_S = 12 V; f_{mod} = 1 kHz; Q_B approx. 45