

FM IF Amplifier with Demodulator

TBA 120

Bipolar IC

Features

- Outstanding limiting qualities
- Few external components
- Terminal for video recorder
- AF output voltage independent of supply voltage
- Insensitive to hum
- Very little residual IF

Type	Ordering Code	Package
TBA 120 T	Q67000-A919	P-DIP-14
TBA 120 UB	Q67000-A920	P-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 units in TV sets. In addition to the controlled AF output, an uncontrolled AF output and an AF input for the connection of video recorders is available.

TBA 120 T: Input and demodulator matched to ceramic resonators

TBA 120 UB: Input and demodulator matched to LC networks.

Absolute Maximum Ratings

Parameter	Symbol	Limit Values	Unit
Supply voltage	V_S	18	V
Voltage	V_S	6	V
Current	I_A	5	mA
Junction temperature	T_j	150	°C
Storage temperature range	T_{stg}	- 40 to 125	°C
Thermal resistance (system-air)	$R_{th SA}$	90	K/W

Operating Range

Supply voltage	V_S	10 to 18	V
Ambient temperature	T_A	- 15 to 70	°C
Frequency	f	0 to 12	MHz

Characteristics

$V_S = 12 \text{ V}$; $T_A = 25 \text{ }^\circ\text{C}$, Q_B approx. 45, $f_{IF} = 5.5 \text{ MHz}$

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	
Current consumption	I_S	9.5	13.5	17.5	mA
IF voltage gain V_6 / V_{14}	G_V		68		dB
IF output voltage with limiting at each output	$V_{O\text{pp } 6-10}$	175	250	325	mV
Output resistance	R_{O8}, R_{O12}	0.8	1.1	1.4	k Ω
Input resistance	R_{I3}	1.4	2.0	2.6	k Ω
Internal resistance	R_{I4}		12	16	Ω
DC level of output signal	V_8	3.4	4.0	4.7	V
$V_I = 0$	V_{12}	4.4	4.9	6.3	V
Stabilized voltage	V_4	4.2	4.8	5.3	V
Residual IF voltage without deemphasis	V_8 V_{12}		20 30		mV mV
AF gain (AF not attenuated)	V_8 / V_3	6	7.5	8.5	
Attenuation $R_{4-5} = 5 \text{ k}\Omega$; $R_{5-1} = 13 \text{ k}\Omega$	V_{AF8}	20	30	40	dB
Range of volume control	$V_{AF8 \text{ max}}$ $V_{AF8 \text{ min}}$	70	85		dB
Resistance	$R_{4-5}^1)$	1		10	k Ω
Input voltage for limiting $\Delta f = \pm 50 \text{ kHz}$; $f_{\text{mod}} = 1 \text{ kHz}$	$V_{I \text{ lim}}$		30	60	μV
Hum suppression	V_S / V_{11} V_{12} / V_{11}		35 30		dB dB
Signal-to-noise ratio ($V_I = 10 \text{ mV}$)	α_{SN}	80	85		dB
Noise voltage (in acc. with DIN 45405)	V_n			70	μV
Input impedance	R_{O7-9}		5.4		k Ω

1) If DC volume control is not used, pin 4 has to be connected directly to pin 5.

Characteristics

$V_S = 12\text{ V}$; $T_A = 25\text{ }^\circ\text{C}$, Q_B approx. 45, $f_{IF} = 5.5\text{ MHz}$

Parameter	Symbol	Limit Values			Unit
		min.	typ.	max.	

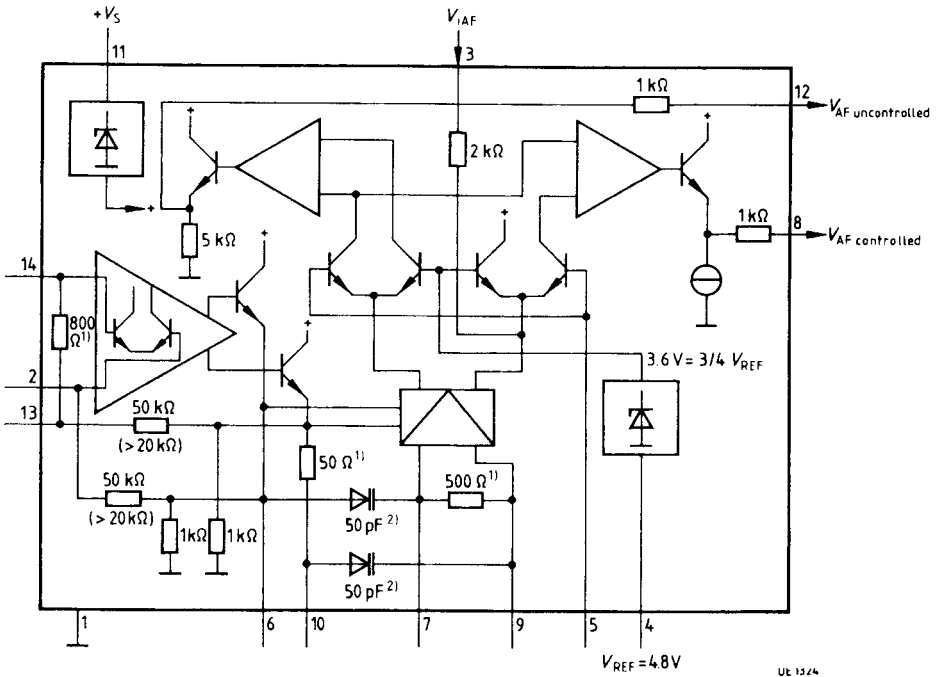
TBA 120 T only:

AF output voltage	$V_{8\text{ rms}}$	650	900	1100	mV
$\Delta f = \pm 50\text{ kHz}$; $f_{\text{mod}} = 1\text{ kHz}$	$V_{12\text{ rms}}$	400	650	1000	mV
Input impedance	Z_I		800/5		Ω/pF
AM suppression $V_I = 500\text{ }\mu\text{V}$; $\Delta f = \pm 50\text{ kHz}$; $m = 30\%$; $f_{\text{mod}} = 1\text{ kHz}$	a_{AM}	50	60		dB
Bridging resistance	R_{13-14}			1	$\text{k}\Omega$

TBA 120 UB only:

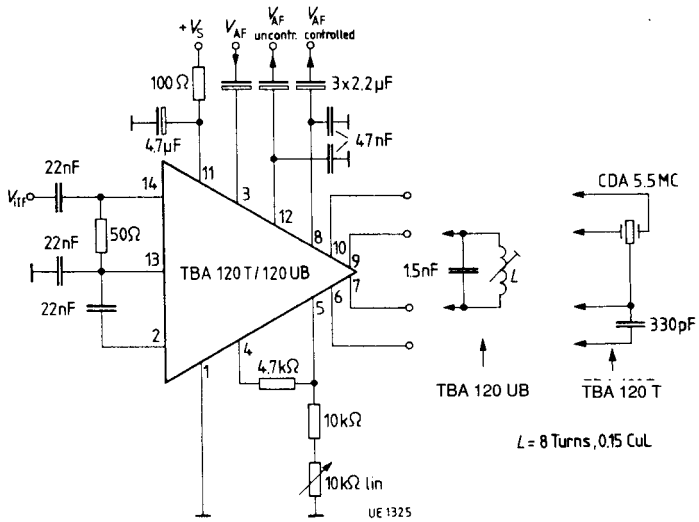
AF output voltage	$V_{8\text{ rms}}$	850	1200	1700	mV
$\Delta f = \pm 50\text{ kHz}$; $V_I = 10\text{ mV}$; $f_{\text{mod}} = 1\text{ kHz}$; $\text{THD} = 4\%$	$V_{12\text{ rms}}$	600	1000	1600	mV
Input impedance ($f_I = 5.5\text{ MHz}$)	Z_I	15/6	40/4.5		$\text{k}\Omega/\text{pF}$
AM suppression $\Delta f = \pm 50\text{ kHz}$; $V_I = 500\text{ }\mu\text{V}$; $f_{\text{mod}} = 1\text{ kHz}$; $m = 30\%$	a_{AM}	50	60		dB
Total harmonic distortion $\Delta f = \pm 25\text{ kHz}$; $V_I = 10\text{ mV}$; $f_{\text{mod}} = 1\text{ kHz}$	THD		1.3	2.5	%
Noise Voltage (in acc. with DIN 45405)	V_n			50	μV

Block Diagram

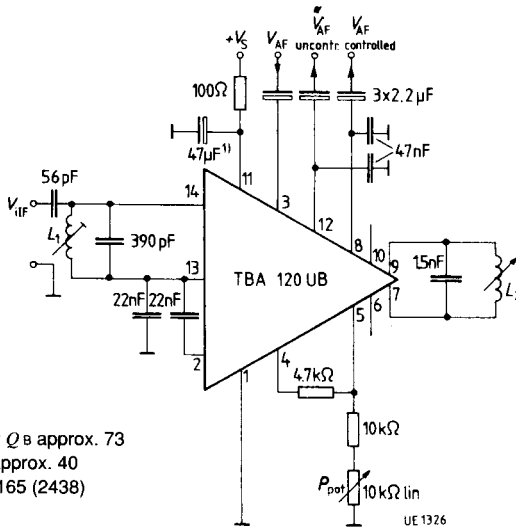


- 1) only TBA 120 T
- 2) only TBA 120 UB

Test Circuit (5.5 MHz)



Application Circuit TBA 120 UB for 5.5 MHz



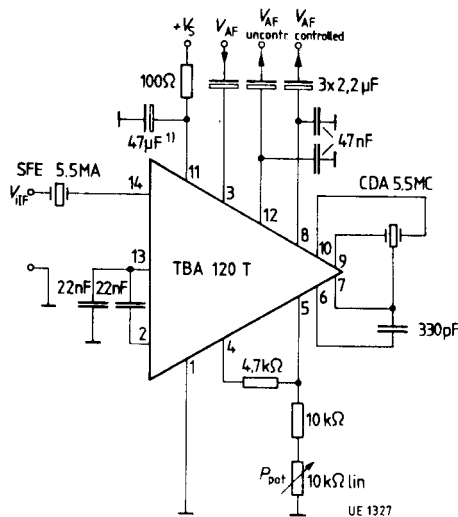
L_1 : 20 turns 15×0.05 CuLs; Q в approx. 73

L_2 : 9 turns 0.25 CuLs; Q в approx. 40

Coil assembly Vogt D41 – 2165 (2438)

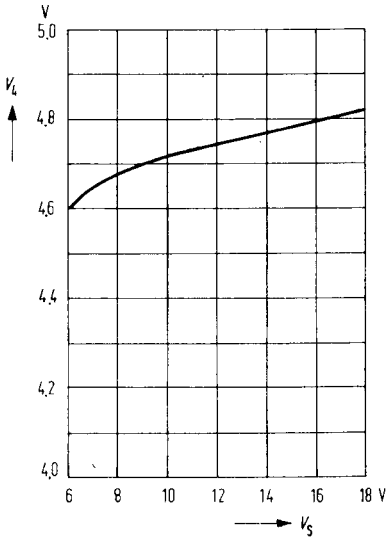
without cup core

Application Circuit TBA 120 T for 5.5 MHz

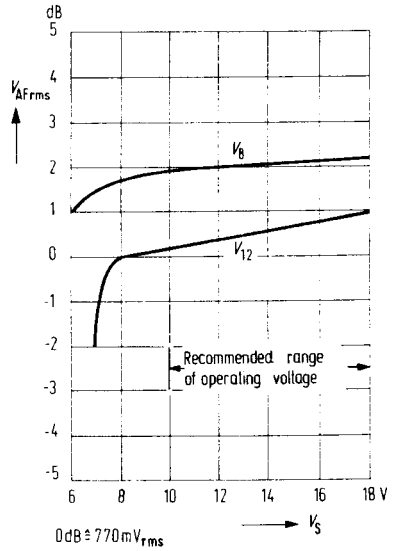


1) Omitting the electrolytic capacitor 47 μF at pin 11 changes the volume-control range.

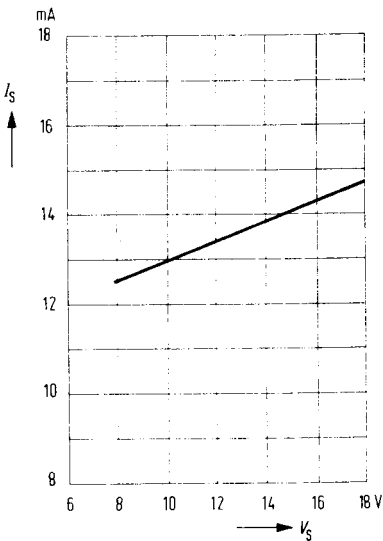
Z voltage versus supply voltage



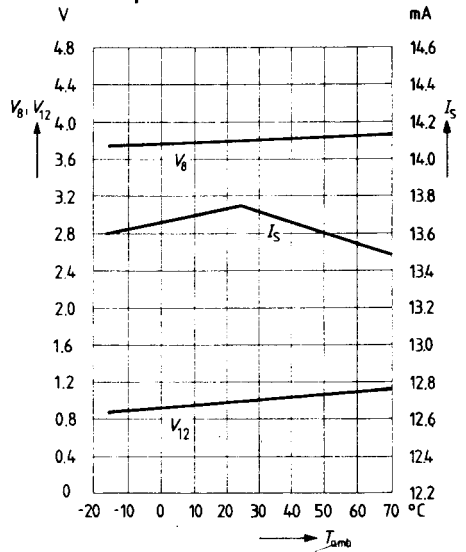
AF output voltage versus supply voltage



Current consumption versus supply voltage

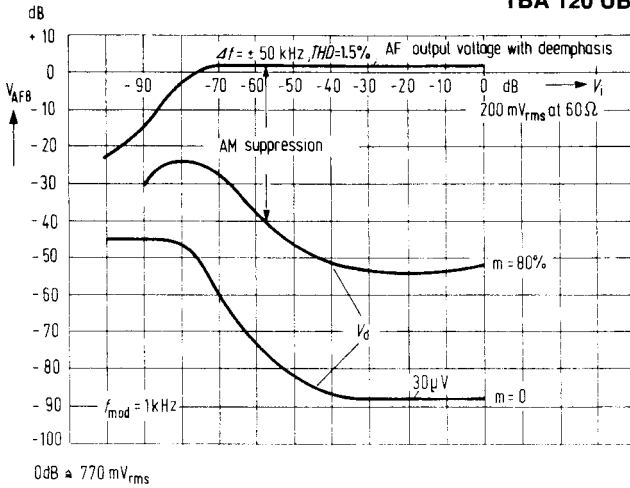


AF output voltage and current consumption versus ambient temperature



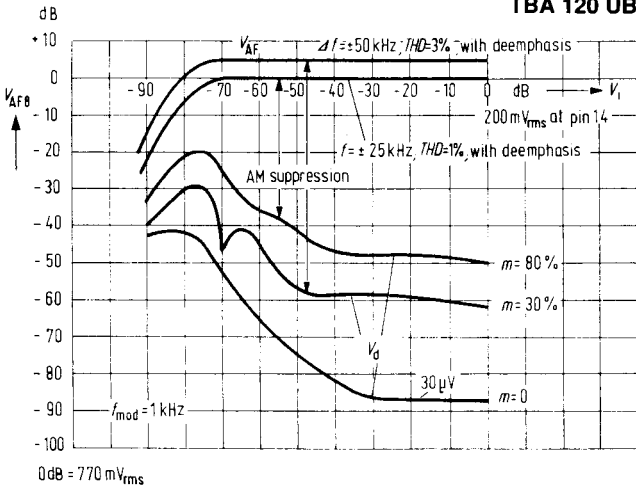
AF output voltage and disturbance voltage versus input voltage
(Input wired with SFE 5.5 MA/Murata)

TBA 120 UB

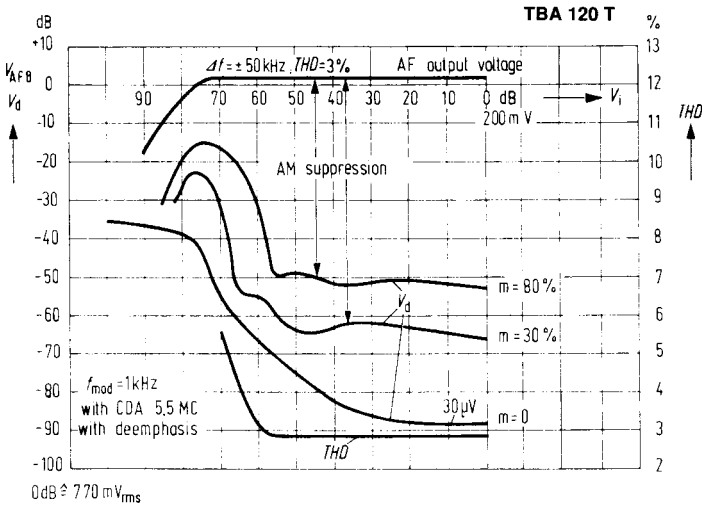


AF output voltage and disturbance voltage versus input voltage
(Input 60 Ω impedance broadband)

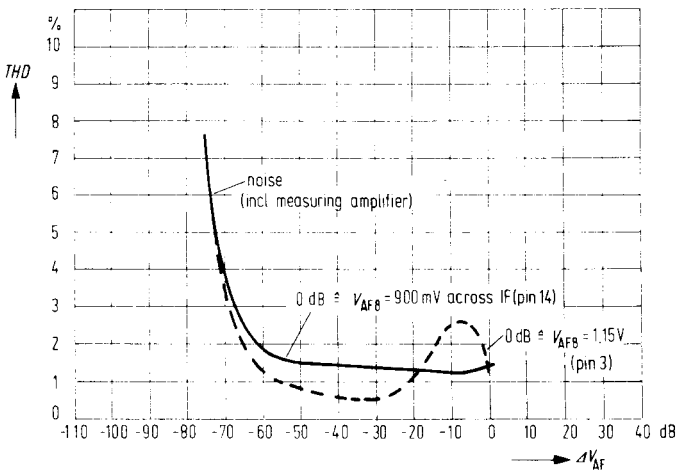
TBA 120 UB



AF output voltage (pin 8) disturbance voltage, and total harmonic distortion versus input voltage



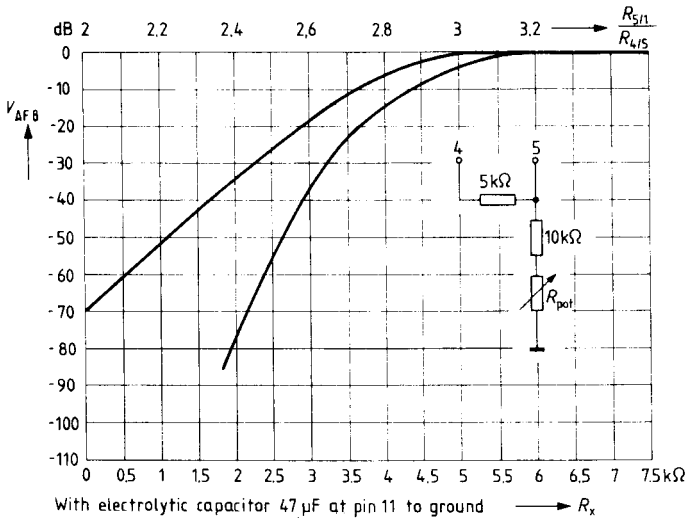
Total harmonic distortion versus volume control



Spread

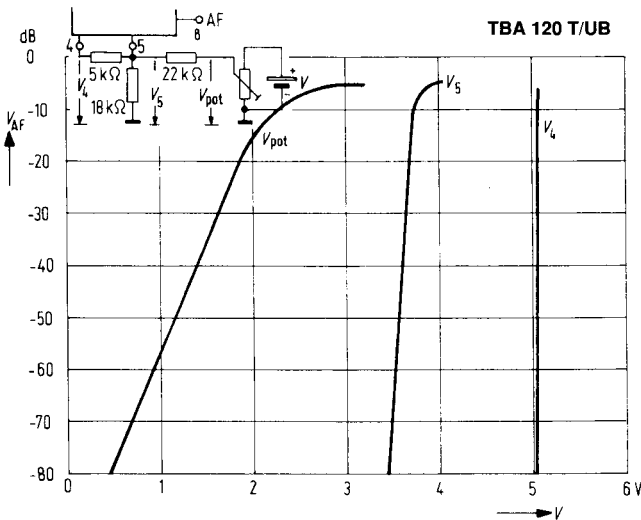
AF output voltage (pin 8) versus potentiometer resistance and versus ratio of resistance

TBA 120 T/UB

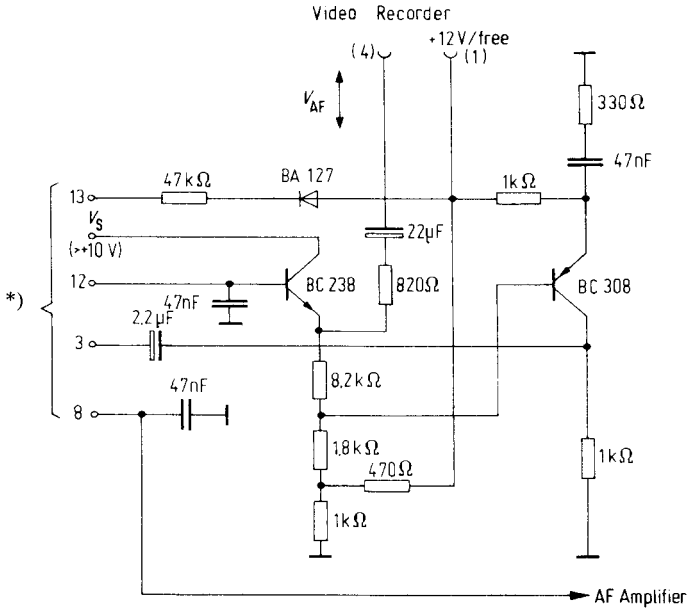


AF output voltage (pin 8) versus voltage fed into pin 5

TBA 120 T/UB



Circuit for Direct Connection to Video Recorders



*) to TBA 120 T/UB

Socket (1): Switching voltage: at playback +12 V
at recording: free

Socket (4): Simultaneous input and output for AF

Function

When the switching voltage is applied, the emitter follower BC 238 is blocked at the output, and the buffer stage BC 308 is switched on. A preemphasis is included to balance the deemphasis at the AF output. The IF amplifier becomes inoperable by means of the diode BA 127 and the 47 kΩ resistor. The remote-controlled volume regulator in the TBA 120 is used for recording and playback.