SOUND I.F. AMPLIFIER/DEMODULATOR FOR TV

The TBA120U is an i.f. amplifier with a symmetrical FM demodulator and an a.f. amplifier with adjustable output voltage. The a.f. amplifier is also provided with an output for volume control and an input for VCR operation.

The input and output of the TBA120U are especially designed for LC-circuits, but the input can also be used with a ceramic filter.

QUICK REFERENCE DATA

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage (pin 11)</td>
<td>V_p</td>
<td>typ.</td>
<td>12 V</td>
</tr>
<tr>
<td>Supply current</td>
<td>I_p</td>
<td>typ.</td>
<td>13.5 mA</td>
</tr>
<tr>
<td>I.F. voltage gain at f = 5.5 MHz</td>
<td>G_v_if</td>
<td>typ.</td>
<td>68 dB</td>
</tr>
<tr>
<td>Input voltage starting limiting</td>
<td>V_i</td>
<td>typ.</td>
<td>30 μV</td>
</tr>
<tr>
<td>AM suppression at Δf = ± 50 kHz</td>
<td>α</td>
<td>typ.</td>
<td>60 dB</td>
</tr>
<tr>
<td>A.F. output voltage adjustment range (pin 8)</td>
<td>ΔV_o_af</td>
<td>typ.</td>
<td>85 dB</td>
</tr>
<tr>
<td>A.F. output voltage at Δf = ± 50 kHz (r.m.s. value) at pin 8</td>
<td>V_o_af(rms)</td>
<td>typ.</td>
<td>1.2 V</td>
</tr>
<tr>
<td>at pin 12</td>
<td>V_o_af(rms)</td>
<td>typ.</td>
<td>1.0 V</td>
</tr>
</tbody>
</table>

Fig. 1 Block diagram.

PACKAGE OUTLINE

14-lead DIL; plastic (SOT27).
RATINGS
Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage (pin 11) \( V_P = V_{11-1} \) max. 18 V*
Adjustment voltage (pin 5) \( V_{5-1} \) max. 6 V
Total power dissipation \( P_{tot} \) max. 400 mW
By-pass resistance \( R_{13-14} \) max. 1 kΩ
Storage temperature range \( T_{stg} \) -40 to +125 °C
Operating ambient temperature range \( T_{amb} \) 0 to +70 °C

CHARACTERISTICS

\( V_P = 12 \text{ V}; \ T_{amb} = 25 \text{ °C}; \ f = 5,5 \text{ MHz} \)

I.F. voltage gain
Input voltage starting limiting
at \( \Delta f = \pm 50 \text{ kHz}; \ f_m = 1 \text{ kHz} \)
\( G_{v \text{ if 6-14}} \) typ. 68 dB
\( V_i \) typ. 30 \( \mu \text{V} \)
\( V_i \) typ. < 60 \( \mu \text{V} \)

I.F. output voltage at limiting
(peak-to-peak value)
\( V_o \text{ if (p-p)} \) typ. 250 mV
\( \alpha \) typ. > 50 dB
\( \alpha \) typ. 60 dB

I.F. residual voltage without de-emphasis
at pin 12
\( V_{if \text{ 12}} \) typ. 30 mV
at pin 8
\( V_{if \text{ 8}} \) typ. 20 mV

A.F. voltage gain
A.F. adjustment
at \( R_{4.5} = 5 \text{ kΩ}; \ R_{5-1} = 13 \text{ kΩ} \)
\( G_{v \text{ af 8-3}} \) typ. 7,5
\( \Delta V_{o \text{ af}} \) typ. 20 to 36 dB
\( \Delta V_{o \text{ af}} \) typ. 28 dB

A.F. output voltage control range

Adjustment resistor**
D.C. voltage portion at the a.f. outputs
pin 12
\( V_{12-1} \) typ. 5,6 V
pin 8
\( V_{8-1} \) typ. 4,0 V

Output resistance of the a.f. outputs
pin 12
\( R_{o \text{ 12-1}} \) typ. 1,1 kΩ
pin 8
\( R_{o \text{ 8-1}} \) typ. 1,1 kΩ

Input resistance of the a.f. input
\( R_{i \text{ 3-1}} \) typ. 2 kΩ

Stabilized reference voltage
\( V_{4-1} = V_{ref} \) typ. 4,2 to 5,3 V

Source resistance of reference voltage source
\( R_{4-1} \) typ. 12 Ω

* Supply voltage operating range is 10 to 18 V.
** Pin 5 must be connected to pin 4, when volume control adjustment is not applicable.
Hum suppression
at pin 12
at pin 8

Supply current (pin 11)

I.F. input impedance

A.F. output voltage at $\Delta f = \pm 50$ kHz; $f_m = 1$ kHz;
$V_i = 10$ mV; $Q_o = 45$; r.m.s. value
at pin 12
at pin 8

Distortion at $\Delta f = \pm 50$ kHz; $f_m = 1$ kHz;
$V_i = 10$ mV; $Q_o = 20$

$V_{12/V11}$ typ. 30 dB
$V_{8/V11}$ typ. 35 dB
$|I_p| = I_{11}$ typ. 9.5 to 17.5 mA
$|Z_i| > 15$ k$\Omega$ / 4.5 pF

$V_{o \text{ af (rms)}}$ typ. 1.0 V
$V_{o \text{ af (rms)}}$ typ. 1.2 V

$d_{\text{tot}}$ typ. 1 %

Fig. 2 Application example using TBA120U.
Fig. 3 The a.f. output voltage at pin 8 as a function of the resistance values as shown in Fig. 4.

Fig. 4 Resistor conditions for curves in Fig. 3.

(1) $V_{o}\text{ af}$ with de-emphasis at $\Delta f = \pm 50$ kHz; $f_m = 1$ kHz; $d_{tot} = 1.5\%$; $0\text{ dB} \pm 770$ mV.
(2) $V_i: 0\text{ dB} \pm 200$ mV at 60 $\Omega$.

Fig. 5 The a.f. output voltage at pin 8 as a function of the input voltage with SFC 5.5 MA at the input (see Fig. 2).

Fig. 6 The a.f. output voltage at pin 8 as a function of the input voltage with broadband input (60 $\Omega$).
Fig. 7 The a.f. output voltages at pins 8 and 1 as a function of the supply voltage; 0 dB = 770 mV.

Fig. 8 Total distortion as a function of the a.f. output voltage change.
- --- 0 dB = 900 mV over i.f. (pin 8)
- --- 0 dB = 1,15 V (pin 8)

Fig. 9 Supply current and the reference voltage at pin 4 as a function of supply voltage.