INFORMAZIONI TECNICHE PHILIPS

Sezione ELCOMA - Rep. Microelettronica

LA PRESENTE ANNULLA E SOSTITUISCE LA N. 273

299

CIRCUITI INTEGRATI LINEARI

PHILIPS S.p.A. - Sez. ELCOMA - Piazza IV Novembre, 3 - MILANO - Tel. 69.94

Philips S.p.A. Sezione ELCOMA - Ufficio Documentazioni Tecniche

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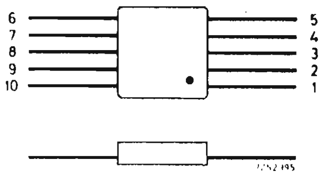
Stampata nel **"Centro Stampa"** della Fabbrica Valvole Philips - Monza

Silicon monolithic integrated circuits

* Dati tecnici aggiornati

** Tipi nuovi

OPERATIONAL AMPLIFIER

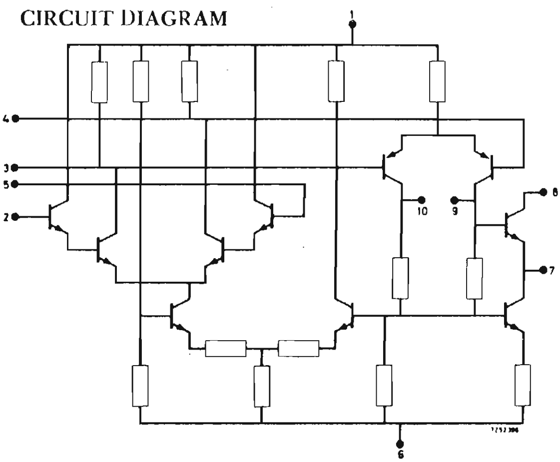


The TAA182 is a silicon monolithic integrated differential amplifier designed to be used as an operational amplifier in analog instrumentation and control systems. It has both single-ended and differential outputs, greatly increasing its application flexibility. The use of both n-p-n and true (vertical) p-n-p transistors contributes to improved performance. With proper use of feedback this amplifier makes an excellent transducer amplifier, preamplifier, voltage comparator, bandpass or buffer amplifier.

Operating ambient temperature range: −55 to +125 ^{o}C
(With heatsink of at least 6 cm^2)

QUICK REFERENCE DATA			
Ambient temperature		25	^{o}C
Positive supply voltage		10	V
Negative supply voltage		10	V
Voltage gain	typ.	1100	
Common mode rejection	typ.	80	dB
Input offset voltage	typ.	10	mV
Input offset voltage drift	typ.	5	μV/^{o}C
Frequency response (−3 dB)	typ.	500	kHz
Input impedance	typ.	300	kΩ
Output impedance	typ.	40	Ω
Output voltage range (peak-peak)	typ.	10	V
Package		CI (TO-91 flat-pack)	

CIRCUIT DIAGRAM



1. Positive supply
2. Inverting input
3. Node
4. Node
5. Non-inverting input
6. Negative supply
7. Single-ended output
8. Positive supply
9. Differential output
10. Differential output

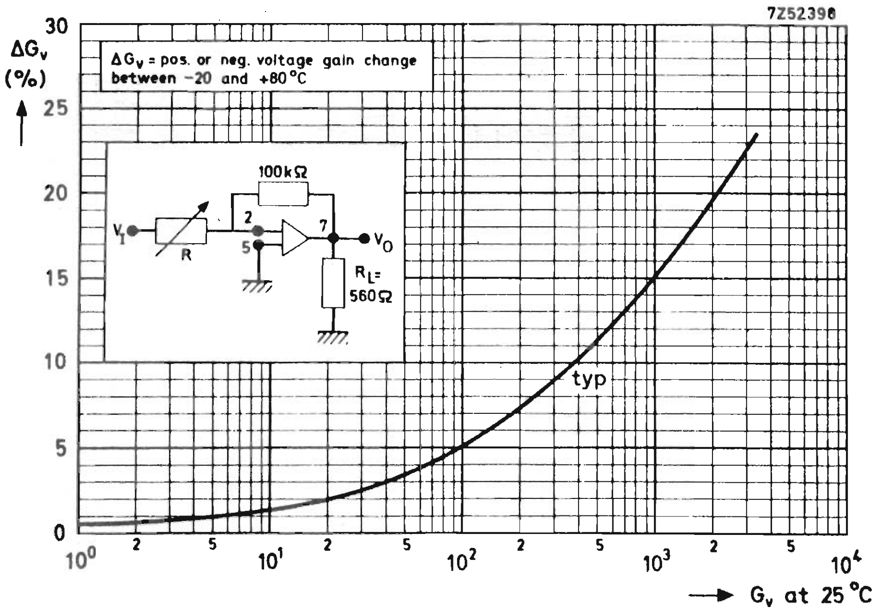
7Z3 1628

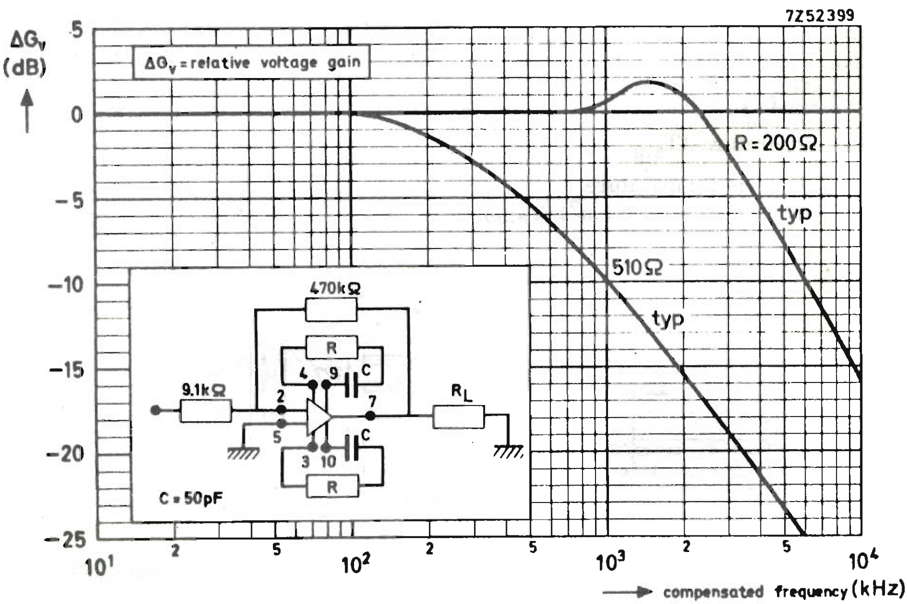
CHARACTERISTICS

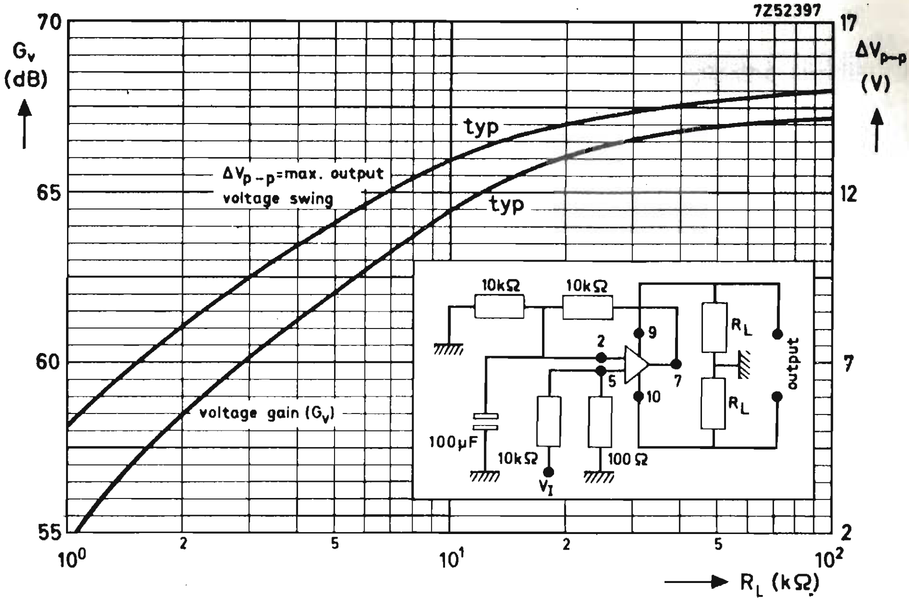
No load, open loop, no frequency compensation unless otherwise specified.
$V_1 = V_8 = 10$ V; $-V_6 = 10$ V.

		Tamb (°C) -55	+25	+125	
Voltage gain $\left\lvert \frac{\Delta V_7}{\Delta(V_5 - V_2)} \right\rvert$, 0 to 1000 Hz	min.		800		
	typ.		1100		
	max.		3000		
Input offset voltage	typ.	10.4	10.0	9.5	mV
	max.		20.0		mV
Input offset voltage change with temperature	typ.	5	5	5	μV/°C
	max.		10		μV/°C
Input bias current	typ.		120		nA
	max.		800		nA
Input offset current	typ.		60		nA
	max.		250		nA
Input offset current change with temperature	typ.		1.0		nA/°C
Common mode rejection ratio, referred to output 7, at 1000 Hz and load 560 Ω	min.		75		dB
	typ.		80		dB
	max.		86		dB
10 kHz and load 560 Ω	typ.		60		dB
100 kHz and load 560 Ω	typ.		40		dB
1 MHz and load 560 Ω	typ.		20		dB
Frequency response (-3 dB)	min.		0 to 250		kHz
	typ.		0 to 500		kHz
	max.		0 to 600		kHz
Unity gain frequency	min.		20		MHz
	typ.		30		MHz
Quiescent input voltage (V_2; V_5)	typ.	0	0	0	mV
Quiescent output voltage (V_7)	typ.	0	0	0	V
Input common mode voltage range	min.		-4.9 to +4.9		V
Max. output voltage (peak-peak) at pin 7, load 560 Ω	min.		7		V
	typ.		10		V
load 2000 Ω	typ.		11		V
Differential input impedance	min.		100		kΩ
	typ.		300		kΩ
Output impedance at pin 7	typ.		40		Ω
	max.		90		Ω
Power dissipation	typ.		420		mW

7Z3 1629


7Z52398
ΔGv (%)
ΔGv = pos. or neg. voltage gain change between −20 and +80 °C
100 kΩ
Vi
R
2
5
7
Vo
RL= 560 Ω
typ
30
25
20
15
10
5
0
10^0
2
5
10^1
10^2
10^3
10^4
Gv at 25 °C


7Z52399
ΔGv (dB)
ΔGv = relative voltage gain
R = 200 Ω
typ
510 Ω
typ
470 kΩ
R
4
9
C
9.1 kΩ
2
7
RL
5
3
10
C
R
C = 50pF
5
0
−5
−10
−15
−20
−25
10^1
2
5
10^2
10^3
10^4
compensated frequency (kHz)

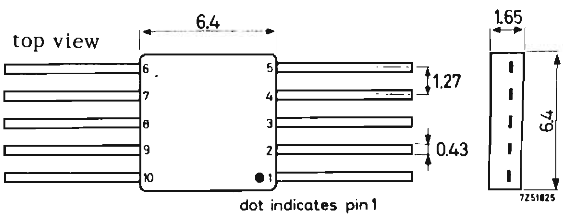


RATINGS (Limiting values) [1])

Positive supply voltage (V_1 = V_8)	max.	12.0	V
Negative supply voltage ($-V_6$)	max.	12.0	V
Input voltage (V_2, V_5)		-6.25 to +6.25	V
Storage temperature (T_{stg})		-65 to +175	°C
Operating ambient temperature (with heatsink of at least 6 cm^2) (T_{amb})		-55 to +125	°C

PACKAGE OUTLINE

Dimensions in mm



1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1630

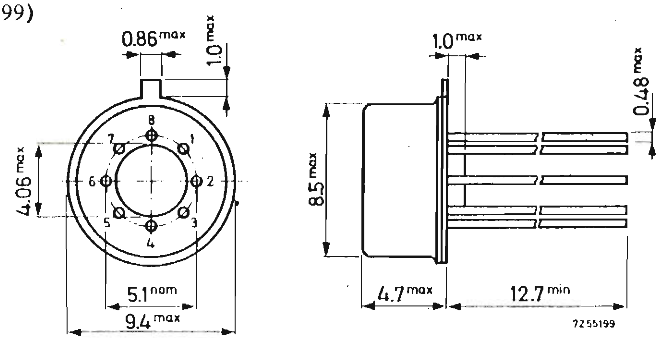
OPERATIONAL AMPLIFIER

The TAA241 is a silicon monolithic integrated d.c. amplifier in a TO-99 metal envelope for applications in the temperature range from 0 to 70 °C.

QUICK REFERENCE DATA				
Positive supply voltage	V_P		12	V
Negative supply voltage	$-V_N$		6	V
Characteristics at T_{amb} = 25 °C				
Voltage gain	G_V	typ.	3400	
Common mode rejection ratio	CMRR	typ.	92	dB
Input offset voltage drift	$\frac{\Delta V_{io}}{\Delta T}$	typ.	5	µV/°C
Differential input resistance	R_i	typ.	32	kΩ
Output resistance	R_o	typ.	200	Ω
Power dissipation	P_{tot}	typ.	90	mW

PACKAGE OUTLINE — Dimensions in mm

XA8 (TO-99)



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

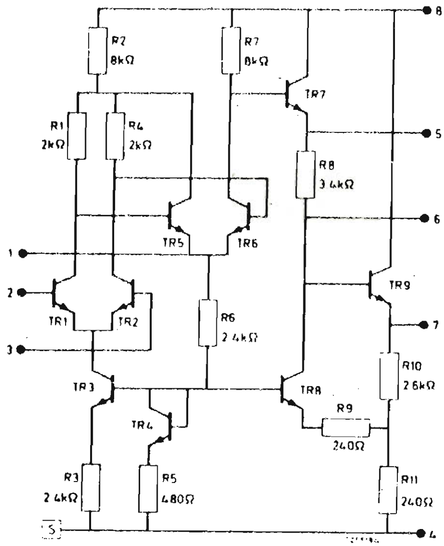
Voltages

Total supply voltage	V_{8-4}	max.	21	V
Common mode voltage	V_i		−6 to +1.5	V
Differential mode voltage	V_{2-3}	max.	±5	V
Output current (peak value)	I_{OM}	max.	50	mA
Power dissipation up to T_{amb} = 70 °C	P_{tot}	max.	300	mW

Temperatures

Operating ambient temperature	T_{amb}	0 to +70	°C
Storage temperature	T_{stg}	−65 to +150	°C

CIRCUIT DIAGRAM



1. Ground
2. Inverting input
3. Non-inverting input
4. Negative supply
5. Lead frequency compensation
6. Lag frequency compensation
7. Output
8. Positive supply

CHARACTERISTICS at $V_P = 12$ V; $-V_N = 6$ V; $T_{amb} = 25$ °C

Voltage gain; $R_L \geq 100$ kΩ; $V_o = \pm 5$ V	G_v		2000 to 6000	
		typ.	3400	
Input offset voltage; $R_S \leq 2$ kΩ	V_{io}	typ.	1.5	mV
		<	5	mV
Input bias current	I_i	typ.	2.5	µA
		<	7.5	µA
Input offset current	I_{io}	typ.	0.5	µA
		<	2	µA
Common mode rejection ratio at $f \leq 1$ kHz; $R_S \leq 2$ kΩ	CMRR	>	70	dB
		typ.	92	dB
Input voltage range	V_i		−4 to +0.5	V
Supply current at $V_o = 0$	I_{tot}	typ.	5	mA
		<	6.7	mA
Differential input resistance	R_i	>	10	kΩ
		typ.	32	kΩ
Output resistance	R_o	typ.	200	Ω
		<	600	Ω
Power dissipation at $V_o = 0$	P_{tot}	typ.	90	mW
		<	120	mW

CHARACTERISTICS at $V_P = 12$ V; $-V_N = 6$ V; $T_{amb} = 0$ to +70 °C unless otherwise specified

Voltage gain; $R_L \geq 100$ kΩ; $V_o = \pm 5$ V	G_v		1500 to 7000	
Input offset voltage; $R_S \leq 2$ kΩ	V_{io}	<	6.5	mV
Average input offset voltage drift; $R_S = 50$ Ω	$\frac{\Delta V_{io}}{\Delta T}$	typ.	5	µV/°C
		<	20	µV/°C
Input bias current at $T_{amb} = 0$ °C	I_i	typ.	4	µA
		<	12	µA
Input offset current	I_{io}	<	2.5	µA
Average input offset current drift at				
$T_{amb} = 0$ to +25 °C	$\frac{\Delta I_{io}}{\Delta T}$	typ.	6	nA/°C
		<	20	nA/°C
$T_{amb} = +25$ to +70 °C	$\frac{\Delta I_{io}}{\Delta T}$	typ.	4	nA/°C
		<	10	nA/°C
Common mode rejection ratio at $f \leq 1$ kHz; $R_S \leq 2$ kΩ	CMRR	>	65	dB
		typ.	86	dB

CHARACTERISTICS (continued)

Supply voltage rejection ratio $V_8 = +12$ to $+6$ V; $V_4 = -6$ to -3 V; $R_S \leq 2$ kΩ	SVRR	typ. <	90 300	µV/V µV/V
Peak output voltage swing at $R_L \geq 100$ kΩ	V_{OM}	> typ.	±5 ±5.3	V V
$R_L \geq 10$ kΩ	V_{OM}	> typ.	±3.5 ±4	V V
Supply current at $V_o = 0$	I_{tot}	typ. <	5 7	mA mA
Power dissipation at $V_o = 0$	P_{tot}	typ. <	90 125	mW mW

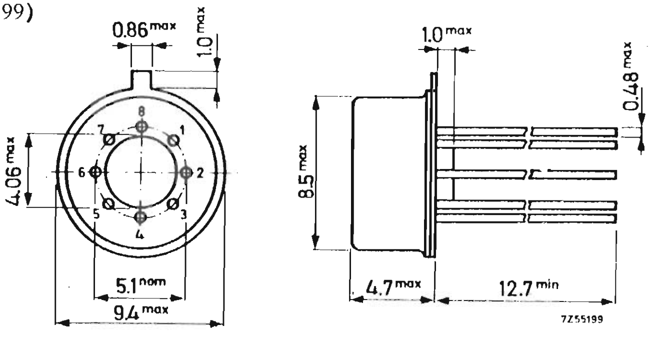
OPERATIONAL AMPLIFIER

The TAA242 is a silicon monolithic integrated d.c. amplifier in a TO-99 metal envelope for applications in the temperature range from −55 to +125 °C.

QUICK REFERENCE DATA				
Positive supply voltage	V_P		12	V
Negative supply voltage	$-V_N$		6	V
Characteristics at T_{amb} = 25 °C				
Voltage gain	G_v	typ.	3600	
Common mode rejection ratio	CMRR	typ.	100	dB
Input offset voltage drift	$\frac{\Delta V_{io}}{\Delta T}$	typ.	2.5	μV/°C
Differential input resistance	R_i	typ.	40	kΩ
Output resistance	R_o	typ.	200	Ω
Power dissipation	P_{tot}	typ.	90	mW

PACKAGE OUTLINE Dimensions in mm

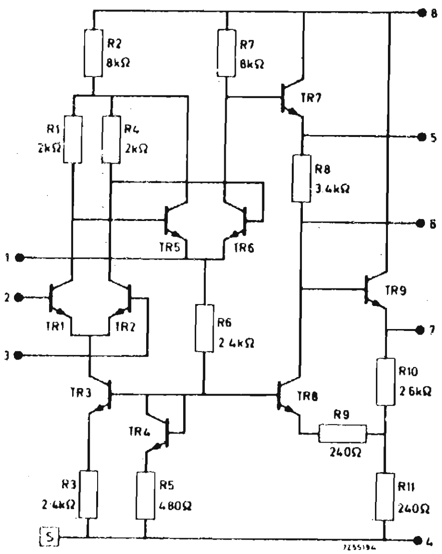
XA8 (TO-99)



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages				
Total supply voltage	V_{8-4}	max.	21	V
Common mode voltage	V_i		−6 to +1.5	V
Differential mode voltage	V_{2-3}	max.	±5	V
Output current (peak value)	I_{OM}	max.	50	mA
Power dissipation up to T_{amb} = 105 °C [1]	P_{tot}	max.	300	mW
at T_{amb} = 125 °C	P_{tot}	max.	170	mW
Temperatures				
Operating ambient temperature	T_{amb}		−55 to +125	°C
Storage temperature	T_{stg}		−65 to +150	°C

CIRCUIT DIAGRAM



1. Ground
2. Inverting input
3. Non-inverting input
4. Negative supply
5. Lead frequency compensation
6. Lag frequency compensation
7. Output
8. Positive supply

[1]) Derate linearly at 6.6 mW/°C for ambient temperatures above 105 °C.

CHARACTERISTICS at V_P = 12 V; $-V_N$ = 6 V; T_{amb} = −55 °C

Input bias current	I_i	typ.	4.3	μA
		<	10	μA
Input offset current	I_{io}	typ.	0.4	μA
		<	1.5	μA
Supply current at V_o = 0	I_{tot}	typ.	5	mA
		<	7.5	mA
Power dissipation at V_o = 0	P_{tot}	typ.	90	mW
		<	135	mW

CHARACTERISTICS at V_P = 12 V; $-V_N$ = 6 V; T_{amb} = 25 °C

Voltage gain; $R_L \geq$ 100 kΩ; V_o = ± 5 V	G_v	2500 to 6000		
		typ.	3600	
Input offset voltage; $R_S \leq$ 2 kΩ	V_{io}	typ.	0.5	mV
		<	2	mV
Input bias current	I_i	typ.	2	μA
		<	5	μA
Input offset current	I_{io}	typ.	0.18	μA
		<	0.5	μA
Common mode rejection ratio at f ≤ 1 kHz; $R_S \leq$ 2 kΩ	CMRR	>	80	dB
		typ.	100	dB
Input voltage range	V_i		−4 to +0.5	V
Supply current at V_o = 0	I_{tot}	typ.	5	mA
		<	6.7	mA
Differential input resistance	R_i	>	16	kΩ
		typ.	40	kΩ
Output resistance	R_o	typ.	200	Ω
		<	500	Ω
Power dissipation at V_o = 0	P_{tot}	typ.	90	mW
		<	120	mW

CHARACTERISTICS at V_P = 12 V; $-V_N$ = 6 V; T_{amb} = 125 °C

Supply current at V_o = 0	I_{tot}	typ.	4.4	mA
		<	6.7	mA
Input offset current	I_{io}	typ.	80	nA
		<	0.5	μA
Power dissipation at V_o = 0	P_{tot}	typ.	80	mW
		<	120	mW

CHARACTERISTICS at $V_P = 12$; $-V_N = 6$ V; $T_{amb} = -55$ to $+125$ °C

Voltage gain; $R_L \geq 100$ kΩ; $V_o = \pm 5$ V	G_v	>	2000	
Input offset voltage; $R_S \leq 2$ kΩ	V_{io}	<	3	mV
Average input offset voltage drift; $R_S = 50$ Ω				
$T_{amb} = -55$ to $+25$ °C	$\frac{\Delta V_{io}}{\Delta T}$	typ. <	2 10	µV/°C µV/°C
$T_{amb} = +25$ to $+125$ °C	$\frac{\Delta V_{io}}{\Delta T}$	typ. <	2.5 10	µV/°C µV/°C
Average input offset current drift; $R_S = 50$ Ω				
$T_{amb} = -55$ to $+25$ °C	$\frac{\Delta I_{io}}{\Delta T}$	typ. <	3 16	nA/°C nA/°C
$T_{amb} = +25$ to $+125$ °C	$\frac{\Delta I_{io}}{\Delta T}$	typ. <	1 5	nA/°C nA/°C
Common mode rejection ratio at $f \leq 1$ kHz; $R_S \leq 2$ kΩ	CMRR	> typ.	70 95	dB dB
Supply voltage rejection ratio $V_8 = +12$ to $+6$ V; $V_4 = -6$ to -3 V; $R_S \leq 2$ kΩ	SVRR	typ. <	75 200	µV/V µV/V
Peak output voltage swing at $R_L \geq 10$ kΩ	V_{OM}	> typ.	±3.5 ±4	V V
$R_L \geq 100$ kΩ	V_{OM}	> typ.	±5 ±5.3	V V

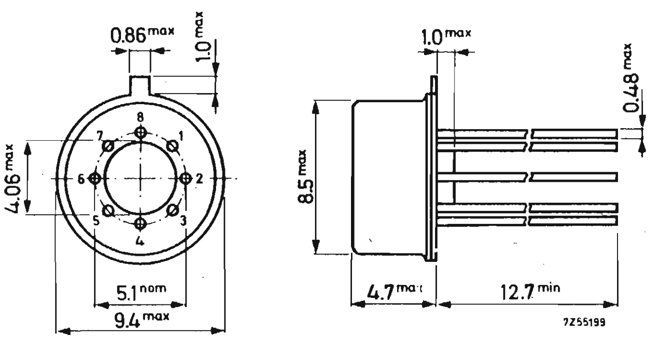
OPERATIONAL AMPLIFIER

The TAA243 is a silicon monolithic integrated d.c. amplifier in a TO-99 metal envelope for applications in the temperature range from −20 to +100 °C.

QUICK REFERENCE DATA				
Positive supply voltage	V_P		12	V
Negative supply voltage	$-V_N$		6	V
Characteristics at T_{amb} = 25 °C				
Voltage gain	G_v	typ.	2300	
Common mode rejection ratio	CMRR	typ.	80	dB
Differential input resistance	R_i	typ.	20	kΩ
Output resistance	R_o	typ.	200	Ω
Power dissipation	P_{tot}	typ.	90	mW

PACKAGE OUTLINE Dimensions in mm

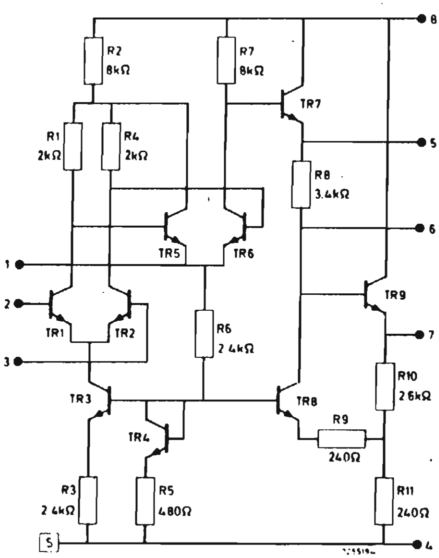
XA8 (TO-99)



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages			
Total supply voltage	V_{8-4}	max. 21	V
Common mode voltage	V_i	-6 to +1.5	V
Differential mode voltage	V_{2-3}	max. ±5	V
Output current (peak value)	I_{OM}	max. 50	mA
Power consumption up to T_{amb} = 75 °C	P_{tot}	max. 200	mW
Temperatures			
Operating ambient temperature	T_{amb}	-20 to +100	°C
Storage temperature	T_{stg}	-65 to +150	°C

CIRCUIT DIAGRAM



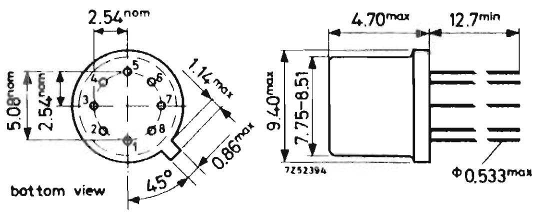
1. Ground
2. Inverting input
3. Non-inverting input
4. Negative supply
5. Lead frequency compensation
6. Lag frequency compensation
7. Output
8. Positive supply

CHARACTERISTICS at V_P = 12 V; $-V_N$ = 6 V; T_{amb} = 25 °C

Voltage gain	G_V	900 to 4000		
		typ.	2300	
Input offset voltage; $R_S \leq 2$ kΩ, T_{amb} = 0 to +70 °C	V_{io}	typ.	7	mV
		<	15	mV
Input bias current	I_i	typ.	5	μA
		<	15	μA
Input offset current	I_{io}	typ.	3	μA
		<	5	μA
Common mode rejection ratio at f = 1 kHz	CMRR	>	65	dB
		typ.	80	dB
Input voltage range	V_i	-4 to +0.5		V
Differential input resistance	R_i	>	6	kΩ
		typ.	20	kΩ
Output impedance	R_o	typ.	200	Ω
		<	600	Ω
Peak output voltage swing at $R_L \leq 100$ kΩ	V_{OM}	>	±5	V
		typ.	±5.3	V
Power dissipation at V_o = 0	P_{tot}	typ.	90	mW
		<	125	mW.

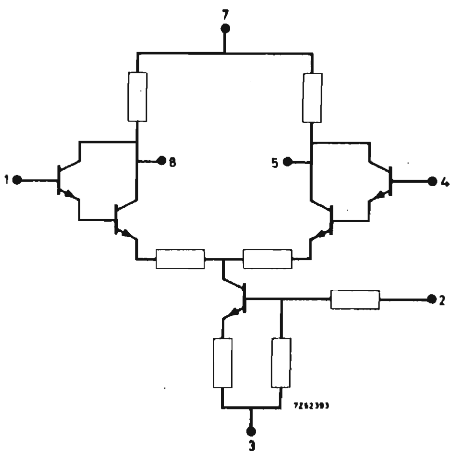
DIFFERENTIAL AMPLIFIER

The TAA201 is a silicon monolithic integrated differential amplifier using two Darlington connected pairs with a constant-current source for high input impedance, excellent input-output isolation and good temperature stability. The TAA201 can be used as a differential amplifier or as a single-ended input or output amplifier giving both inverting and non-inverting operation.



QUICK REFERENCE DATA			
Ambient temperature		25	°C
Positive supply voltage		12	V
Negative supply voltage		6	V
Voltage gain	typ.	60	
Common mode rejection	typ.	75	dB
Input offset voltage	typ.	7	mV
Input offset voltage drift	typ.	10	μV/°C
Frequency response (–3 dB)	typ.	300	kHz
Input impedance	typ.	150	kΩ
Output impedance	typ.	8	kΩ
Output voltage range (peak-peak)	typ.	14.5	V
Package		A1 (TO-78)	

CIRCUIT DIAGRAM



1. Input
2. Ground (supply return)
3. Negative supply
4. Input
5. Output
6. (not connected)
7. Positive supply
8. Output

7Z3 1635

CHARACTERISTICS

No load unless otherwise specified. $V_7 = 12$ V; $-V_3 = 6$ V.

		Tamb (°C)			
		−55	+25	+75	
Differential voltage gain	min.		40		
	typ.	67	60	56	
Input offset voltage	typ.	4.0	7.0	7.0	mV
	max.		10.0		mV
Input offset voltage change with temperature	typ.		10		μV/°C
	max.		20		μV/°C
Input bias current	typ.		0.3		μA
	max.		1.2		μA
Input offset current	typ.	8.0	8.0	5.0	nA
	max.		30		nA
Input offset current change with temperature	typ.		0.5		nA/°C
	max.		3.0		nA/°C
Common mode rejection ratio 0 to 10 kHz	min.		70		dB
	typ.		75		dB
100 kHz	typ.		59		dB
Frequency response (−3 dB)	min.		0 to 150		kHz
	typ.		0 to 300		kHz
Quiescent input voltage (V_1; V_4)	typ.	0	0	0	mV
Quiescent output voltage (V_8; V_5)	typ.		7.0		V
	max.		8.5		V
Max. output voltage (peak-peak) at pin 8 and at pin 5	min.		12.0		V
	typ.		14.5		V
Differential input impedance	min.		75		kΩ
	typ.		150		kΩ
Single-ended output impedance	typ.		8.0		kΩ
	max.		10.0		kΩ
Positive supply current (I_7)	typ.		0.9		mA
Negative supply current ($-I_3$)	typ.		2.6		mA
Power dissipation	typ.		26		mW
	max.		33		mW

7Z3 1636

RATINGS (Limiting values) [1])

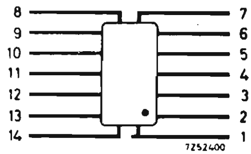
Positive supply voltage (V_7)	max.	25	V
Negative supply voltage ($-V_3$)	max.	24	V
Power dissipation	max.	200	mW
Storage temperature (T_{stg})	-65 to	+175	^oC
Operating ambient temperature (T_{amb})	-55 to	+75	^oC

1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1637

DIFFERENTIAL AMPLIFIER

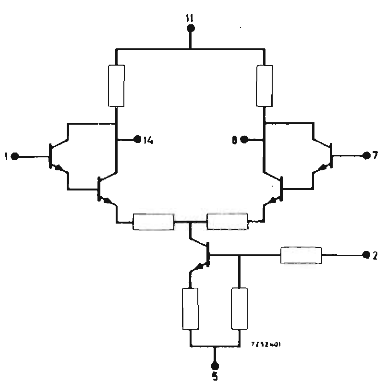
The TAA202 is a silicon monolithic integrated differential amplifier using two Darlington connected pairs with a constant-current source for high input impedance, excellent input-output isolation and good temperature stability. The TAA202 can be used as a differential amplifier or as a single-ended input or output amplifier giving both inverting and non-inverting operation.



Operating ambient temperature range: −55 to +125 °C

QUICK REFERENCE DATA			
Ambient temperature		25	°C
Positive supply voltage		12	V
Negative supply voltage		6	V
Voltage gain	typ.	50	
Common mode rejection	typ.	80	dB
Input offset voltage	max.	7.0	mV
Input offset voltage drift	typ.	10	μV/°C
Frequency response (−3 dB)	typ.	150	kHz
Input impedance	typ.	1.0	MΩ
Output impedance	typ.	8	kΩ
Output voltage range (peak-peak)	typ.	13	V
Package	E2 (TO-84 flat-pack)		

CIRCUIT DIAGRAM



1. Input
2. Ground (supply return)
3. (not connected)
4. (not connected)
5. Negative supply
6. (not connected)
7. Input
8. Output
9. (not connected)
10. (not connected)
11. Positive supply
12. (not connected)
13. (not connected)
14. Output

7Z3 1638

CHARACTERISTICS

No load unless otherwise specified. V_{11} = 12 V; $-V_5$ = 6 V; T_{amb} = 25 °C

Differential voltage gain	min.	40	
	typ.	50	
	max.	65	
Input offset voltage	max.	7.0	mV
Input offset voltage change with temperature	typ.	10	μV/°C
Common mode rejection ratio, 0 to 10 kHz	min.	70	dB
	typ.	80	dB
Frequency response (−3 dB)	typ.	0 to 150	kHz
Quiescent input voltage (V_1; V_7)	typ.	0	mV
Quiescent output voltage (V_8; V_{14})	min.	6.0	V
	typ.	7.0	V
	max.	8.0	V
Max. output voltage (peak-peak) at pin 8 and at pin 14	typ.	13.0	V
Differential input impedance	min.	300	kΩ
	typ.	1000	kΩ
Single-ended output impedance	typ.	8.0	kΩ
	max.	13.0	kΩ
Positive supply current (I_{11})	typ.	0.9	mA
Negative supply current ($-I_5$)	typ.	2.6	mA
Power dissipation	typ.	26	mW

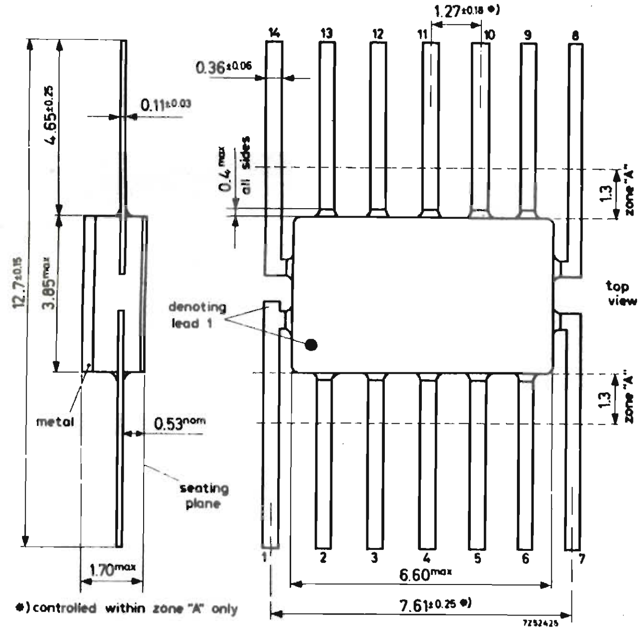
7Z3 1639

RATINGS (Limiting values) [1])

Positive supply voltage (V_{11})	max.	25	V
Negative supply voltage ($-V_5$)	max.	14	V
Power dissipation	max.	200	mW
Storage temperature (T_{stg})		-65 to +175	°C
Operating ambient temperature (T_{amb})		-55 to +125	°C

PACKAGE OUTLINE

Dimensions in mm

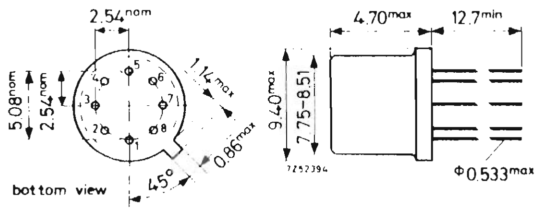


1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1640

WIDE-BAND AMPLIFIER

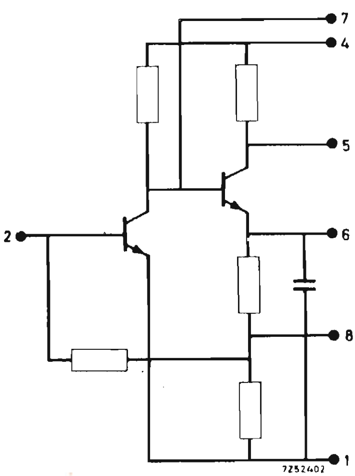
The TAA231 is a silicon monolithic integrated wide-band amplifier comprising two direct coupled stages with negative feedback and shunt peaking. External connections to all circuit nodes, such as for a.g.c. and tuning purposes, allow a maximum in custom application flexibility.



Operating ambient temperature range: 0 to +75 °C

QUICK REFERENCE DATA			
Ambient temperature		25	°C
Single supply voltage (V_4)		12	V
Power gain	typ.	23	dB
Cut-off frequency (-3 dB)	typ.	45	MHz
Gain control range	typ.	20	dB
Noise figure	typ.	4	dB
Power dissipation	typ.	42	mW
Package		A1 (TO-78)	

CIRCUIT DIAGRAM



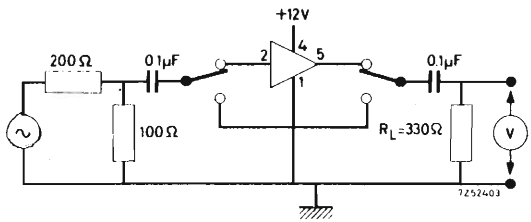
1. Ground (supply return)
2. Input and a.g.c.
3. (not connected)
4. Positive supply
5. Output at collector
6. Output at emitter
7. a.g.c.
8. Feedback network

7Z3 1645

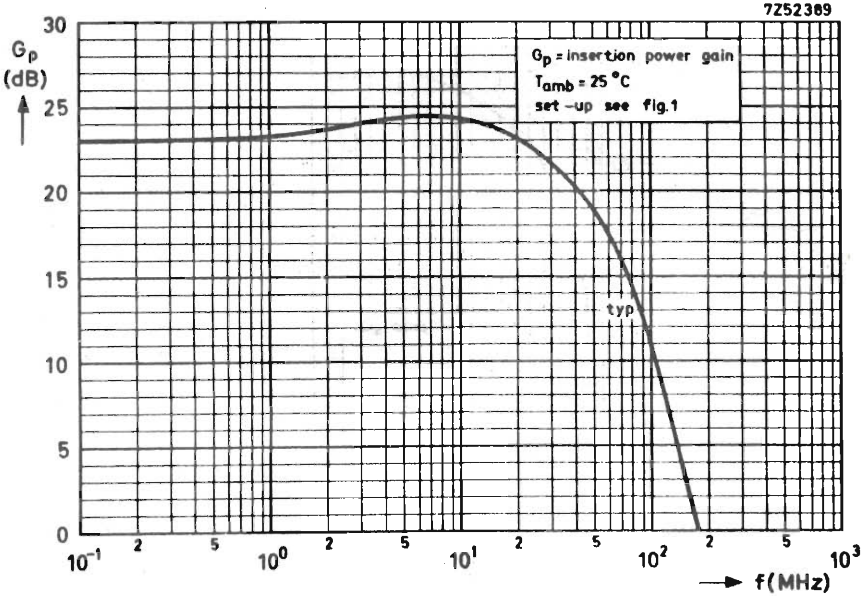
CHARACTERISTICS at V_4 = 12 V

		Tamb °C			
		0	+25	+75	
Insertion power gain (Set-up see Fig. 1; other conditions see page 4)	min.		18		dB
	typ.	23	23	22	dB
Cut-off frequency (−3 dB) (Set-up see Fig. 1)	min.		30		MHz
	typ.		45		MHz
Noise figure bandwidth 100 kHz source resistance 100 Ω	typ.		4		dB
Input impedance at 60 MHz; resistance	typ.		83		Ω
capacitance	typ.		22		pF
Output impedance at 60 MHz; resistance	typ.		1900		Ω
capacitance	typ.		15		pF
Gain control range at pin 2 (page 3)	typ.		16		dB
pin 7 (page 3)	typ.		20		dB
Output voltage range (peak to peak) at pin 5 unloaded	typ.	2.5	2.5	2.0	V
loaded with 330 Ω	typ.	0.55	0.55	0.50	V
at pin 6 unloaded	typ.		6.0	4.0	V
loaded with 330 Ω	typ.		0.70	0.45	V
Supply current (I_4)	typ.	3.7	3.5	3.2	mA
	max.		7.0		mA
Power dissipation	typ.	44	42	38	mW

Fig. 1. Set-up for measuring the insertion power gain

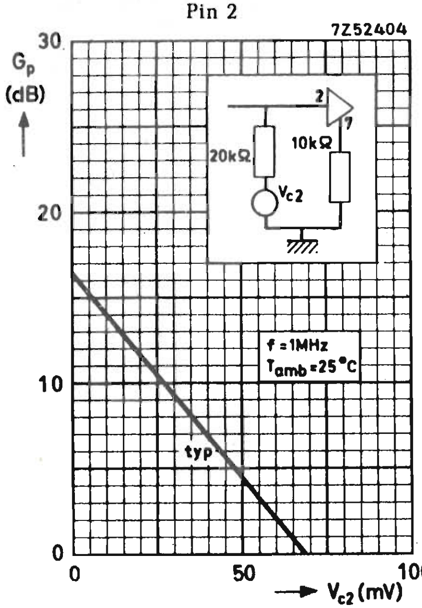


7Z3 1646

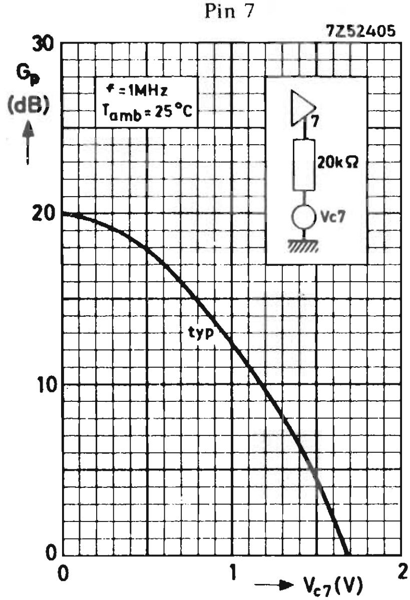


Insertion power gain versus a.g.c. voltage, test set-up Fig. 1, modified as shown.

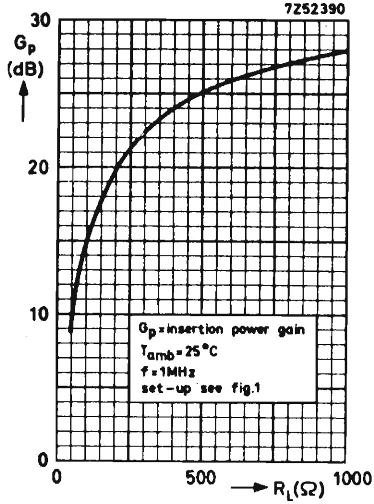
Pin 2



Pin 7



7Z3 1647



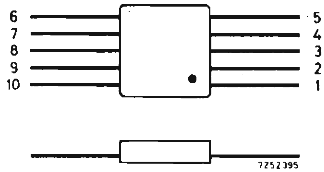
RATINGS (Limiting values) [1])

Supply voltage (V_4)	max. 16.0	V
Storage temperature (T_{stg})	-65 to +175	°C
Operating ambient temperature (T_{amb})	0 to 75	°C

7Z3 1648

WIDE-BAND AMPLIFIER

The TAA232 is a silicon monolithic integrated wide-band amplifier comprising two direct coupled stages with negative feedback and shunt peaking. External connections to all circuit nodes, such as for a.g.c. and tuning purposes, allow a maximum in custom application flexibility.

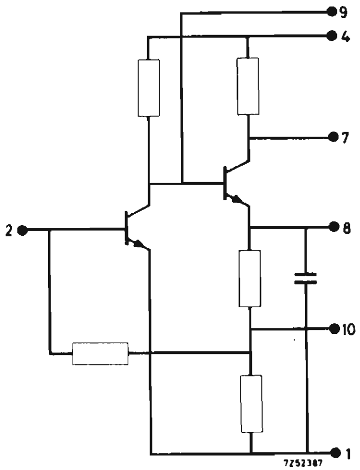


Operating ambient temperature range: −55 to +125 °C

QUICK REFERENCE DATA

Ambient temperature		25	°C
Single supply voltage (V_4)		12	V
Power gain	typ.	23	dB
Cut-off frequency (−3 dB)	typ.	45	MHz
Gain control range	typ.	20	dB
Noise figure	typ.	4	dB
Power dissipation	typ.	42	mW
Package	C1 (TO-91 flat-pack)		

CIRCUIT DIAGRAM



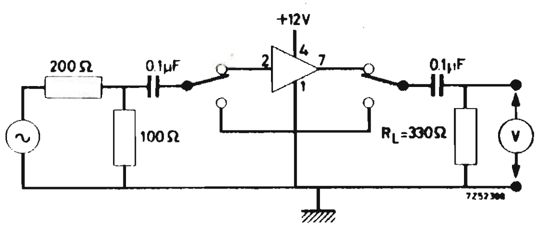
1. Ground (supply return)
2. Input and a.g.c.
3. (not connected)
4. Positive supply
5. (not connected)
6. (not connected)
7. Output at collector
8. Output at emitter
9. a.g.c.
10. Feedback network

7Z3 1641

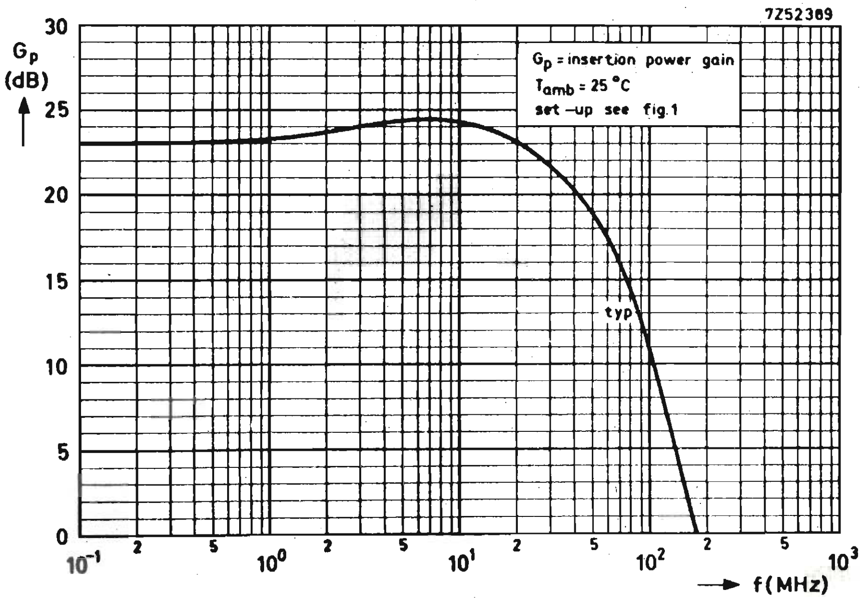
CHARACTERISTICS at V_4 = 12 V

		T_{amb} (°C)			
		−55	+25	+125	
Insertion power gain (Set-up see Fig.1; other conditions see page 4)	min.		20		dB
	typ.	21	23	20	dB
	max.		25		dB
Cut-off frequency (−3 dB) (Set-up see Fig.1)	min.		35		MHz
	typ.		45		MHz
Noise figure bandwidth 100 kHz; source resistance 100 Ω	typ.		4		dB
Input impedance at 60 MHz; resistance	typ.		83		Ω
capacitance	typ.		22		pF
Output impedance at 60 MHz; resistance	typ.		1900		Ω
capacitance	typ.		15		pF
Gain control range at pin 2 (page 3)	typ.		16		dB
pin 9 (page 3)	typ.	14	20	19	dB
Output voltage range (peak to peak)					
at pin 7 unloaded	min.		1.5	•	V
	typ.	3.0	3.0	2.0	V
loaded with 330 Ω	typ.	0.60	0.60	0.40	V
at pin 8 unloaded	min.		4.0		V
	typ.	0.14	6.0	2.5	V
loaded with 330 Ω	typ.	5	700	300	mV
Supply current (I_4)	min.		2.0		mA
	typ.	4.0	3.5	3.0	mA
	max.		7.0		mA
Power dissipation	typ.	48	42	36	mW

Fig.1. Set-up for measuring the insertion power gain.

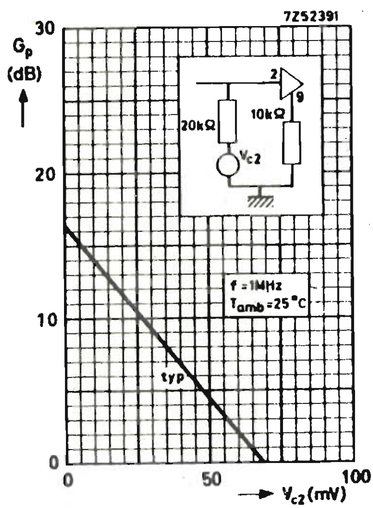


7Z3 1642

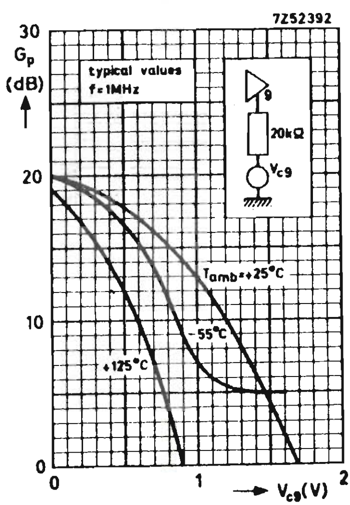


Insertion power gain versus a.g.c. voltage, test set-up Fig.1 modified as shown.

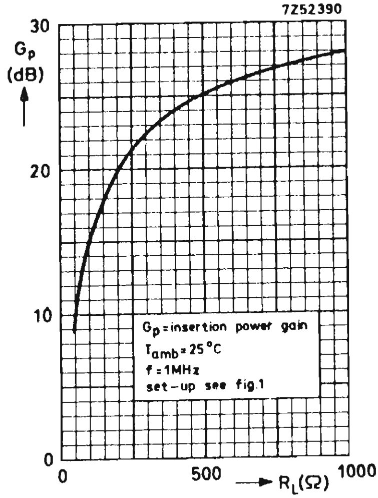
Pin 2



Pin 9



7Z3 1643

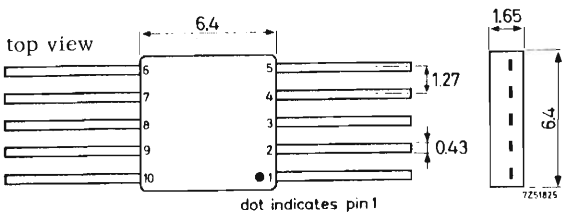


RATINGS (Limiting values) [1])

Supply voltage (V_4)	max. 16.0 V
Storage temperature (T_{stg})	-65 to +175 °C
Operating ambient temperature (T_{amb})	-55 to +125 °C

PACKAGE OUTLINE

Dimensions in mm



1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1644

OPERATIONAL AMPLIFIER

DEVELOPMENT SAMPLE DATA

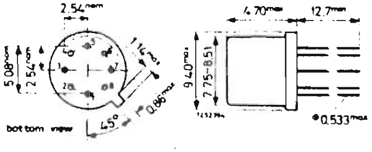
The TAA521 is a silicon monolithic integrated operational amplifier with high gain, low offset, high input impedance, high output voltage swing and low power dissipation.

QUICK REFERENCE DATA		
Positive supply voltage	V_P	15 V
Negative supply voltage	$-V_N$	15 V
Characteristics at T_{amb} = 25 °C		
Voltage gain	G_v	typ. 45,000
Common mode rejection ratio	CMRR	typ. 90 dB
Input offset voltage	V_{io}	typ. 2 mV
Differential input resistance	R_i	typ. 250 kΩ
Output voltage swing	V_{om}	typ. ±14 V
Power consumption	P_{tot}	typ. 80 mW

PACKAGE OUTLINE

TO-78

Dimensions in mm



These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product.

RATINGS (Limiting values) [1)]

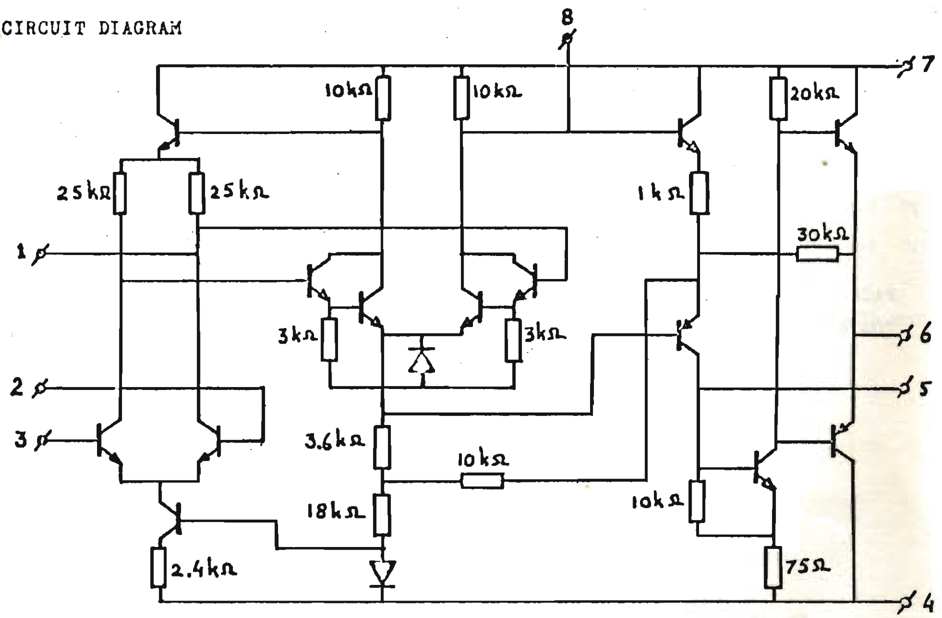
Voltages

Positive supply voltage	V_P	max.	18V
Negative supply voltage	$-V_N$	max.	18V
Common mode voltage	V_i	max.	± 10V
Differential mode voltage	V_{2-3}	max.	± 5V
Power dissipation up to T_{amb} = 75°C	P_{tot}	max.	250mW

Temperatures

Operating ambient temperature	T_{amb}	0 to +75°C
Storage temperature	T_{stg}	-55 to +125°C

CIRCUIT DIAGRAM



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1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

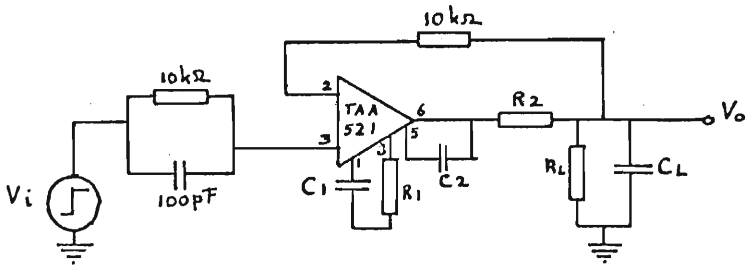
CHARACTERISTICS at V_P = 15V; $-V_N$ = 15V; T_{amb} = 25°C unless otherwise specified.

Voltage gain; $R_L \geq 2$ kΩ; $V_o = \pm$ 10V	G_v		15,000
		typ.	45,000
Input offset voltage; $R_S \leq 10$ kΩ;	V_{io}	typ.	2,0 mV
$V_P = -V_N$ = 9 to 15V		<	7,5 mV
Input bias current	I_i	typ.	0,3 µA
		<	1,5 µA
Input offset current	I_{io}	typ.	0,1 µA
		<	0,5 µA
Common mode rejection ratio	CMRR	>	65 dB
at $R_S \leq 2$ kΩ		typ.	90 dB
Input voltage range	V_i	>	± 8.0 V
		typ.	± 10 V
Differential input resistance	R_i	>	50 kΩ
		typ.	250 kΩ
Output resistance	R_o	typ.	150 Ω
Peak output voltage swing at $R_L \geq 10$ kΩ	V_{OM}		± 12 V
		typ.	± 14 V
$R_L \geq 2$ kΩ	V_{OM}		± 10 V
		typ.	± 13 V
Supply voltage rejection ratio at $R_S \leq 10$ kΩ	SVRR	typ.	25 µV/V
		<	200 µV/V
Power dissipation at V_o = o	P_{tot}	typ.	80 mW
		<	200 mW
Transient response (see fig. on page 4)			
Risetime	t_r	typ.	0.3 µs
		<	1.0 µs
Overshoot	$\frac{\Delta V}{V_o}$	typ.	10 %
			30 %

CHARACTERISTICS at V_P = 15V; $-V_N$ = 15V; T_{amb} = 0 to +75°C unless otherwise specified

Voltage gain; $R_L \geq 2$ kΩ; $V_o = \pm 10$ V	G_v	>	12,000
Input offset voltage; $R_S \leq 2$ kΩ; $V_P = -V_N = 9$ to 15V	V_{io}	<	10 mV
Input bias current	I_i	<	2 μA
Input offset current	I_{io}	<	0.75 μA
Differential input resistance	R_i	>	35 kΩ

Test circuit for transient response



V_i = 20 mV
R_L = 2 kΩ
C_L = 100 pF
R_1 = 1.5 kΩ

C_1 = 5000 pF
R_2 = 50 Ω
C_2 = 200 pF

Printed in Holland

LOW FREQUENCY AMPLIFIER

DEVELOPMENT SAMPLE DATA

The TAA480 is a silicon monolithic integrated a.f. amplifier suitable for use as channel amplifier in telephone carrier equipment. The accurate amplification and input and output impedances required for this application make the use of low tolerance resistors imperative. Therefore only the transistors and diodes have been integrated.

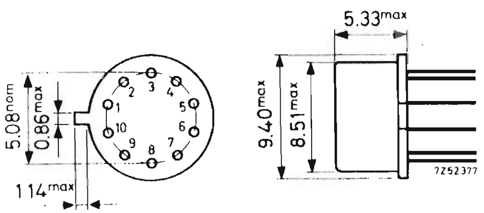
Owing to the push-pull configuration of the output stage no d.c. current will flow through the output transformer. This makes considerable savings possible.

QUICK REFERENCE DATA				
(see test circuit on page 4)				
Supply voltage	V_B	nom.	20	V
Voltage gain	G_v	typ.	15	dB
Output voltage at d_{tot} = 1%	$V_{o(rms)}$	min.	4	V

PACKAGE OUTLINE

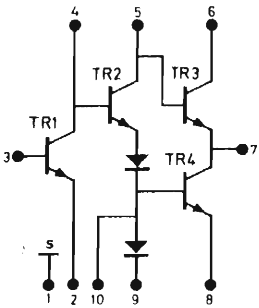
Dimensions in mm

TO-74 reduced height



These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product

CIRCUIT DIAGRAM



RATINGS (Limiting values) [1])

Voltages	V_{4-3}	max.	25	V
	V_{4-2}	max.	25	V
	V_{5-4}	max.	25	V
	V_{5-10}	max.	25	V
	V_{6-5}	max.	25	V
	V_{6-7}	max.	25	V
	V_{7-10}	max.	25	V
	V_{7-8}	max.	25	V
	V_{10-1}	max.	25	V
	V_{4-1}	max.	25	V
	V_{5-1}	max.	25	V
	V_{6-1}	max.	25	V
	V_{7-1}	max.	25	V
	V_{2-3}	max.	5	V
	V_{10-4}	max.	10	V
	V_{7-5}	max.	5	V
	V_{8-10}	max.	5	V
Currents	I_4	max.	10	mA
	I_5	max.	10	mA
	I_6	max.	10	mA
Total power dissipation up to $T_{amb} = 75\ ^oC$	P_{tot}	max.	200	mW
Temperatures				
Storage temperature	T_{stg}		−55 to +125	^oC
Operating ambient temperature	T_{amb}		−5 to +75	^oC

[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

CHARACTERISTICS at T_{amb} = 25 °C

TRANSISTOR TR1

D.C. current gain

I_C = 0.2 mA; V_{CB} = 5 V	h_{FE}	typ. 125 50 to 300	

TRANSISTORS TR3 and TR4

Saturation voltage

I_C = 10 mA; I_B = 1 mA	V_{CEsat}	typ. <	260 600	mV mV

EACH TRANSISTOR

Collector cut-off current

I_E = 0; V_{CB} = 10 V	I_{CBO}	<	100	nA

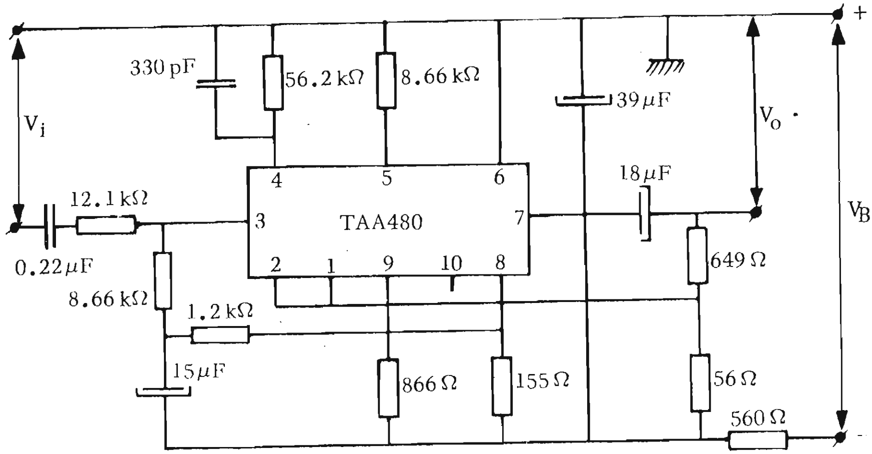
Collector-substrate leakage current

V_{CS} = 10 V	I_{CSO}	<	100	nA

PERFORMANCE in recommended test circuit

Supply voltage	V_B	nom.	20	V
Output voltage at d_{tot} = 1%	$V_{o(rms)}$	>	4	V
Distortion at P_o = 4.5 mW	d_{tot}	<	0.1	%
Input voltage at P_o = 4.5 mW	$V_{i(rms)}$	typ.	310	mV
D.C. collector voltage of TR4	V_{7-6}	typ.	7.8	V
			6.3 to 9.4	V
Total current drain	I_{tot}	typ.	5.2	mA
			4.75 to 5.6	mA

Test circuit:



Printed in Holland
9399 310 17601

MICROPHONE AMPLIFIER

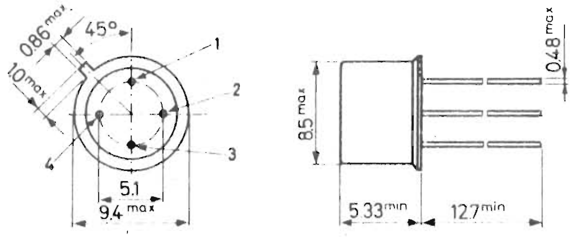
DEVELOPMENT SAMPLE DATA

A monolithic integrated a.f. amplifier intended for use with a piezo-electric ceramic microphone in telephones. It maintains an almost constant voltage gain and d.c. voltage drop even if the supply current is varied between 20 mA and 100 mA. The TAA500 is protected against accidental reversal of the polarity of the supply voltage and requires very few external components.

QUICK REFERENCE DATA			
Supply current	I_1	20 to 100	mA
Voltage drop	V_{1-4}	typ. 4.5	V
Voltage gain	G_v	typ. 300	
Output voltage at $d_{tot} < 5\%$	$V_{o(rms)}$	typ. 1.0	V

PACKAGE OUTLINE Dimensions in mm

TO-12 with reduced height



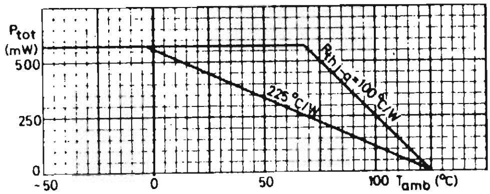
These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product

RATINGS (Limiting values) [1])

Currents

Supply current (d.c.)	I_1	-100 to +100	mA
A.C. component of supply current (peak value)	I_{1m}	max. 100	mA
Current at terminal 2	I_2	-100 to +100	µA
Current at terminal 3	I_3	-100 to +100	µA

Total power dissipation (see graph)



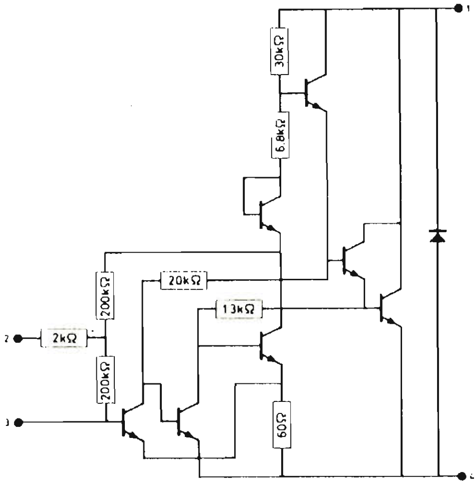
Temperatures

Storage temperature	T_{stg}	-55 to +125	°C
Junction temperature	T_j	max. 125	°C

THERMAL RESISTANCE

From junction to case	$R_{th\ j\text{-}c}$	60	°C/W

CIRCUIT DIAGRAM



1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Voltage drop at T_{case} = 25 °C

I_1 = 20 mA	V_{1-4}	3.8 to 5.3 V
I_1 = 100 mA	V_{1-4}	4.2 to 5.7 V
$-I_1$ = 100 mA	V_{4-1}	< 2.2 V

For next characteristics see recommended test circuit.

Voltage gain (refer to point A)

f = 2 kHz	G_V	250 to 350

Gain reduction at f = 300 Hz

(with respect to f = 2 kHz)	ΔG_V	typ. 1 dB < 4 dB

Change of voltage gain

T_{amb} = −20 to +55 °C	ΔG_V	< 10 %

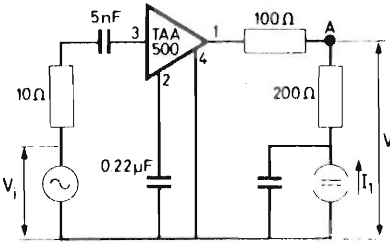
Output voltage (at point A)

I_1 = 50 mA; f = 2 kHz; d_{tot} = 5%; T_{amb} = 25 °C	$V_{o(rms)}$	> 1 V
T_{amb} = 55 °C	$V_{o(rms)}$	> 0.7 V

Noise voltage (at point A)

B = 0.3 to 4 kHz	V_n	< 2 mV

Recommended test circuit:



SILICON P-CHANNEL MOST ARRAY

DEVELOPMENT SAMPLE DATA

This monolithic integrated circuit comprises four matched P-channel, enhancement type, insulated gate field effect transistors. This device is intended as high quality solid-state chopper in sensitive d.c. amplifiers.
The TAA530 offers the following advantages as a chopper:
1. Differential input and output
2. Suppression of feedthrough spikes by bridge configuration
3. Extremely low thermal voltage and current drift
4. Applicable at very high chopping frequencies
The device is encapsulated in a 10 leads TO-74 reduced height envelope

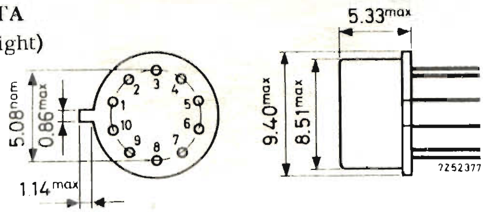
QUICK REFERENCE DATA

Each MOST			
Drain-source voltage	$\pm V_{DS}$	max.	25 V
Gate-source voltage (peak value)	$\pm V_{GSM}$	max.	50 V
Gate-source resistance	r_{GS}	>	10 TΩ
Drain resistance (on)	r_{DSon}	<	200 Ω
Characteristics of the chopper in a differential amplifier			
Input offset voltage at f_{ch} = 1 kHz	V_{io}	<	2 μV
Thermal drift of the input offset voltage at f_{ch} = 1 kHz	$\Delta V_{io}/\Delta T$	<	20 nV/°C
Input offset current at f_{ch} = 1 kHz	I_{io}	<	2 nA
Thermal drift of the input offset current at f_{ch} = 1 kHz	$\Delta I_{io}/\Delta T$	<	20 pA/°C

MECHANICAL DATA

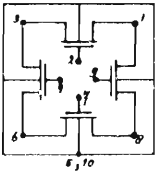
TO-74 (reduced height)

Dimensions in mm



These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product

CIRCUIT DIAGRAM



RATINGS (Limiting values) [1])

Voltages

Drain-source voltage	$\pm V_{DS}$	max. 25	V
Drain-substrate voltage	$-V_{DB}$	max. 25	V
Source-substrate voltage	$-V_{SB}$	max. 25	V
Gate voltage to any other terminal			
Continuous	$\pm V_{GX}$	max. 15	V
Instantaneous peak value	$\pm V_{GXM}$	max. 50	V

Current

Current in any terminal	$\pm I_X$	max. 10	mA

Power dissipation

Total power dissipation up to T_{amb} = 75 °C	P_{tot}	max. 50	mW

[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

CHARACTERISTICS (each MOST) T_{amb} = 25 °C unless otherwise specified

Gate-source cut-off voltage			
$-I_D$ = 1 μA; $-V_{DS}$ = 10 V; V_{BS} = 0	$-V_{(P)GS}$	3 to 6	V
Gate-source resistance			
$\pm V_{GS}$ = 10 V; V_{BS} = V_{DS} = 0	r_{GS}	> 10	TΩ [1]
Drain-source resistance (on)			
$-V_{GS}$ = 10 V; V_{BS} = V_{DS} = 0	r_{DSon}	< 200	Ω
Drain-source resistance (off)			
V_{GS} = V_{BS} = V_{DS} = 0	r_{DSoff}	> 100	MΩ

CHARACTERISTICS of the chopper in a differential amplifier at a chopping frequency f_{ch} = 1 kHz (All characteristics are proportional to the chopping frequency) [2]

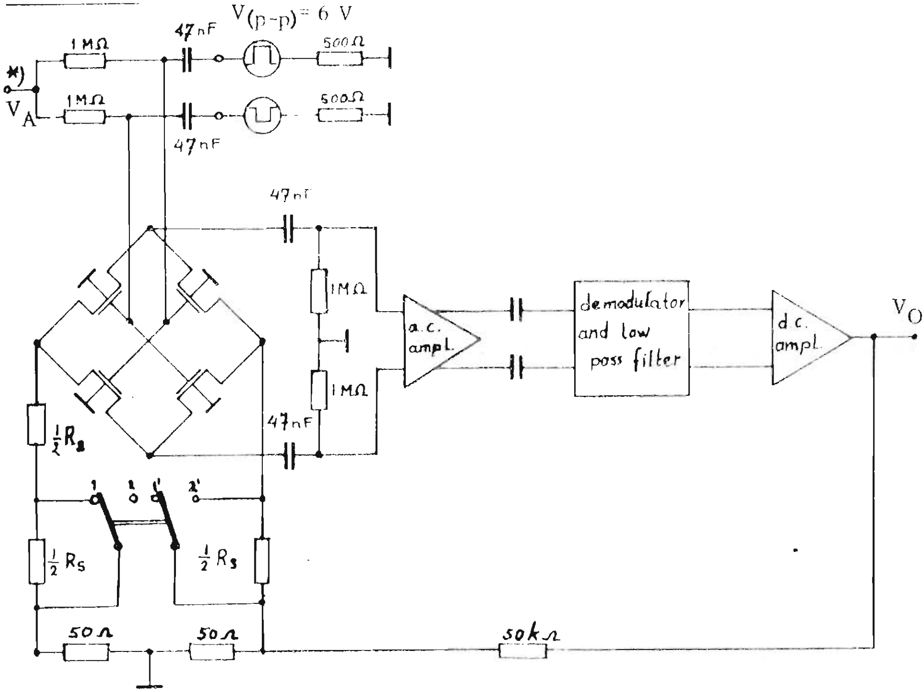
Input offset voltage	V_{io}	< 2	μV
Thermal drift of the input offset voltage (0 to +75 °C)	$\Delta V_{io}/\Delta T$	< 20	nV/°C
Input offset current	I_{io}	< 2	nA
Thermal drift of the input offset current (0 to +75 °C)	$\Delta I_{io}/\Delta T$	< 20	pA/°C
Bias current			
R_S = 100 kΩ	I_A	< 2	nA
R_S = 1 kΩ	I_A	< 20	nA
Thermal drift of the bias current (0 to +75 °C)			
R_S = 100 kΩ	$\Delta I_A/\Delta T$	< 20	pA/°C
R_S = 1 kΩ	$\Delta I_A/\Delta T$	< 200	pA/°C

1) 1 TΩ = 1 tera ohm = 10^{12} Ω

2) Test circuit see page 4.

CHARACTERISTICS (continued)

Test circuit



1. Input offset voltage: $V_{io} = V_O \times 10^{-3}$ Switch S in position 1-1'

2. Input offset current: $I_{io} = \dfrac{V_O \times 10^{-3}}{R_S}$ Switch S in position 1-1'

3. Bias current: $I_B = \dfrac{V_O \times 10^{-3}}{R_S}$ Switch S in position 2-2'

---

*) $-V_A = |V_{(P)GS}| + 2.5$ V

Printed in The Nether[lands]
9399 310 18601

RING (DE)MODULATOR FOR TELEPHONY AND INDUSTRIAL EQUIPMENT

The TAB101 is a monolithic integrated circuit comprising a 4-transistor modulator and demodulator circuit. The circuit being made on a single crystal ensures a great similarity in characteristics of the transistors and optimal tracking of their parameters with temperature variations. Consequently, the TAB101 gives a better balancing and therefore less carrier leakage than a conventional circuit. The use of transistors instead of diodes provides a better isolation between input and output circuits.

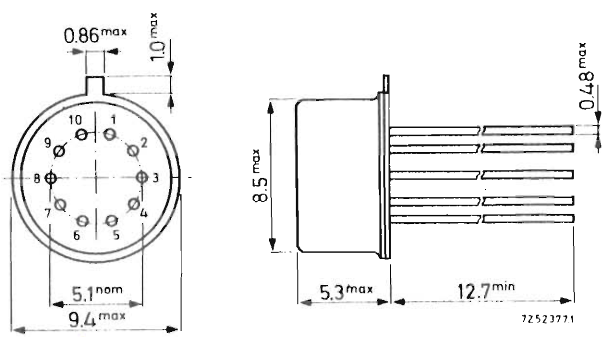
QUICK REFERENCE DATA

Collector cut-off current V_{CB} = 5 V; T_{amb} = 25 °C	I_{CBO}	<	100	nA
Base-emitter voltage differences between transistors 1, 2, 3, 4	$\lvert V_{BE1}-V_{BE2} \rvert$	<	5	mV
V_{CB} = 5 V; $-I_E$ = 150 μA	$\lvert V_{BE3}-V_{BE4} \rvert$	<	5	mV
Common-base current gain differences between transistors 1, 2, 3, 4	$\lvert h_{FB1}-h_{FB2} \rvert$	<	0.008	
V_{CB} = 5 V; $-I_E$ = 150 μA	$\lvert h_{FB3}-h_{FB4} \rvert$	<	0.008	

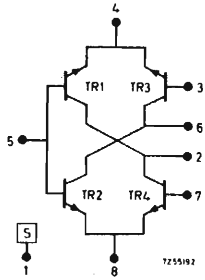
PACKAGE OUTLINE

Dimensions in mm

XA10; TO-74 (reduced height)



CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages (each transistor)

Collector-base voltage (open emitter)	V_{CBO}	max.	10	V
Emitter-base voltage (open collector)	V_{EBO}	max.	5	V
Collector-substrate voltage	V_{CS}	max.	12	V

Currents (each transistor)

Collector current	I_C	max.	10	mA

Power dissipation (4 transistors)

Total power dissipation up to T_{amb} = 100 °C	P_{tot}	max.	100	mW

Temperatures

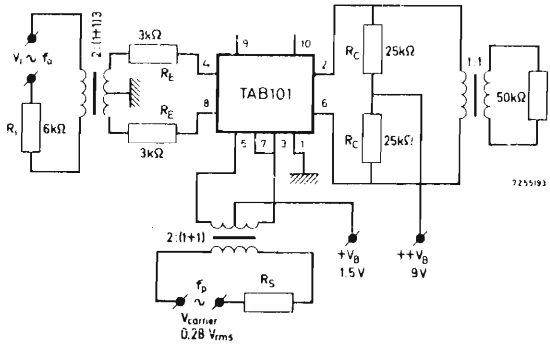
Storage temperature	T_{stg}	−35 to +125	°C
Operating ambient temperature	T_{amb}	−25 to +100	°C

CHARACTERISTICS (each transistor) $T_{amb} = 25\ ^oC$

Collector cut-off current				
$I_E = 0$; $V_{CB} = 5$ V	I_{CBO}	typ. <	5 100	nA nA
Collector-substrate leakage current				
$V_{CS} = 9.5$ V	I_{CS}	typ. <	5 100	nA nA
Emitter cut-off current				
$I_C = 0$; $V_{EB} = 1$ V	I_{EBO}	typ. <	5 100	nA nA
Break down voltages				
$I_E = 0$; $I_C = 10\ \mu A$	$V_{(BR)CBO}$	>	10	V
$I_B = 0$; $I_C = 10\ \mu A$	$V_{(BR)CEO}$	>	9	V
$-I_S = 10\ \mu A$	$V_{(BR)CS}$	>	12	V
$I_C = 0$; $I_E = 200\ \mu A$	$V_{(BR)EBO}$	>	5	V
D.C. current gain				
$I_C = 150\ \mu A$; $V_{CE} = 5$ V	h_{FE}	< typ.	20 75	
Spot noise figure at f = 1 kHz				
$-I_E = 150\ \mu A$; $V_{CB} = 5$ V $R_S = 1\ k\Omega$; Bandwidth: 200 Hz		typ.	6	dB
Base-emitter voltage difference				
between transistors TR1 and TR2 at $-I_{E1} = -I_{E2} = 150\ \mu A$; $V_{CB1} = V_{CB2} = 5$ V	$\lvert V_{BE1}-V_{BE2} \rvert$	typ. <	2 5	mV mV
between transistors TR3 and TR4 at $-I_{E3} = -I_{E4} = 150\ \mu A$; $V_{CB3} = V_{CB4} = 5$ V	$\lvert V_{BE3}-V_{BE4} \rvert$	typ. <	2 5	mV mV
Current amplification factor difference				
between transistors TR1 and TR2 at $-I_{E1} = -I_{E2} = 150\ \mu A$; $V_{CB1} = V_{CB2} = 5$ V	$\lvert h_{FB1}-h_{FB2} \rvert$	typ. <	0.002 0.008	
between transistors TR3 and TR4 at $-I_{E3} = -I_{E4} = 150\ \mu A$; $V_{CB3} = V_{CB4} = 5$ V	$\lvert h_{FB3}-h_{FB4} \rvert$	typ. <	0.002 0.008	

APPLICATION INFORMATION

Telephony carriers ring modulator



Performance at Tamb = 25 °C

Conversion gain at f_a = 1 kHz,				
V_i = 0.4 V; f_p = 34 kHz	G_c	typ.	-0.75	dB
Carrier leakage power in R_o at f_p = 34 kHz	P_{oc}	typ.	. 3	nW

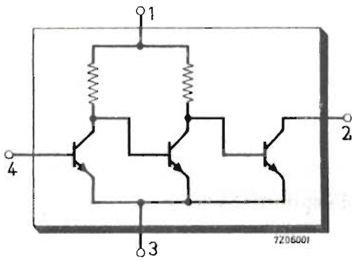
INTEGRATED CIRCUIT
AMPLIFIER FOR IN THE EAR HEARING AID

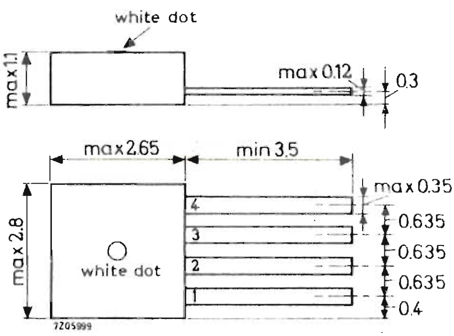
Monolithic semiconductor integrated-circuit amplifier in a plastic envelope, primarily intended for in the ear hearing aids.

QUICK REFERENCE DATA				
For meaning of symbols: see page 3 fig. 1.				
Supply voltage	V_{1-3}	max.	5	V
Output current	I_2	max.	5	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	25	mW
In a practical circuit as given at page 3 fig. 1:				
Total supply current	I_{tot}	typ.	1	mA
Transducer gain	G_{tr}	>	75	dB
		typ.	80	dB
Power output at d_{tot} = 10 %	P_o	>	0.2	mW
Frequency cut-off (−3 dB)	f_c	>	20	kHz

MECHANICAL DATA

Dimensions in mm





The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles). 7Z3 0744

RATINGS (Limiting values) [1])
(for meaning of symbols see page 3, fig.1)

Voltages

Supply voltage	V_{1-3}	max.	5	V
Output voltage	V_{2-3}	max.	5	V [2])
Input voltage	$-V_{4-3}$	max.	5	V

Currents

Output current	I_2	max.	5	mA
Input current	I_4	max.	5	mA

Power dissipation

Total power dissipation (See page C)	P_{tot}	max.	25	mW

Temperatures

Storage temperature	T_{stg}	-20 to +80		^oC
Ambient temperature	T_{amb}	max.	80	^oC

CHARACTERISTICS at $V_{1-3} = 1.3$ V and $T_{amb} = 25\ ^oC$ unless otherwise specified
I_2 see figure 1

Supply current (no signal)	I_{tot}	<	1.2	mA
	I_1	typ.	0.34	mA
Transducer gain [3]) at f = 1 kHz	G_{tr}	>	75	dB
		typ.	80	dB
$V_{1-3} = 1.3$ V; $T_{amb} = -10\ ^oC$	G_{tr}	typ.	78	dB
$V_{1-3} = 1.1$ V; $T_{amb} = 25\ ^oC$	G_{tr}	typ.	76	dB

---

1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

2) This value may be exceeded during inductive switch-off for transient energies < 10 μWs.

3) The transducer gain is defined as the ratio of the output power in the load of $|Z| = 1.5\ k\Omega$ and the available input power of the source with $R_S = 5\ k\Omega$

$$G_{tr} = \frac{P_o}{V_i^2/4R_S}$$

7Z3 0745

CHARACTERISTICS (continued)

at V_{1-3} = 1.3 V and T_{amb} = 25 °C unless otherwise specified
I_2 see figure 1

Total distortion at f = 1 kHz

P_o = 100 μW	d_{tot}	typ.	4	%
		<	6	%
P_o = 200 μW	d_{tot}	<	10	%

Noise figure at R_S = 5 kΩ

Bandwidth f = 400 to 3200 Hz	F	<	6	dB

Frequency cut-off (-3 dB)	f_c	>	20	kHz

		>	50	kΩ
Value of R_F to adjust I_2 at 0.7 mA	R_F	typ.	300	kΩ
		<	700	kΩ

I_2 = 0.7 mA,
adjusted by means of R_F.
V_{1-3} = 1.3 V; T_{amb} = 25 °C.

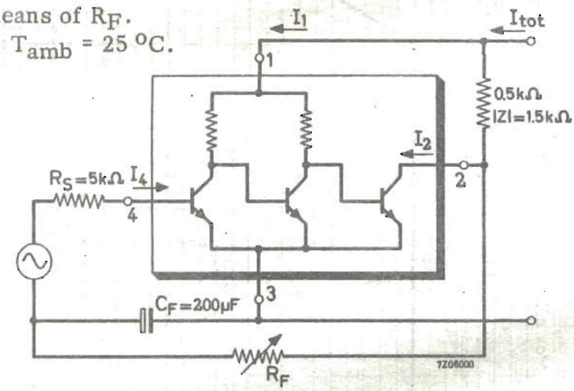


Fig. 1

SOLDERING RECOMMENDATION

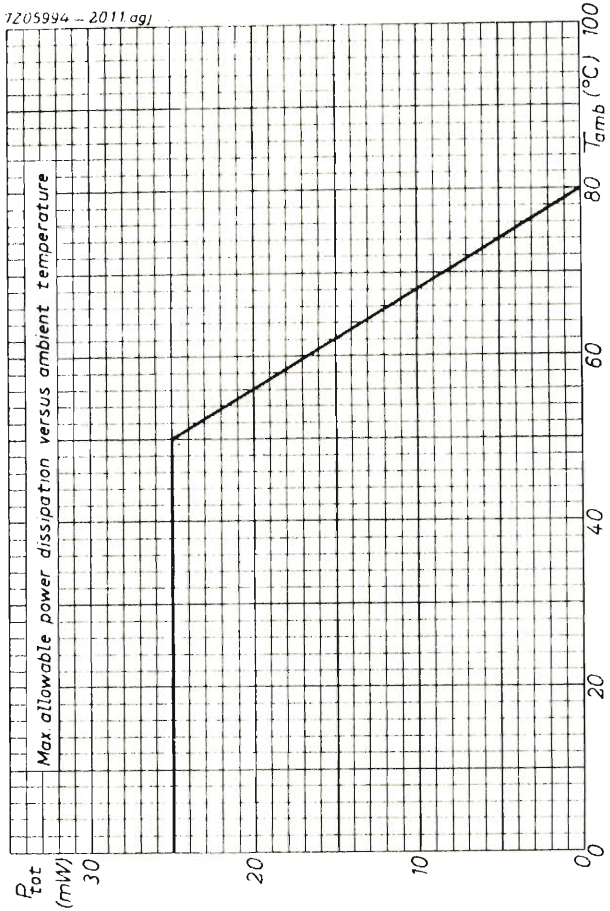
A: Iron soldering

At a maximum iron temperature of 300 °C the maximum permissible soldering time is 3 seconds, provided the soldering spot is at least 0.5 mm from the seal and the leads are not soldered at the same time. Soldering in immediate subsequence is allowed.

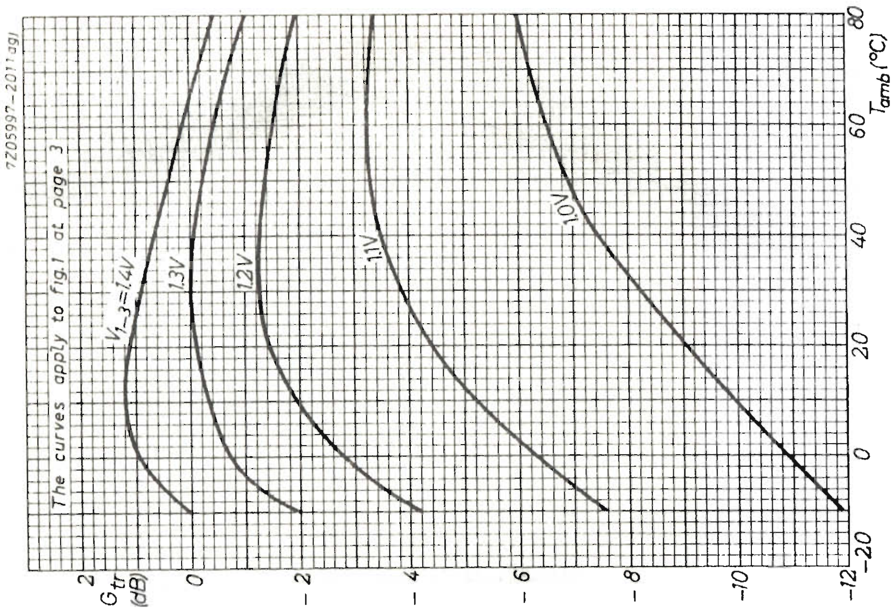
B: Dip soldering

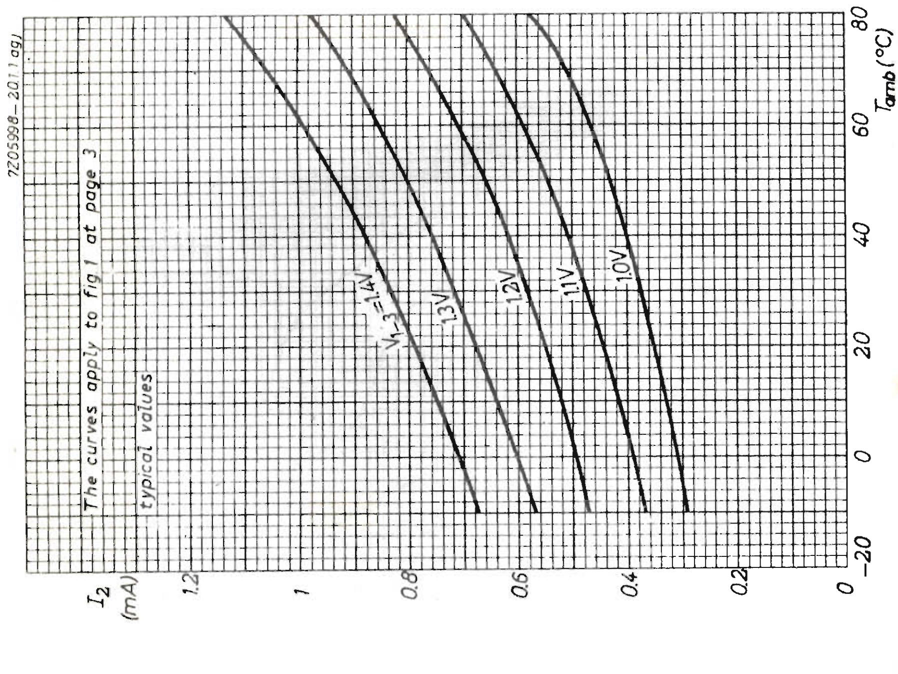
At a maximum solder temperature of 250 °C the maximum permissible soldering time is 3 seconds, provided the soldering spot is at least 0.5 mm from the seal.

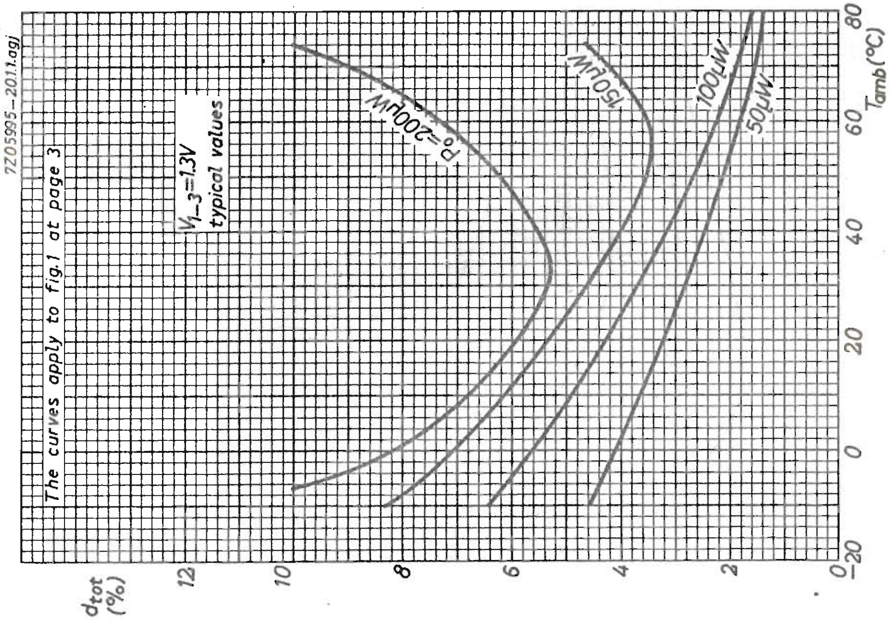
7Z3 0746

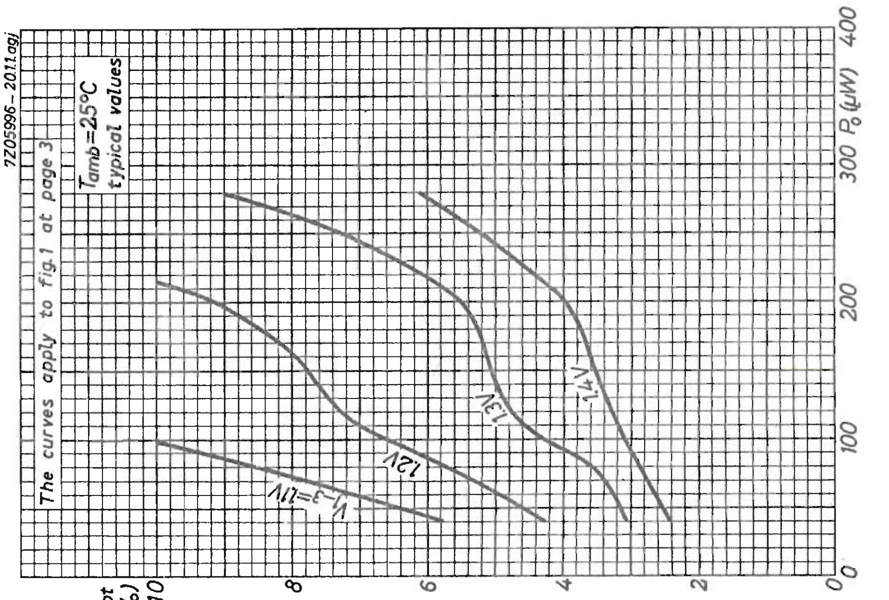


Max. allowable power dissipation versus ambient temperature
Ptot (mW)
30
20
10
0
Tamb (°C)
0
20
40
60
80
100


7Z05997-2011agj
The curves apply to fig.1 at page 3
V_{1-3}=1.4V
1.3V
1.2V
1.1V
1.0V
G_{tr} (dB)
2
0
−2
−4
−6
−8
−10
−12
−20
0
20
40
60
80
T_{amb} (°C)


7Z05998-2011agj
The curves apply to fig.1 at page 3
typical values
V_{1-3}=1.4V
1.3V
1.2V
1.1V
1.0V
I_2 (mA)
1.2
1
0.8
0.6
0.4
0.2
0
−20
0
20
40
60
80
T_{amb} (°C)


7Z05995-20.1.1.agj
The curves apply to fig.1 at page 3
V1-3=1.3V
typical values
Po=200µW
150µW
100µW
50µW
dtot
(%)
12
10
8
6
4
2
0
−20
0
20
40
60
80
Tamb(°C)


7Z05996-20.1.1.agj
The curves apply to fig.1 at page 3
Tamb=25°C
typical values
V1-3=1.1V
1.2V
1.3V
1.4V
dtot
(%)
10
8
6
4
2
0
0
100
200
300
400
Po (µW)

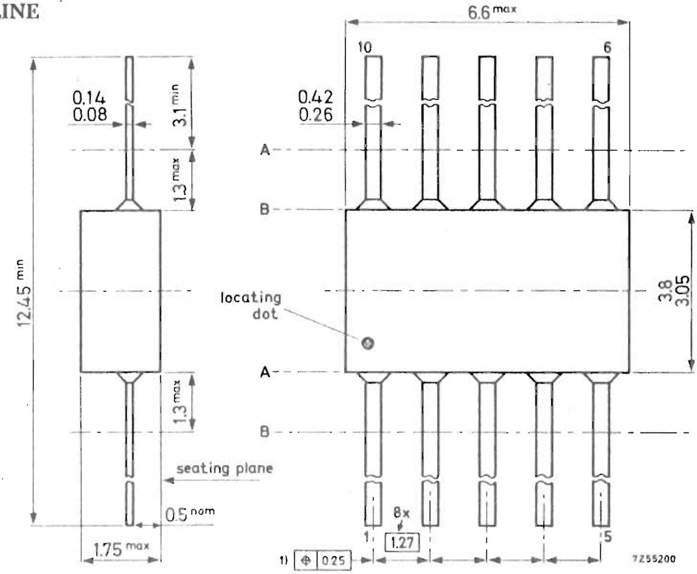
HEARING-AID AMPLIFIER

Integrated monolithic a.f. amplifier for use in hearing aids. The collector current of the class A output transmitter can be determined externally, making the circuit suitable for a wide range of output powers at a low current consumption. Provision is made for the use of peak-clipping and frequency compensation circuits, and special measures have been taken to minimize the influence of temperature and supply voltage variations.

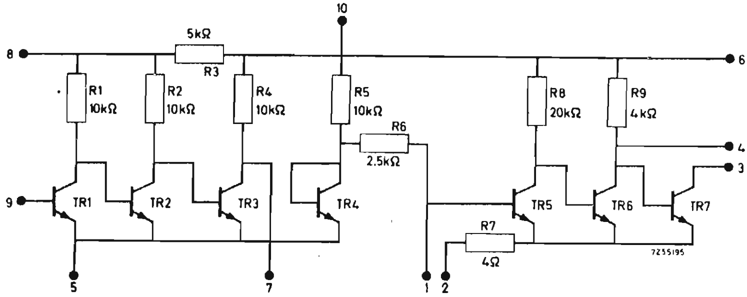
QUICK REFERENCE DATA				
Supply voltage	V_B	nom.	1.3	V
Transducer gain	G_{tr}	typ.	90	dB
Output power at d_{tot} = 10%	P_o	typ.	1.5	mW
Saturation voltage of TR7 at I_C = 5 mA; V_{6-2} = 1.3 V	V_{3-2sat}	<	300	mV
Current consumption of all stages except output stage	I	typ.	0.35	mA
Noise figure	F	typ.	3	dB

PACKAGE OUTLINE

XE10 (TO-89)



CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages	V_{6-2}	max.	5	V
	V_{3-2}	max.	5	V
	V_{8-2}	max.	5	V
	V_{5-9}	max.	5	V
Currents	I_2	max.	20	mA
	I_3	max.	20	mA

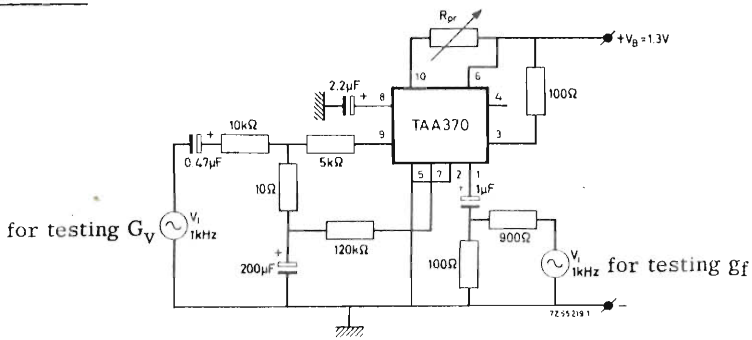
Maximum allowable total power dissipation versus ambient temperature

Temperatures			
Storage temperature	T_{stg}	−55 to +85	°C
Operating ambient temperature	T_{amb}	−55 to +85	°C

CHARACTERISTICS (see also test circuit) T_{amb} = 25 °C

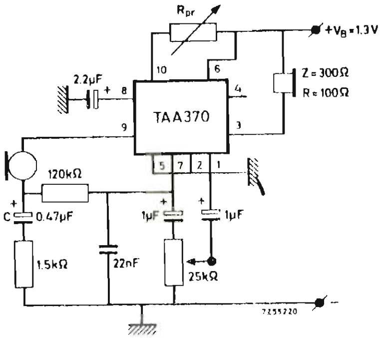
Supply voltage	V_B	nom.	1.3	V
Voltage gain of first 3 transistors (TR1 to TR3)	G_v	>	60	dB
Transconductance of last 3 transistors (TR5 to TR7)	g_f		200 to 280	$m\Omega^{-1}$
Saturation voltage of last transistor (TR7) at I_C = 5 mA; V_{6-2} = 1.3 V	$V_{3-2\,sat}$	<	300	mV
Current consumption of all stages except output stage	I	typ.	0.35	mA
		<	0.5	mA
Noise figure R_S = 5 kΩ; B = 400 to 3200 Hz	F	typ.	3	dB
		<	6	dB

Test circuit



APPLICATION INFORMATION

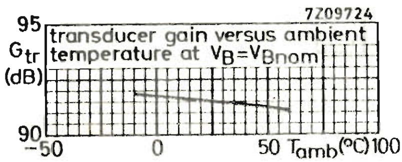
The TAA370 in a 1.5 mW amplifier

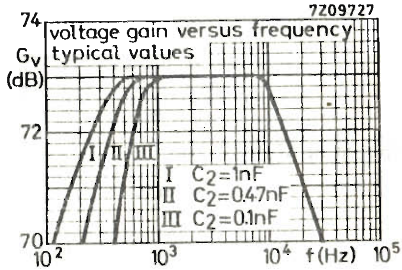


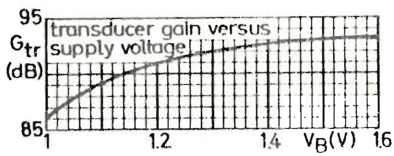
I_3 = 2.5 mA

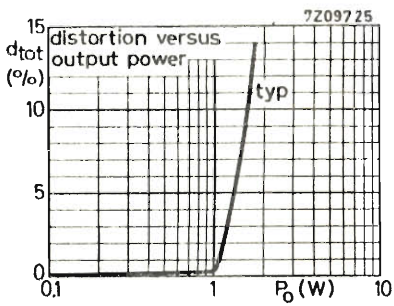
I_{tot} = 2.85 mA

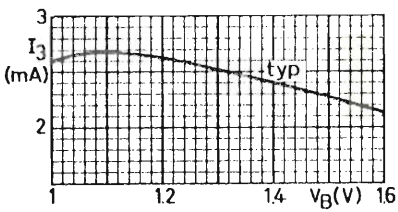
R_{pr} = 4 kΩ











LOW-LEVEL AMPLIFIER

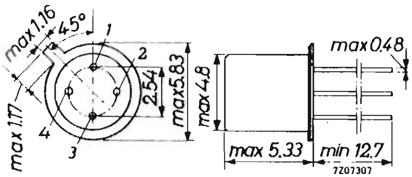
The TAA263 is a semiconductor integrated amplifier in a 4-lead TO-72 metal envelope. It comprises a three-stage, direct coupled low-level amplifier for use from d.c. up to frequencies of 600 kHz.

QUICK REFERENCE DATA				
Supply voltage	V_B	max.	8	V
Output voltage	V_{3-4}	max.	7	V
Output current	I_3	max.	25	mA
Transducer gain at P_o = 10 mW				
R_L = 150 Ω; f = 1 kHz	G_{tr}	typ.	77	dB
Operating ambient temperature	T_{amb}	-20 to +100		^oC

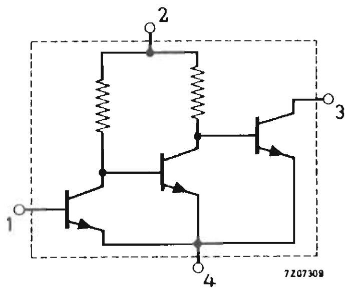
PACKAGE

Dimensions in mm

TO-72



EQUIVALENT CIRCUIT



7Z3 0992

RATINGS (Limiting values) [1])

Voltages

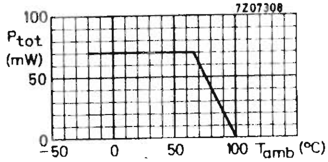
Supply voltage	V_B	max.	8	V
Output voltage	V_{3-4}	max.	7	V
Input voltage	$-V_{1-4}$	max.	5	V

Currents

Output current	I_3	max.	25	mA
Input current	I_1	max.	10	mA

Power dissipation

Total power dissipation up to $T_{amb} = 65\ ^oC$	P_{tot}	max.	70	mW



Temperatures

Storage temperature	T_{stg}	−65 to +100	^oC
Operating ambient temperature	T_{amb}	−20 to +100	^oC

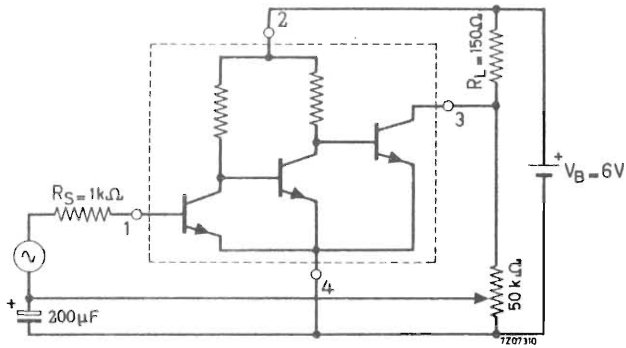
1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 0993

CHARACTERISTICS

T_{amb} = 25 °C

Test circuit:



Currents				
Output current	I_3	typ.	12	mA
Total current drain (no signal)	$I_2 + I_3$	<	16	mA
Over-all small signal current gain				
f = 1 kHz	$h_{f\ tot}$	typ.	5.10^5	
Transducer gain				
f = 1 kHz; P_o = 10 mW	G_{tr}	>	70	dB
		typ.	77	dB
Output power at f = 1 kHz; d_{tot} = 10%	P_o	>	10	mW
d_{tot} = 5%	P_o	>	8	mW
Noise figure				
f = 400 Hz to 6 kHz	F	typ.	5	dB
		<	10	dB
f = 450 kHz; Δf = 5 kHz	F	typ.	2.7	dB

7Z3 0994

CHARACTERISTICS (continued) T_{amb} = 25 °C

y parameters (point 4 common connection)

V_B = 6 V; I_3 = 3 mA; V_{3-4} = 4.2 V

f = 1 kHz

Input admittance	$y_i = g_i$	typ.	20	$\mu\Omega^{-1}$
Transfer admittance	$y_f = g_f$	typ.	11	Ω^{-1}
Output admittance	$y_o = g_o$	typ.	60	$\mu\Omega^{-1}$

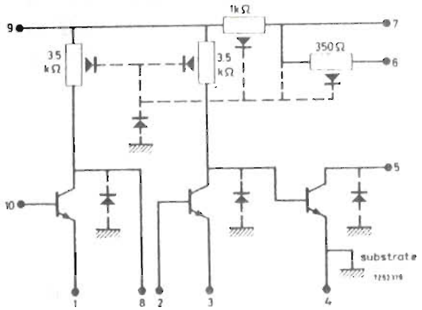
f = 450 kHz

Input conductance	g_i	typ.	15	$\mu\Omega^{-1}$
Input capacitance	C_i	typ.	14	pF
Transfer admittance	$\lvert y_f \rvert$	typ.	9.4	Ω^{-1}
Phase angle of transfer admittance	φ_f	typ.	125°	
Output conductance	g_o	typ.	20	$\mu\Omega^{-1}$
Output capacitance	C_o	typ.	13	pF

7Z3 0995

GENERAL PURPOSE AMPLIFIER

CIRCUIT DIAGRAM

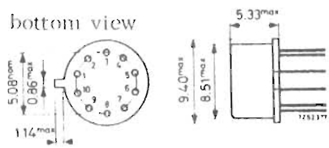


PACKAGE

Dimensions in mm

TO-74 (reduced height)

bottom view



Note:

The diodes drawn with dotted lines are the parasitic diodes formed by the P-N junction of the resistor-diffusions in the N-isle and of the N-isle to the P-substrate respectively. Taking account of the parasitic diodes one can prevent any unwanted effects due to their becoming conducting under certain conditions of d.c. potentials or signal voltages.

QUICK REFERENCE DATA				
Supply voltage	V_B	nom.	+6.0	V
Small signal current gain of first transistor $I_8 = 1$ mA; $V_{8-1} = 1$ V	h_{fe}	typ.	80	
Transducer gain	G_{tr}	typ.	80	dB
Noise figure (30 to 15 000 Hz)	F	typ.	6	dB
Frequency response (−3 dB)		typ.	600	kHz
Package		TO-74 (reduced height)		

The TAA293 is a general purpose integrated amplifier which can be applied in various audio and i.f. applications. Its configuration furthermore allows the use of the TAA293 in multivibrators, pulse amplifiers, trigger circuits, etc. 7Z3 1718

RATINGS (Limiting values) [1])

Voltages

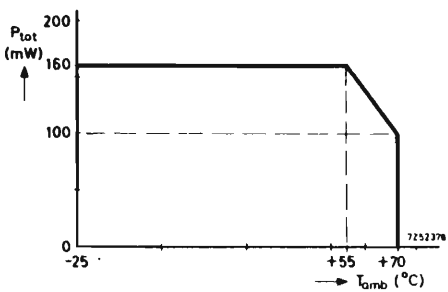
V_{9-1}	max.	7.0	V
V_{8-1}	max.	7.0	V
V_{8-10}	max.	7.0	V
V_{9-3}	max.	7.0	V
V_{9-4}	max.	7.0	V
V_{8-4}	max.	7.0	V
V_{7-4}	max.	7.0	V
V_{6-4}	max.	7.0	V
V_{5-4}	max.	7.0	V
V_{1-10}	max.	6.0	V
V_{3-2}	max.	6.0	V

Currents

I_5	max.	40	mA
$-I_4$	max.	40	mA
$-I_1$	max.	20	mA
I_8	max.	20	mA
$-I_3$	max.	10	mA
I_{10}	max.	10	mA
I_2	max.	10	mA

Power dissipation

Total power dissipation				
up to T_{amb} = 55 °C	P_d	max.	160	mW
up to T_{amb} = 70 °C	P_d	max.	100	mW



Temperatures

Storage temperature	T_{stg}	−25 to +100	°C
Operating ambient temperature	T_{amb}	max. 70	°C

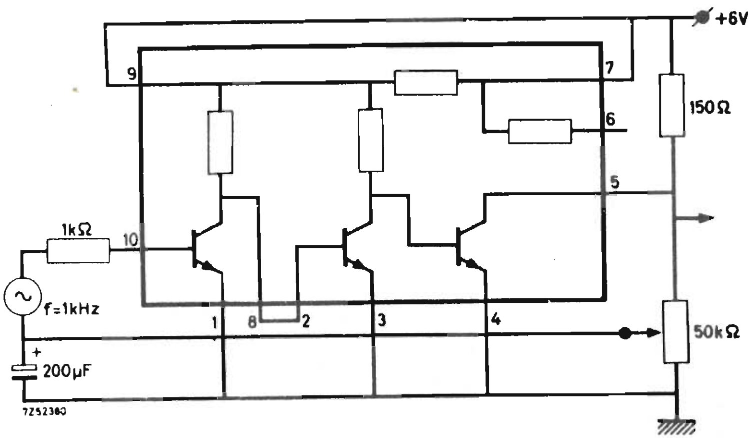
1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1622

CHARACTERISTICS at T_{amb} = 25 °C

Small signal current gain				
of first transistor		>	30	
I_8 = 1 mA; V_{8-1} = 1 V	h_{fe}	typ.	80	
Saturation voltage				
of last transistor at I_5 = 24 mA	$V_{5-4\ sat}$	<	2	V
Noise figure				
$-I_1$ = 100 μA; R_S = 2 kΩ	F	typ.	6	dB
B = 30 Hz to 15000 Hz		<	10	dB
Transducer gain	G_{tr}	typ.	80	dB
Output power at d_{tot} = 10%	P_o	>	10	mW

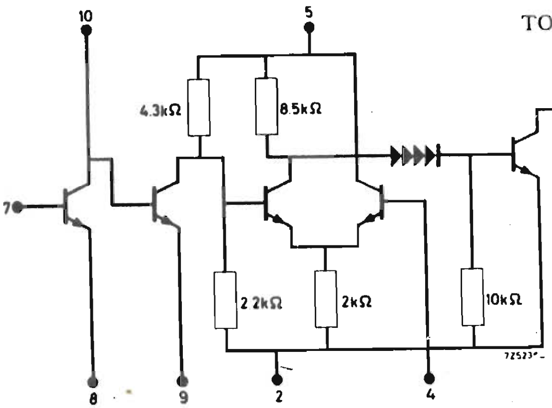
Test circuit for measuring the transducer gain and the output power



7Z3 1623

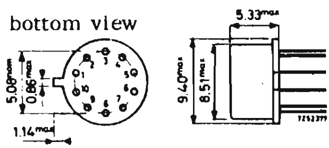
A.F. PREAMPLIFIER

CIRCUIT DIAGRAM



PACKAGE Dimensions in mm

TO-74 (reduced height)



Pins 1 and 6 are not connected

QUICK REFERENCE DATA				
Supply voltage	V_B	nom.	+7	V
Voltage gain	G_v	typ.	100	dB
Noise figure	F	$\leq$	4	dB
Input impedance	z_i	typ.	20	kΩ
Package	TO-74 (reduced height)			

The TAA310 is a monolithic integrated circuit designed for use as an a.f. high-gain preamplifier, with a very low noise figure (< 4 dB) and a high voltage gain of at least 90 dB. Because this gain can be achieved at a low load impedance (1 kΩ) and the input impedance is high, the TAA310 is specially suited for the recording and play-back amplifier in tape recorders.

7Z3 1624

RATINGS (Limiting values) [1])

Voltages

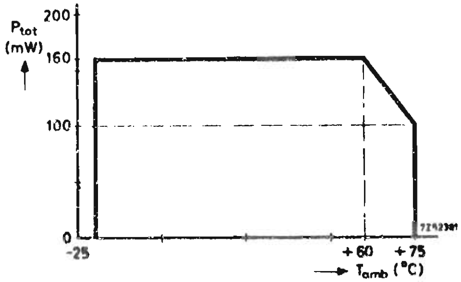
V_{5-2}	max.	9.5	V
V_{3-2}	max.	9.5	V
V_{10-8}	max.	6	V
V_{8-7}	max.	6	V
V_{9-10}	max.	6	V
V_{4-2}	max.	6	V

The pins 3, 4, 5 and 10 must never have a negative potential with respect to pin 2 (substrate).

Currents

I_3	max.	20	mA
I_7	max.	3	mA
$-I_8$	max.	10	mA
$-I_9$	max.	10	mA
I_{10}	max.	10	mA
I_4	max.	3	mA

Total power dissipation



Temperatures

Storage temperature	T_{stg}	-20 to +80	°C
Operating ambient temperature	T_{amb}	-20 to +75	°C

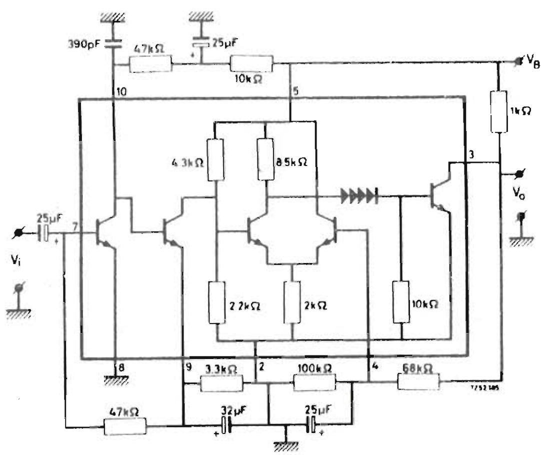
[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1625

CHARACTERISTICS at T_{amb} = 25 °C

<u>D.C. current gain</u>				
of first transistor I_{10} = 100 μA; V_{10-7} = 0	h_{FE}	>	40	
<u>Input impedance</u> at f = 1 kHz				
I_{10} = 100 μA; V_{10-7} = 0	z_i	typ.	20	kΩ
<u>Saturation voltage</u>				
of output transistor at I_3 = 7 mA	$V_{3-2\ sat}$	typ. <	0.8 1.2	V V
<u>Voltage gain</u>	G_v	>	93	dB
<u>Noise figure</u>				
R_S = 2 kΩ; B = 30 to 15 000 Hz	F	typ. <	2.5 4	dB dB
<u>Output voltage</u> at d_{tot} = 10%	$V_{o(rms)}$	typ.	2	V
<u>Cut-off frequency</u> (−3 dB)	f_c	≥	15	kHz
<u>D.C. collector voltage</u>				
of output transistor at I_9 = 200 μA	V_{3-2}	typ. 3.4 to 4.2	3.8	V V

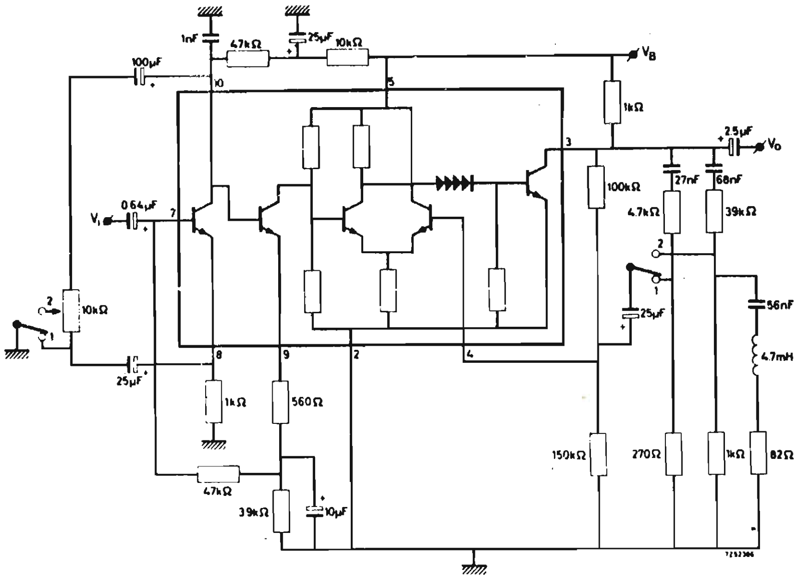
Test circuit for measuring G_v, F, $V_{o(rms)}$, f_c and V_{3-2} at V_B = 7 V ←



7Z3 1719

APPLICATION INFORMATION

Practical tape-recorder preamplifier with a TAA310.



Switch in play-back position.

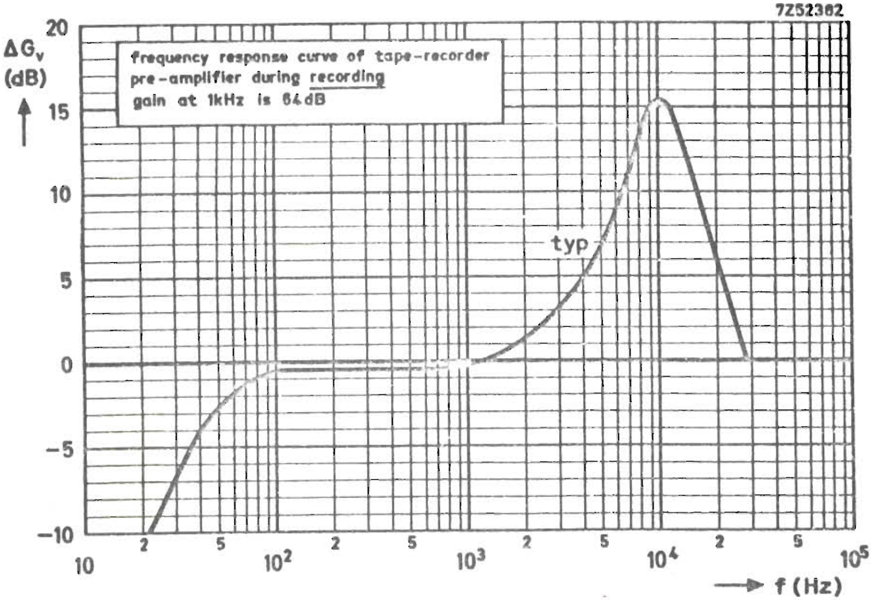
Data for use as recording amplifier (measured at f = 1 kHz)

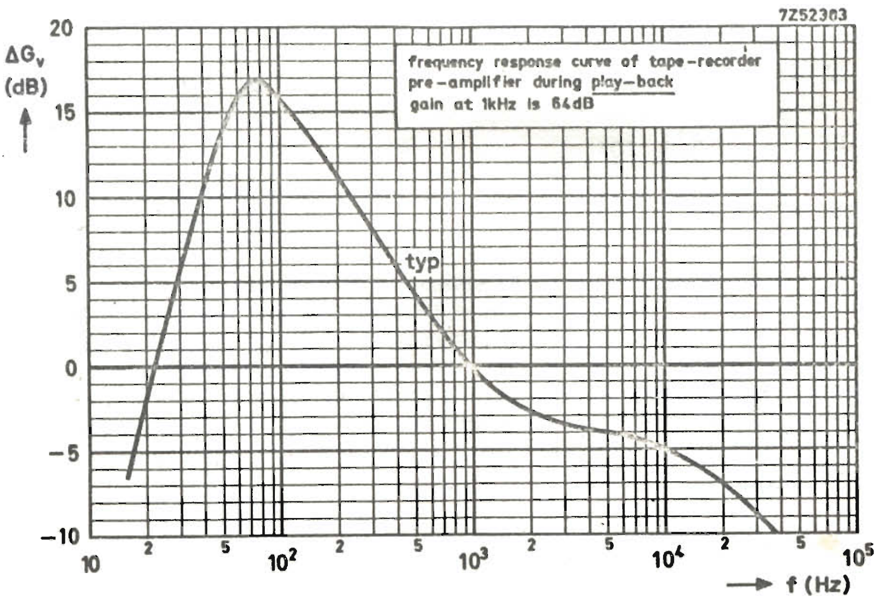
Voltage gain	G_V		64 ± 2	dB
Frequency response (see page A)				
Distortion at $V_{o(rms)}$ = 0.5 V	d_{tot}	<	0.5	%
Volume control range		typ.	75	dB
Signal handling		>	20	mV
Gain variation at V_B decreasing from 7 to 5 V	ΔG_V	typ.	3	dB

Data for use as play-back amplifier (measured at f= 1 kHz)

Voltage gain	G_V		64 ± 2	dB
Frequency response (see page A)				
Distortion at $V_{o(rms)}$ = 0.5 V	d_{tot}	<	0.5	%
Gain variation at V_B decreasing from 7 to 5 V	ΔG_V	typ.	3	dB

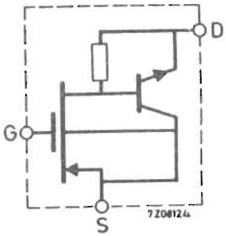
7Z3 1627


7Z52382
ΔG_v (dB)
20
15
10
5
0
−5
−10
frequency response curve of tape-recorder pre-amplifier during recording gain at 1kHz is 64dB
typ
10
2
5
10^2
2
5
10^3
2
5
10^4
2
5
10^5
f (Hz)


7Z52383
ΔG_v (dB)
20
15
10
5
0
−5
−10
frequency response curve of tape-recorder pre-amplifier during play-back gain at 1kHz is 64dB
typ
10
2
5
10^2
2
5
10^3
2
5
10^4
2
5
10^5
f (Hz)

INTEGRATED MOST AMPLIFIER

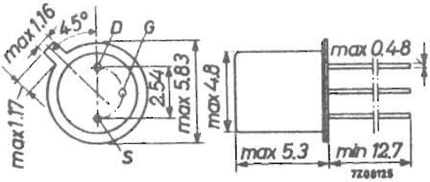
CIRCUIT DIAGRAM



PACKAGE

TO-18 Dimensions in mm

Source connected to case



Accessories available: 56246, 56263

QUICK REFERENCE DATA				
Drain-source voltage (V_{GS} = 0)	$-V_{DSS}$	max.	20	V
Drain current	$-I_D$	max.	25	mA
Gate-source voltage $-I_D$ = 10 mA; $-V_{DS}$ = 10 V	$-V_{GS}$	typ.	11	V
Gate-source resistance $-V_{GS}$ up to 20 V; T_j up to 125 °C	r_{GS}	>	100	GΩ
Transfer admittance at f = 1 kHz $-I_D$ = 10 mA; $-V_{DS}$ = 10 V	$\lvert y_{fs} \rvert$	typ.	75	$m\Omega^{-1}$

The TAA320 is a silicon monolithic integrated circuit, consisting of a MOS transistor and an n-p-n transistor in a TO-18 metal envelope.
The device is primarily intended for audio amplifiers with a very high input resistance (e.g. for crystal pick-ups).
Besides this application the TAA320 is also suitable for other applications where a high input resistance is required, like impedance converters, timing circuits, microphone-amplifiers, etc.

7Z3 1739

RATINGS (Limiting values) [1])

Voltages

Drain-source voltage (V_{GS} = 0)	$-V_{DSS}$	max.	20	V
Gate-source voltage (I_D = 0)	$-V_{GSO}$	max.	20	V
Non repetitive peak gate-source voltage ($t \leq 10$ ms)	$-V_{GSM}$	max.	100	V

Current

Drain current	$-I_D$	max.	25	mA

Power dissipation

Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	200	mW

Temperatures

Storage temperature	T_{stg}		-65 to +125	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0.5	°C/mW

1) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

7Z3 1528

CHARACTERISTICS — T_j = 25 °C unless otherwise specified

Drain current			
$-V_{DS}$ = 20 V; V_{GS} = 0	$-I_{DSS}$	typ. 5	nA
		< 1	μA
Gate-source voltage [1]			
$-I_D$ = 10 mA; $-V_{DS}$ = 10 V	$-V_{GS}$	typ. 11	V
		9 to 14	V
Gate-source resistance			
$-V_{GS}$ up to 20 V; T_j up to 125 °C	r_{GS}	> 100	GΩ
Equivalent noise voltage			
$-I_D$ = 10 mA; $-V_{DS}$ = 10 V B = 50 Hz to 15 kHz	v_n	typ. 25	μV
y parameters at f = 1 kHz			
$-I_D$ = 10 mA; $-V_{DS}$ = 10 V			
Transfer admittance	$\lvert y_{fs} \rvert$	typ. 75	$m\Omega^{-1}$
		40 to 120	$m\Omega^{-1}$
Input capacitance	C_{is}	typ. 8	pF
Feedback capacitance	$-C_{rs}$	typ. 1.5	pF
Output conductance	g_{os}	typ. 0.65	$m\Omega^{-1}$

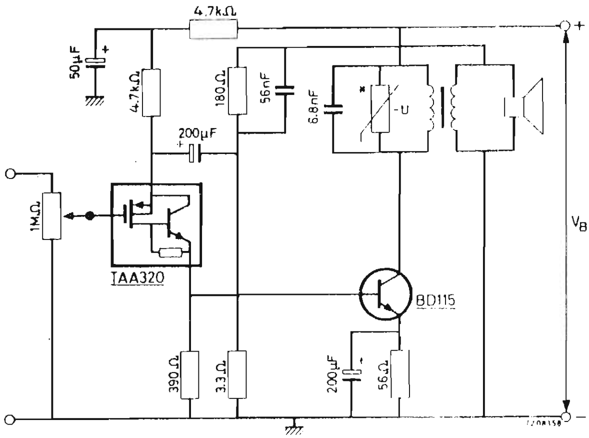
NOTE

To exclude the possibility of damage to the gate oxide layer by an electrostatic charge building up on the high resistance gate electrode, the leads of the device have been short circuited by a clip. The clip has been arranged so that it need not be removed until the device has been mounted in the circuit.

1) $-V_{GS}$ decreases about 6 mV/°C with increasing ambient temperature at a constant $-I_D$.

7Z3 1529

APPLICATION INFORMATION 2 W audio amplifier with TAA320 and BD115



* The voltage dependent resistor (2322 552 03381) suppresses voltage transients that might otherwise exceed the safe operating limits of the BD115.

Supply voltage	V_B	=	100	V
Collector current of BD115	I_C	typ.	50	mA
Drain current of TAA320	$-I_D$	typ.	9.5	mA
Primary d.c. resistance of output transformer			140	Ω
Primary inductance of output transformer			2.7	H
A.C. collector load for BD115			1.8	kΩ

Performance at f = 1 kHz; feedback = 16 dB

Output power at d_{tot} = 10% (on primary of the output transformer)	P_o	typ.	2.6	W
Input voltage for P_o = 50 mW	$V_{i(rms)}$	typ.	13.5	mV
Input voltage for P_o = 2 W	$V_{i(rms)}$	typ.	86	mV
Total distortion at P_o = 2 W	d_{tot}	typ.	3.6	%
Minimum frequency response (−3 dB)			60 Hz to 20	kHz
Signal-noise ratio at P_o = 2 W		typ.	73	dB

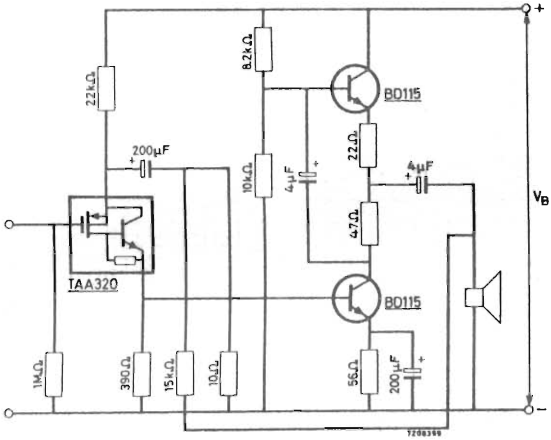
Mounting instruction for BD115

Proper continuous operation is ensured up to T_{amb} = 50 °C, provided the BD115 is directly mounted on a 1.5 mm blackened Al. heatsink of 30 cm^2 with a clamping washer of type 56218.
If the transistor is mounted on a heatsink with a mica washer, the heatsink should have an area of 50 cm^2.
Recommended diameter of hole in heatsink: 7.7 mm.

7Z3 1740

APPLICATION INFORMATION (continued)

4 W audio amplifier with TAA320 and 2 transistors of type BD115.



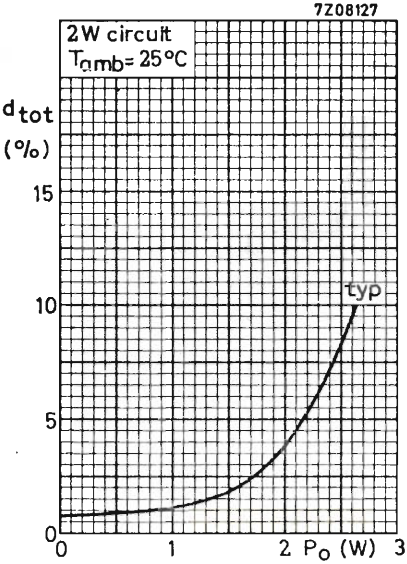
Supply voltage	V_B	=	200	V
Collector current of a BD115	I_C	typ.	52	mA
Drain current of TAA320	$-I_D$	typ.	8.6	mA

Performance at f = 1 kHz; feedback = 12 dB

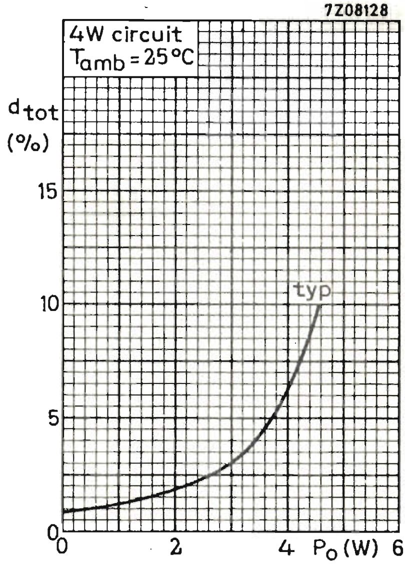
Output power at d_{tot} = 10%	P_o	typ.	4.5	W
Input voltage for P_o = 50 mW	$V_{i(rms)}$	typ.	7.5	mV
Input voltage for P_o = 4 W	$V_{i(rms)}$	typ.	67	mV
Total distortion at P_o = 4 W	d_{tot}	typ.	6	%
Minimum frequency response (−3 dB)			50 Hz to 20	kHz
Signal-noise ratio at P_o = 4 W		typ.	73	dB

Mounting instruction for BD115 see page 4

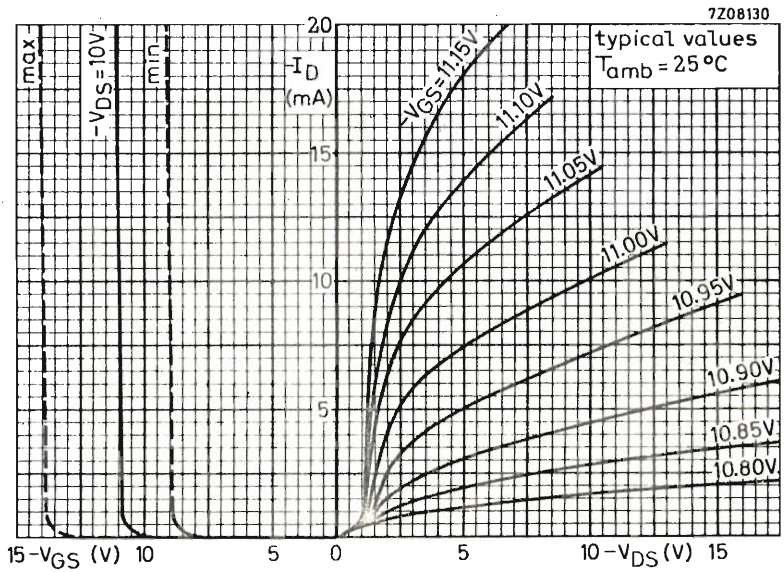
7Z3 1741



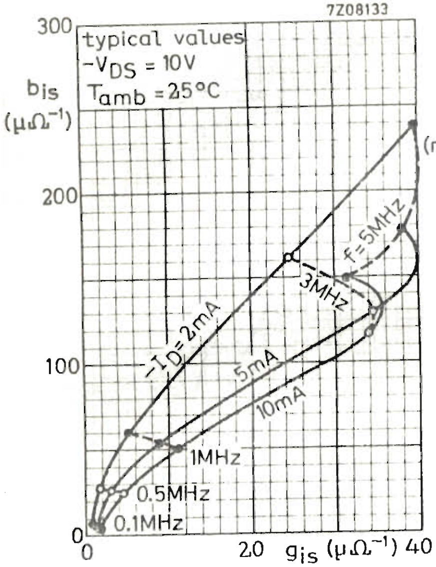
7Z08127
2W circuit
Tamb = 25 °C
dtot (%)
15
10
5
0
typ
0
1
2
Po (W)
3

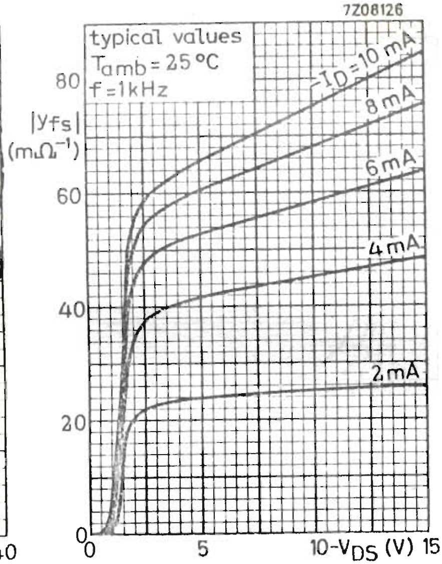


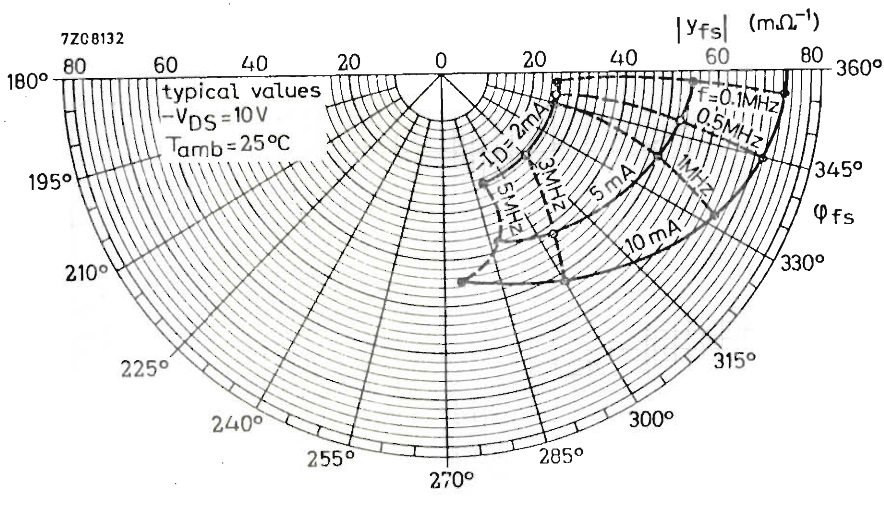
7Z08128
4W circuit
Tamb = 25 °C
dtot (%)
15
10
5
0
typ
0
2
4
Po (W)
6

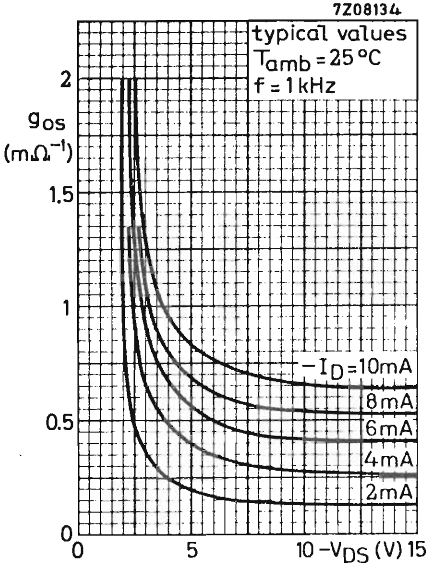


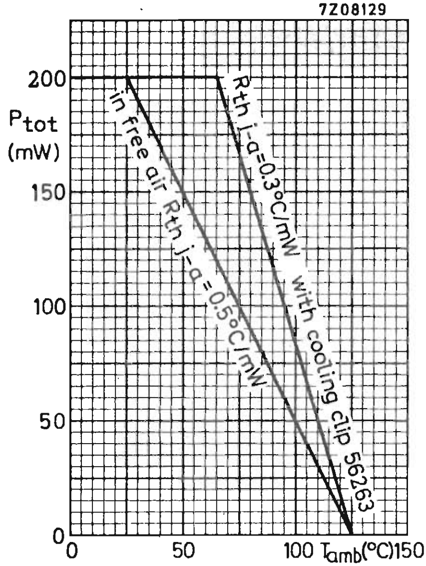
7Z08130
typical values
Tamb = 25 °C
max
−VDS = 10V
min
−ID (mA)
20
15
10
5
−VGS = 11.15V
11.10V
11.05V
11.00V
10.95V
10.90V
10.85V
10.80V
15 −VGS (V) 10
5
0
5
10 −VDS (V) 15

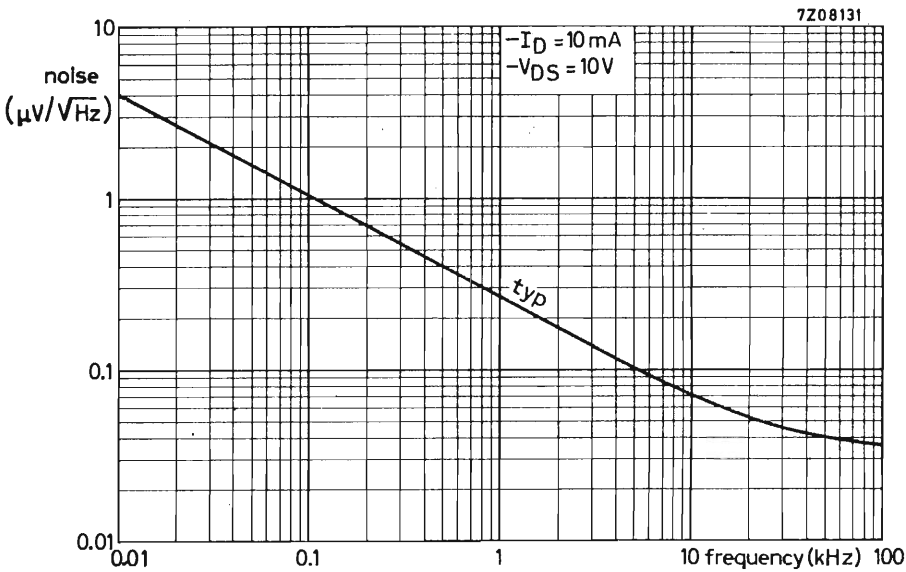

7Z08133
typical values
$-V_{DS}$ = 10V
T_{amb} = 25°C
b_{is} ($\mu\Omega^{-1}$)
300
200
100
0
0
20
g_{is} ($\mu\Omega^{-1}$) 40
$-I_D$=2mA
5mA
10mA
f=5MHz
3MHz
1MHz
0.5MHz
0.1MHz


7Z08126
typical values
T_{amb} = 25 °C
f = 1kHz
$|y_{fs}|$ ($m\Omega^{-1}$)
80
60
40
20
0
0
5
10
$-V_{DS}$ (V) 15
$-I_D$=10 mA
8 mA
6 mA
4 mA
2 mA


7Z08132
typical values
$-V_{DS}$=10V
T_{amb}=25°C
$|y_{fs}|$ ($m\Omega^{-1}$)
80
60
40
20
0
20
40
60
80
180°
195°
210°
225°
240°
255°
270°
285°
300°
315°
330°
345°
360°
φ_{fs}
$-I_D$=2mA
5 mA
10 mA
f=0.1MHz
0.5MHz
1MHz
3MHz
5MHz


7Z08134
typical values
T_{amb} = 25 °C
f = 1 kHz
g_{os}
(mΩ⁻¹)
−I_D=10mA
8mA
6mA
4mA
2mA
0
0.5
1
1.5
2
0
5
10 −V_{DS} (V) 15


7Z08129
P_{tot}
(mW)
200
150
100
50
0
in free air $R_{th\ j\text{-}a}$ = 0.5°C/mW
$R_{th\ j\text{-}a}$=0.3°C/mW with cooling clip 56263
0
50
100 T_{amb}(°C)150


7Z08131
noise
(μV/√Hz)
−I_D = 10 mA
−V_{DS} = 10 V
typ
10
1
0.1
0.01
0.01
0.1
1
10 frequency (kHz) 100

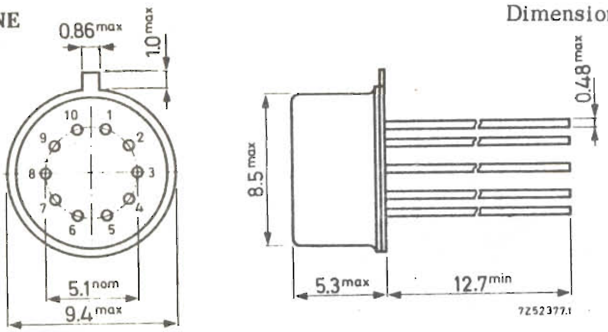
LOW FREQUENCY AMPLIFIER

The TAA435 is a silicon monolithic integrated a.f. preamplifier and driver stage. Combined with a complementary output stage an output power of 4 W can be achieved.

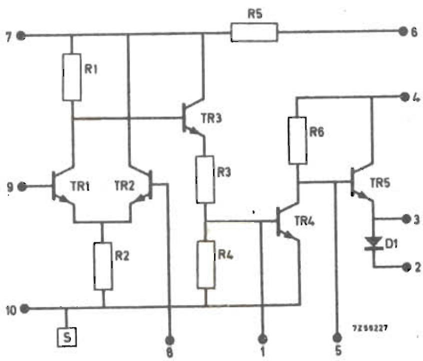
QUICK REFERENCE DATA				
with AD161/AD162 output stage				
Supply voltage	V_B	nom.	14	V
Ambient temperature	T_{amb}	nom.	25	°C
Voltage gain	G_v	typ.	80	dB
Output power at d_{tot} < 10%	P_o	>	4	W
Noise figure at f = 60 Hz to 10 kHz	F	typ.	6	dB

PACKAGE OUTLINE
XA10 (TO-74; reduced height)

Dimensions in mm



CIRCUIT DIAGRAM



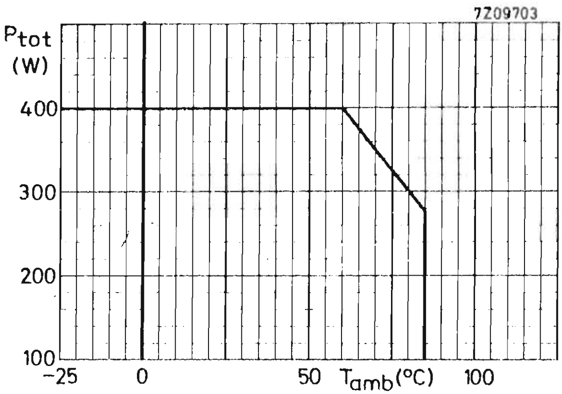
RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages

Supply voltage	V_B	max.	18	V
Input voltage	$-V_9$	max.	5	V
Output voltage (peak value)	V_{4M}	max.	24	V
	V_{3M}	max.	20	V
Supply current	I_4	max.	70	mA

Total power dissipation

Maximum allowable total power dissipation versus ambient temperature.



Temperatures

Operating ambient temperature	T_{amb}	−25 to +85	°C
Storage temperature	T_{stg}	−35 to +125	°C

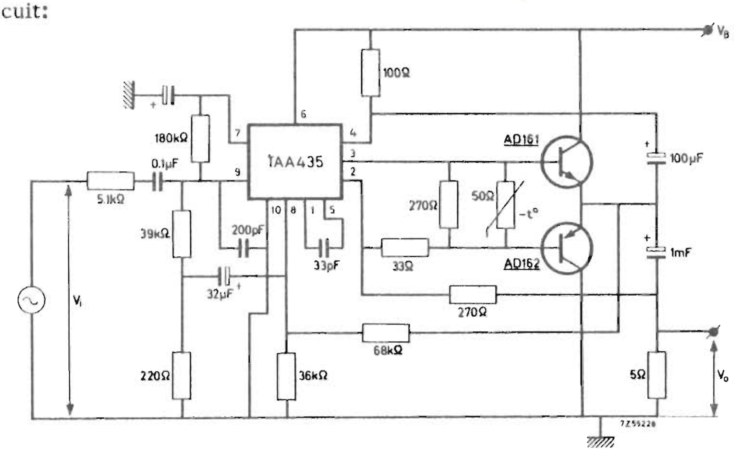
CHARACTERISTICS at V_B = 10 to 18 V; T_{amb} = 25 ^oC

Forward voltage at $-I_2$ = 30 mA	V_{3-2}	typ.	0.8	V
Collector-emitter voltage at I_4 = 50 mA	V_{4-3}	<	3.5	V

CHARACTERISTICS at V_B = 14 V; T_{amb} = 25 ^oC (measured in circuit below)

Voltage gain at f = 1 kHz; without feedback	G_v	typ.	80	dB
with feedback	G_v	typ.	50	dB
Input impedance at f = 1 kHz	$\|Z_{9-10}\|$	>	70	kΩ
Noise figure at f = 60 Hz to 10 kHz	F	typ.	6	dB
Cut-off frequency (−3 dB)	f_c	>	10	kHz
Output power at f = 1 kHz, d_{tot} = 10%	P_o	>	4	W
Total distortion at f = 1 kHz, P_o = 1 W	d_{tot}	<	1	%

Test circuit:



INTEGRATED 1 WATT AUDIO AMPLIFIER

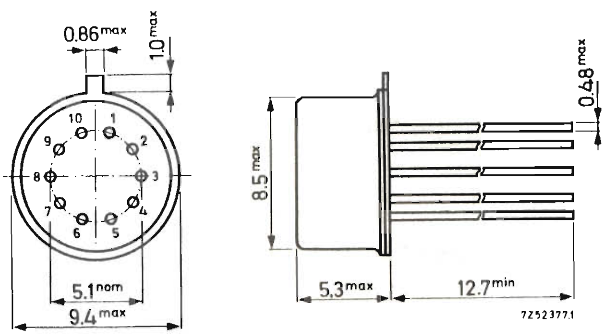
A complete a.f. amplifier in monolithic integrated form incorporating special measures to prevent cross-over distortion throughout an exceptionally wide usable range of supply voltage (4.5 V to 10 V. This, in combination with its low drain current, makes the TAA300 ideally suited for use in battery operated equipment. Due to the high a.c. feedback (≈ 20 dB) the distortion and spread in gain is very low.

QUICK REFERENCE DATA				
Supply voltage	V_B	nom.	9	V
Output power	P_o	typ.	1	W
Input signal for P_o = 1 W	V_i	typ.	8.5	mV
Input impedance	$\|Z_i\|$	typ.	15	kΩ
Load impedance	R_L		8	Ω
Total current (no signal)	I_{tot}	typ.	8	mA

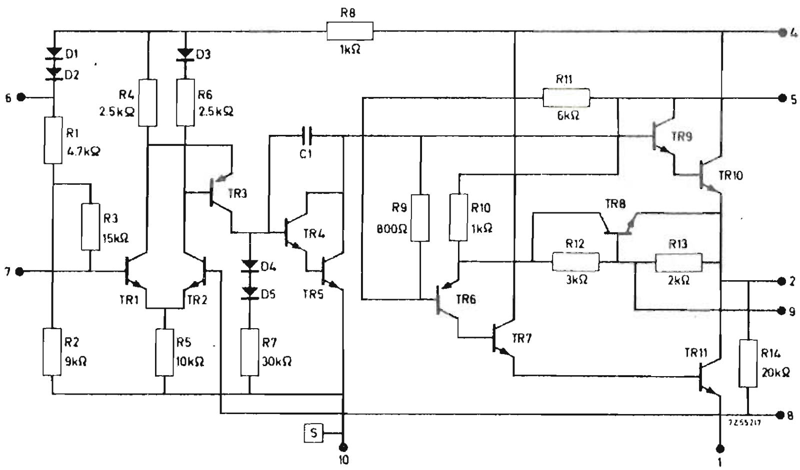
PACKAGE OUTLINE

Dimensions in mm

XA10 (TO-74; reduced height)



CIRCUIT DIAGRAM



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages (see test set-up on page 4)

V_{4-1}	max.	10.5	V
V_{7-8}	max.	6	V
V_{8-7}	max.	6	V
V_{2-9}	max.	6	V
V_{2-1}	max.	10.5	V
V_{4-2}	max.	10.5	V

Currents (see test set-up on page 4)

$-I_1$	max.	600	mA
$\pm I_2$	max.	600	mA
$+I_4$	max.	600	mA

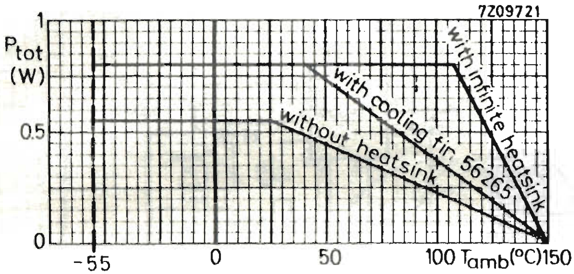
Total power dissipation	P_{tot}	see next page

Temperatures

Storage temperature	T_{stg}	-55 to +150	°C
Operating ambient temperature	T_{amb}	-55 to +150	°C

RATINGS (continued)

Maximum allowable total power dissipation versus ambient temperature

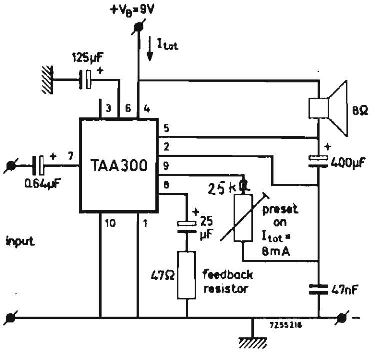


CHARACTERISTICS at T_{amb} = 25 °C; V_B = 9 V

Measured in the test set-up on page 4

Output power at d_{tot} = 10%	P_o	typ.	1	W
Bandwidth (−3 dB)	B	>	10	kHz
		typ.	25	kHz
Total current (d.c.)				
no signal and excluding output transistors:	I_{tot}	typ.	4	mA
with signal at P_o = 1 W:	I_{tot}	typ.	180	mA
Total distortion at P_o = 0.5 W	d_{tot}	typ.	0.7	%
		<	3	%
Input signal at P_o = 1 W	V_i	typ.	8.5	mV
P_o = 0.5 W	V_i	<	8.5	mV
Input impedance	$\|Z_i\|$	>	10	kΩ
		typ.	15	kΩ
Efficiency	η	typ.	60	%
Signal to noise ratio related to P_o = 1 W				
R_S = 2 kΩ; B = 30 Hz to 15 kHz	$\frac{S}{N}$	>	70	dB
		typ.	75	dB
Noise output power				
input short circuited; B = 30 Hz to 15 kHz	P_N	typ.	10	nW
		<	20	nW
Preset resistor for I_{tot} = 8 mA	R_{pr}		4 to 25	kΩ

TEST SET-UP



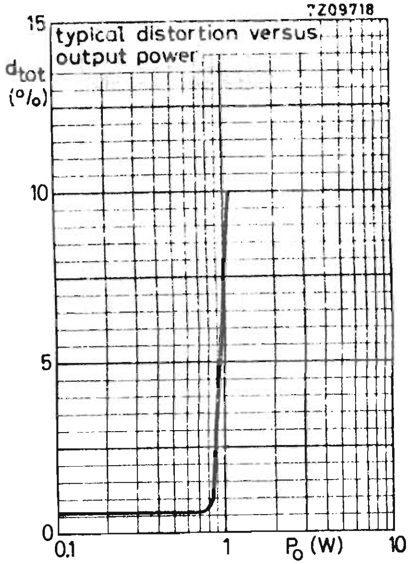
To prevent high-frequency instability, the following precautions must be taken.

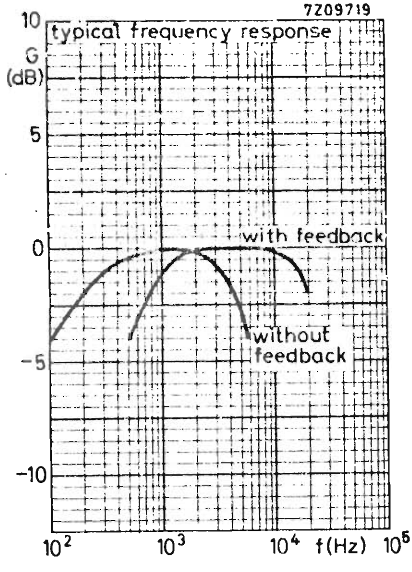
a. Keep the lead inductance from the positive voltage supply to pin 4 to a minimum.

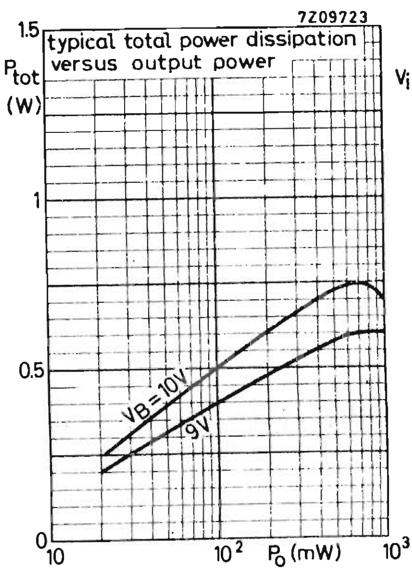
b. Because of the high internal resistance of batteries (especially at end of life) a large capacitance should be connected between pin 4 and ground.

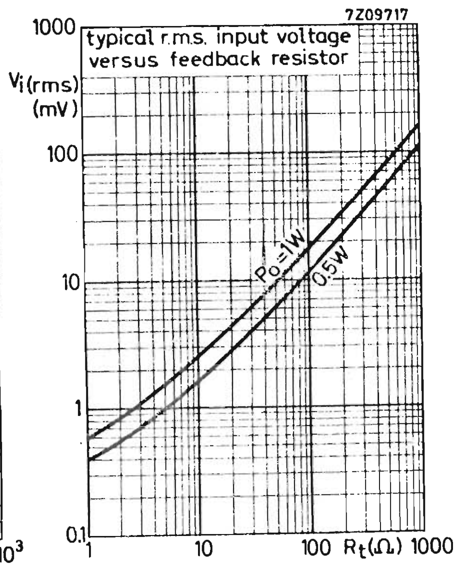
c. A capacitor of at least 47 nF should be connected between pin 2 and ground to prevent instability of the lower Darlington output transistor (see also test set-up).

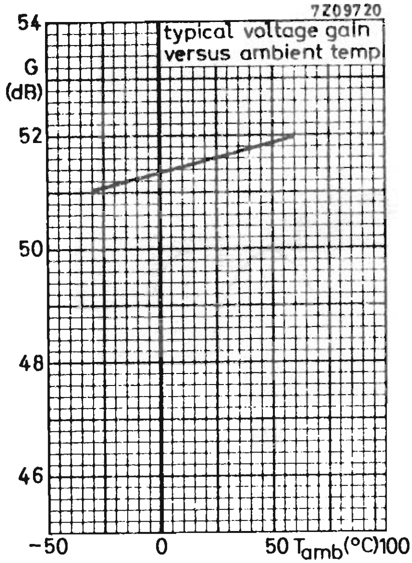
d. Avoid coupling between output and input leads (especially those carrying signals from a high-impedance source). This coupling can be reduced by using short leads, shielded input cable or by limiting the upper frequency to 15 kHz by means of a capacitor of 560 pF between pin 7 and ground.

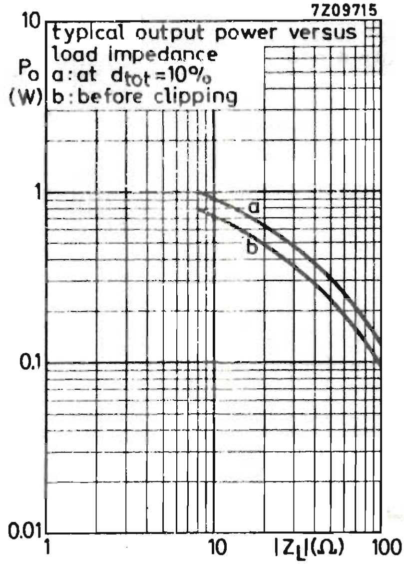

7Z09718
typical distortion versus output power
d_{tot} (%)
15
10
5
0
0.1
1
P_o (W)
10

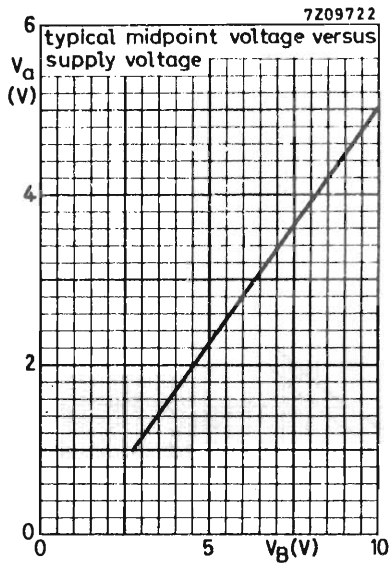

7Z09719
typical frequency response
G (dB)
10
5
0
−5
−10
with feedback
without feedback
10^2
10^3
10^4
f (Hz)
10^5

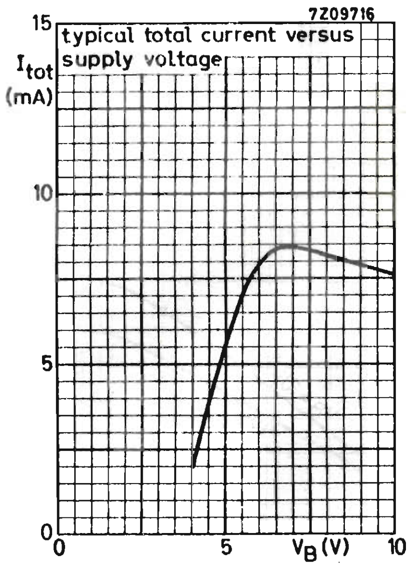

7Z09723
typical total power dissipation versus output power
P_{tot} (W)
1.5
1
0.5
0
VB=10V
9V
10
10^2
P_o (mW)
10^3


7Z09717
typical r.m.s. input voltage versus feedback resistor
$V_{i(rms)}$ (mV)
1000
100
10
1
0.1
Po=1W
0.5W
1
10
100
R_t (Ω)
1000


7Z09720
typical voltage gain versus ambient temp
G (dB)
54
52
50
48
46
−50
0
50
T_{amb} (°C)
100


7Z09715
typical output power versus load impedance
a: at d_{tot} = 10%
b: before clipping
P_o (W)
10
1
0.1
0.01
1
10
$|Z_L|$ (Ω)
100
a
b


7Z09722
typical midpoint voltage versus supply voltage
V_a (V)
6
4
2
0
0
5
V_B (V)
10


7Z09716
typical total current versus supply voltage
I_{tot} (mA)
15
10
5
0
0
5
V_B (V)
10

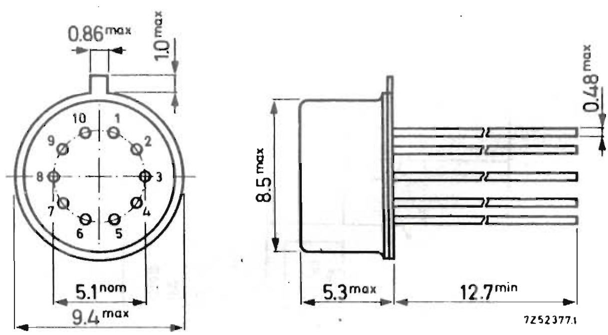
WIDEBAND DIFFERENTIAL LIMITING AMPLIFIER

A monolithic integrated i.f. amplifier for f.m. signals. Differential amplification with current-driven long-tailed pairs gives high a.m. rejection, making the amplifier usable in conjunction with very simple f.m. detectors. The TAA350 can be driven either symmetrically or asymmetrically.

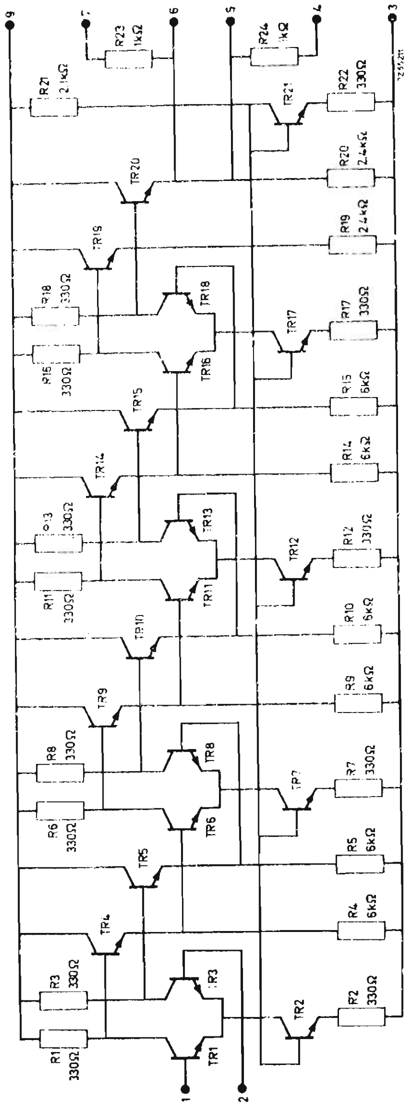
QUICK REFERENCE DATA			
Supply voltage		6	V
Frequency		5.5	MHz
Total current	typ.	20	mA
Power gain	typ.	80	dB
Input limiting voltage	typ.	100	μV
Frequency response (−3 dB)	typ.	12	MHz
Output impedance	typ.	75	Ω

PACKAGE OUTLINE Dimensions in mm

XA10 (TO-74; reduced height)



CIRCUIT DIAGRAM



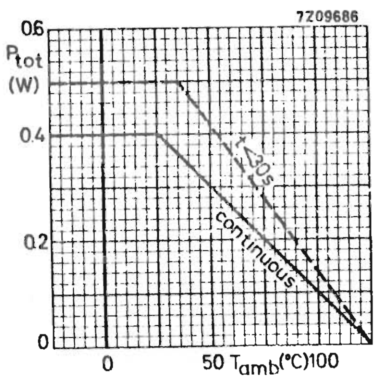
RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Voltages

Pin No.1 voltage at $V_{2-3} = V_{1-3}$; $V_{1-3} \leq V_{9-3}$	V_{1-3}	0 to +10	V
Pin No.2 voltage at $V_{1-3} = V_{2-3}$; $V_{2-3} \leq V_{9-3}$	V_{2-3}	0 to +10	V
Pin No.4 voltage (do not apply an external voltage source)	V_{4-3}	0 to +10	V
Pin No.5 voltage at $\|I_5\| < 20$ mA; $V_{5-3} \leq V_{9-3}$	V_{5-3}	0 to +10	V
Pin No.6 voltage at $\|I_6\| < 20$ mA; $V_{6-3} \leq V_{9-3}$	V_{6-3}	0 to +10	V
Pin No.7 voltage (do not apply an external voltage source)	V_{7-3}	0 to +10	V
Pin No.9 voltage with lower d.c. potential at all other terminals	V_{9-3}	0 to +10	V

Do not connect pins 8 and 10.
The maximum signal voltage between pins 1 and 2 is 6 V.

Total power dissipation



Temperatures

Storage temperature	T_{stg}	−25 to +125	°C
Operating ambient temperature	T_{amb}	−25 to +125	°C

CHARACTERISTICS T_{amb} = 25 °C unless otherwise specified

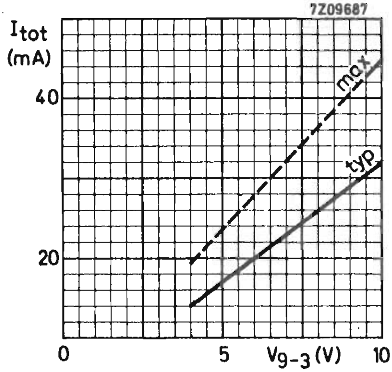
Because the TAA350 has a low ohmic output impedance and it mostly is driven by a bandpass or parallel tuned filter, four-pole hybrid k parameters have been introduced.

The four-pole equations are:

$$I_i = k_i V_i + k_r I_o$$

$$V_o = k_f V_i + k_o I_o$$

Total current (d.c.) [1]



k parameters (see pages 6 to 9)

f = 5.5 MHz; V_{9-3} = 6 V

Input conductance (input pin 2)	g_i	typ.	400	$\mu\Omega^{-1}$
Input susceptance (input pin 2)	b_i	typ.	550	$\mu\Omega^{-1}$
Reverse current transfer ratio (output pin 6, input pin 2) [2]	$\|k_r\|$	typ.	-90	dB
Small signal voltage gain (input pin 2, output pin 6)	$\|k_f\|$	typ.	67	dB
Real part of output impedance (output pin 6)	$Re(k_o)$	typ.	75	Ω
Imaginary part of output impedance (output pin 6)	$Im(k_o)$	typ.	20	Ω

f = 10.7 MHz; V_{9-3} = 6 V

Reverse current transfer ratio (output pin 6, input 2) [2]	$\|k_r\|$	typ.	-80	dB
Small signal voltage gain (input pin 2, output pin 6)	$\|k_f\|$	typ.	65	dB

Input limiting voltage (see pp 5 and 8) [3]

f = 5.5 MHz; V_{9-3} = 6 V	$V_{i\,lim}$	typ.	100	μV

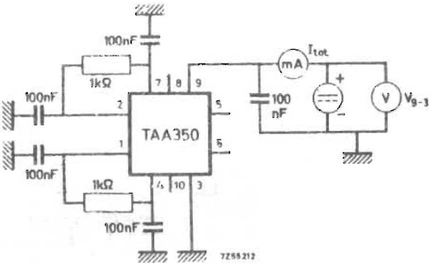
[1] The power dissipation is obtained from $V_{9-3} \times I_{tot}$.

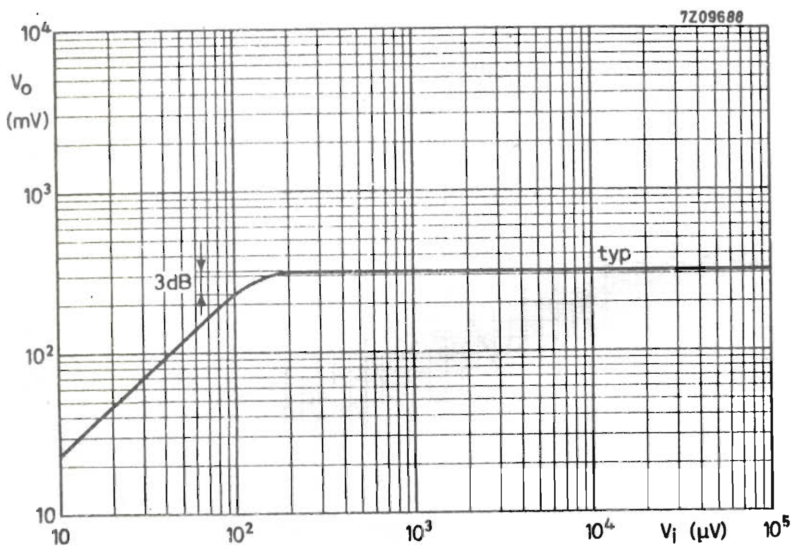
[2] The output is considered open for $R_L \geq 10$ kΩ and $C_L \leq 10$ pF.

[3] $V_{i\,lim}$ is defined as the input signal voltage which decreases the output voltage 3 dB of its max. level (see also page 5).

CHARACTERISTICS (continued)

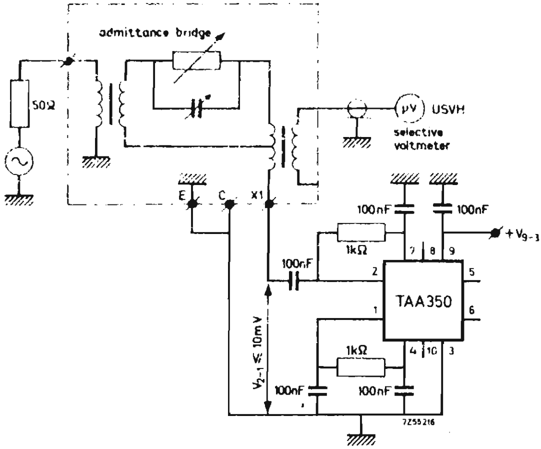
Test circuit for measuring $I_{tot} = f(V_{9-3})$

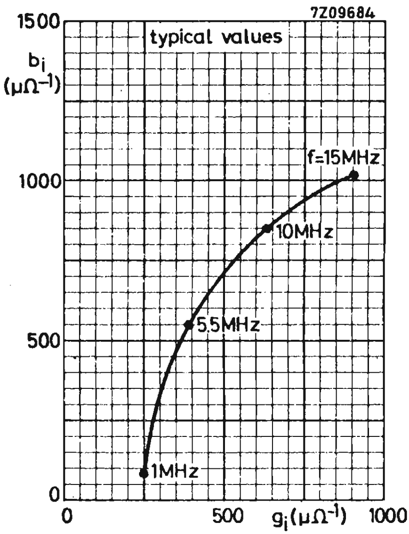




CHARACTERISTICS (continued)

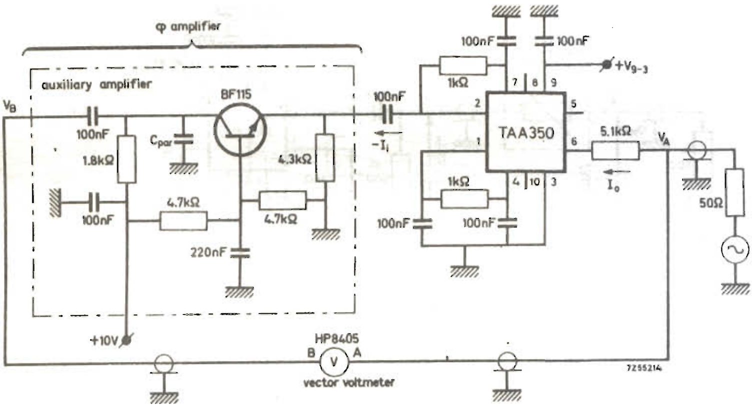
Test circuit for measuring the input characteristic

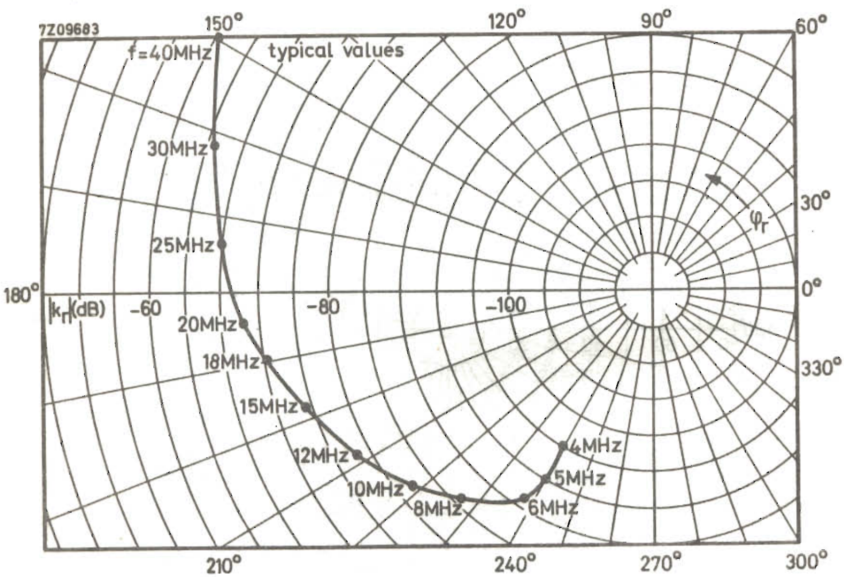




CHARACTERISTICS (continued)

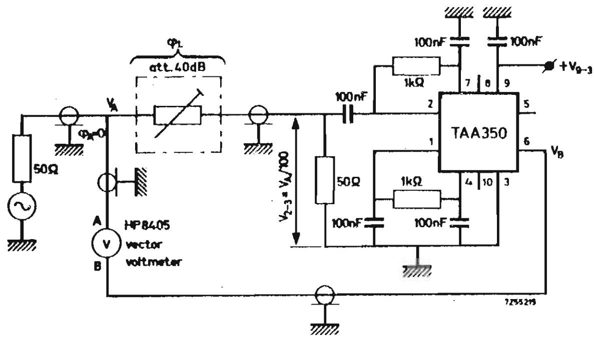
Test circuit for measuring the reverse current transfer ratio





CHARACTERISTICS (continued)

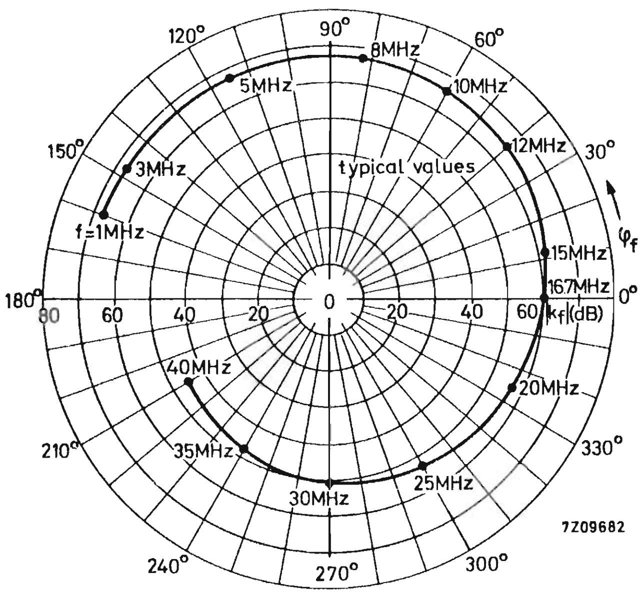
Test circuit for measuring the small signal voltage gain and the input limiting voltage



$$\overline{k_f} = (20 \log \frac{V_B}{V_A} + 40\ \text{dB}) \cdot e^{j(\varphi_B - \varphi_1)}$$

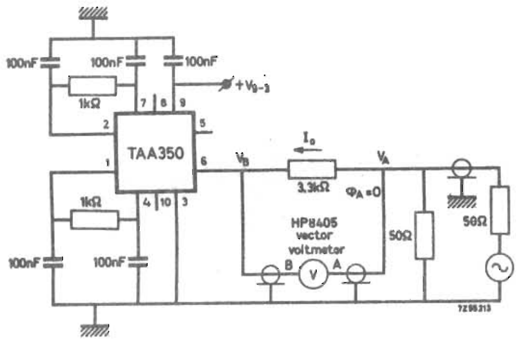
$V_{i\ lim} = V_{Bmax} - 3$ dB

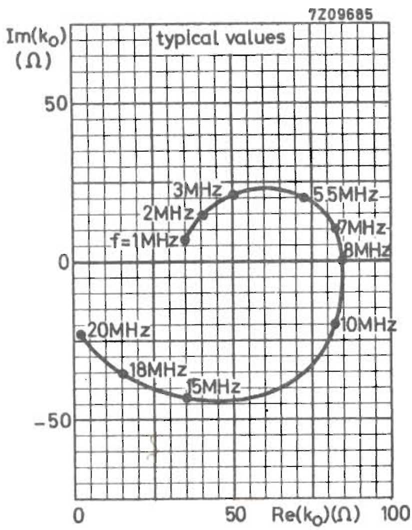
To obtain V_{Bmax}: V_A is increased until V_B is constant



CHARACTERISTICS (continued)

Test circuit for measuring the output characteristic





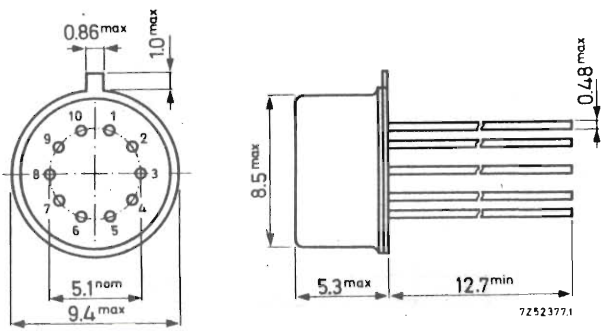
R.F. AMPLIFIER-DISCRIMINATOR-A.F. AMPLIFIER

The TAA380 is a monolithic integrated circuit to be used as i.f. amplifier, discriminator and a.f. amplifier. The frequency response is such that it can be used in the intercarrier-sound circuit of television receivers and in f.m. broadcast receivers.

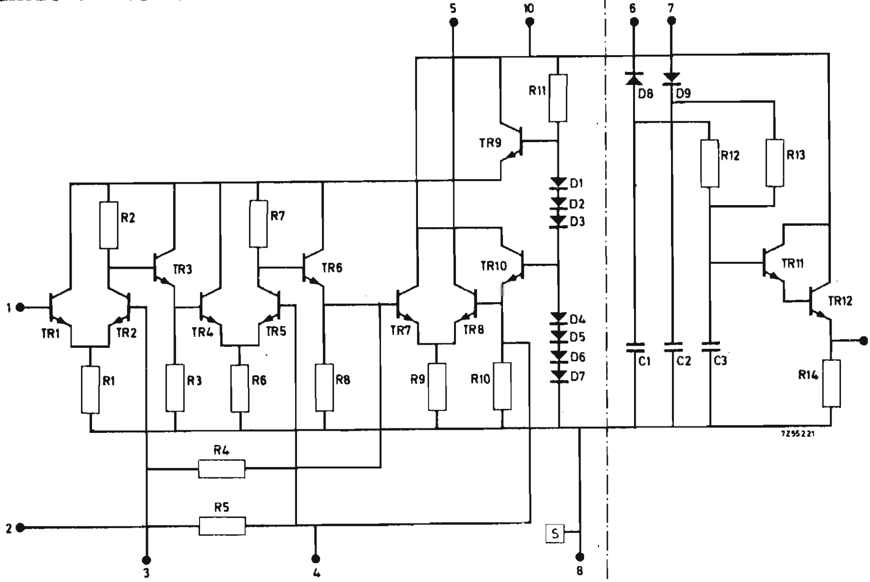
QUICK REFERENCE DATA				
Supply voltage	V_B	=	7.5	V
Ambient temperature	T_{amb}	=	25	°C
Voltage gain at f = 5.5 MHz	G_v	typ.	67	dB
Start of limiting at f = 5.5 MHz	V_i	typ.	400	μV

PACKAGE OUTLINE

XA10 (TO-74; reduced height)



CIRCUIT DIAGRAM



Can also be delivered without ratio-detector and a.f. preamplifier under type number TAA380A. Pinning of r.f. amplifier remains the same.

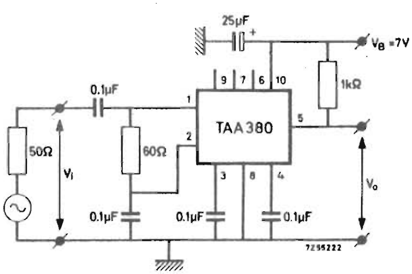
RATINGS Limiting values in accordance with the Absolute Maximum System (IEC 134)

Supply voltage	V_{10-8}	max.	10	V
Output terminal voltage	V_{5-8}	max.	13	V
Total power dissipation	P_{tot}	max.	200	mW
Storage temperature	T_{stg}		-20 to +80	^oC
Operating ambient temperature	T_{amb}		-20 to +60	^oC

CHARACTERISTICS at V_B = 7.5 V; T_{amb} = 25 °C

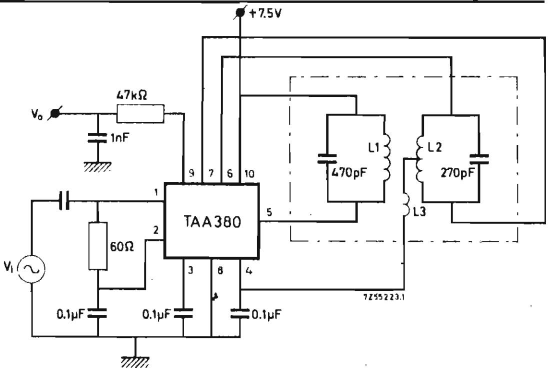
Voltage gain				
V_i = 100 µV: f = 1 MHz	G_v	typ.	71	dB
V_i = 100 µV: f = 4.5 MHz	G_v	typ.	68	dB
V_i = 100 µV: f = 5.5 MHz	G_v	>	60	dB
		typ.	67	dB
Start of limiting at f = 5.5 MHz	V_i	typ.	400	µV
I.F. output current at V_i = 5 mV	$I_{o(p-p)}$	typ.	2.8	mA
A.F. output voltage at V_i = 5 mV; f_{mod} = 1 kHz; Δf = ± 25 kHz	$V_{o(rms)}$	typ.	200	mV
Input resistance	R_i	typ.	3	kΩ
Input capacitance	C_i	typ.	7	pF
Output resistance	R_o	typ.	30	kΩ
Output capacitance	C_o	typ.	4	pF
Total current at V_{10-8} = 7.5 V	I_B	typ.	16	mA
V_{10-8} = 10 V	I_B	16 to	25	mA
Total distortion of a.f. output signal				
V_i = 5 mV	d_{tot}	typ.	1.8	%

I.F. test circuit



APPLICATION INFORMATION

Circuit with the TAA380 in a television intercarrier-sound amplifier.



Primary: frame core AP3014/03
Secondary: frame core AP3014/03
L1 = 13 turns 0.15 mm stranded Cu wire
L2 = 2 x 9 turns 0.15 mm stranded Cu wire; bifilarly wounded
L3 = 6 turns 0.15 mm stranded Cu wire; bifilarly wounded with L1
Top-top distance of frequency response curve: 120 kHz

Intermediate frequency	f_0	= 5.5 MHz
Frequency deviation	Δf	$\pm$ 25 kHz
Modulation frequency	f_m	= 1 kHz
Ambient temperature	T_{amb}	= 25 °C

Start of limiting	V_i	typ.	400	µV
L.F. output voltage at $V_i \geq$ 300 µV	$V_{o(rms)}$	typ.	200	mV
A.M. suppression				
f_m = 1 kHz; m = 0.3; $V_i \geq$ 10 mV		$\geq$	40	dB

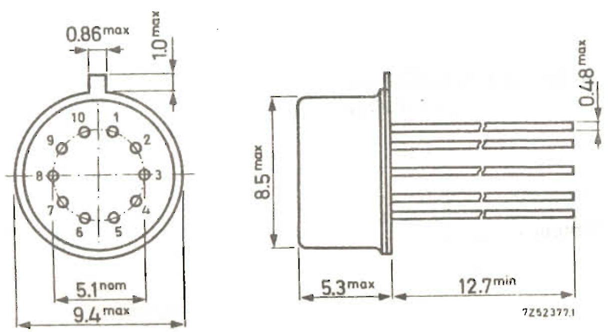
FM CHANNEL AMPLIFIER

The TAA450 is a monolithic integrated circuit containing an i.f. amplifier with limiting characteristics for use up to frequencies of 10 MHz, a ratio detector and an l.f. amplifier with connections brought out for remote volume control.

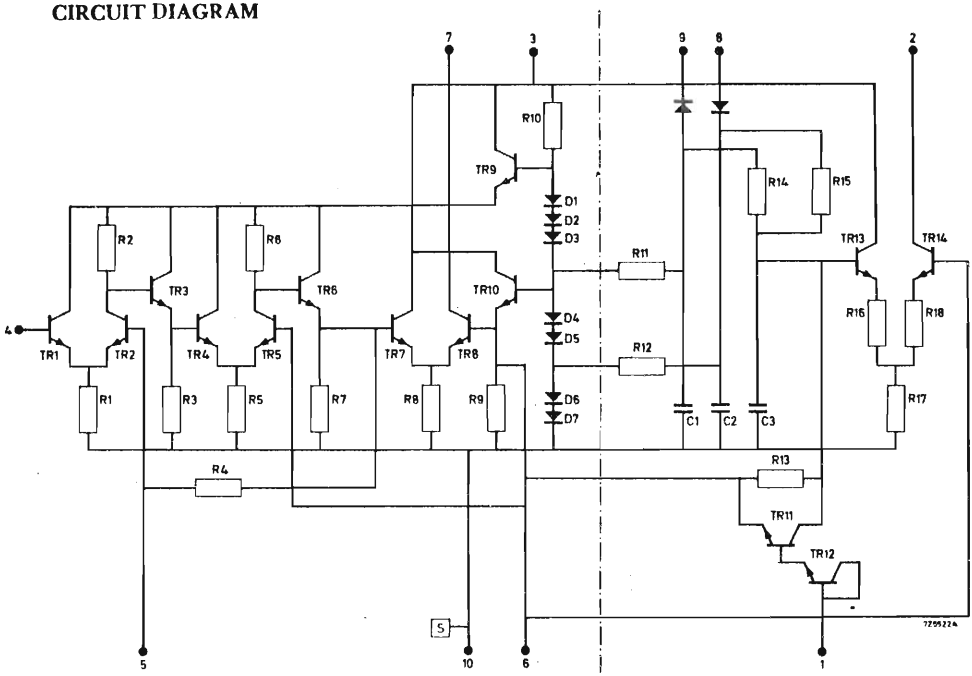
QUICK REFERENCE DATA				
Operating characteristics of i.f. amplifier at f = 5.5 MHz Supply voltage V_B = 7.5 V; T_{amb} = 25 ^oC				
Voltage gain	G_v	typ.	69	dB
Start of limiting	V_i	typ.	300	μV

PACKAGE OUTLINE — Dimensions in mm

XA10 (TO-74; reduced height)



CIRCUIT DIAGRAM



RATINGS (Limiting values in accordance with the Absolute Maximum System (IEC 134)

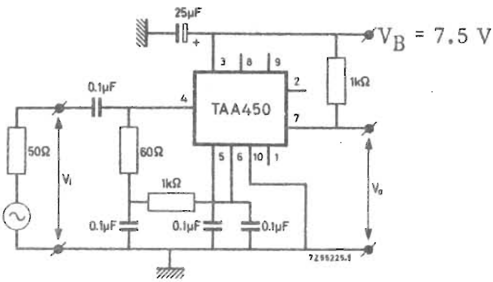
Supply voltage (d.c.) i.f. amplifier	$V_7 = V_3$	max.	12	V
a.f. amplifier	V_2	max.	18	V [1]
Total power dissipation	P_{tot}	max.	380	mW
Storage temperature	T_{stg}		-20 to +80	°C
Operating ambient temperature	T_{amb}		-20 to +60	°C

[1]) During warming-up in tube receivers this value may be exceeded up to 30 V.

CHARACTERISTICS for i.f. amplifier part at V_B = 7.5 V; T_{amb} = 25 °C

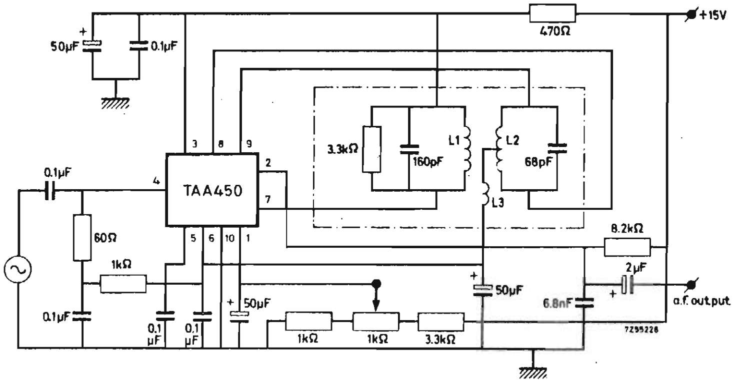
Voltage gain				
V_i = 100 µV: f = 1 MHz	G_v	typ.	71	dB
V_i = 100 µV: f = 4.5 MHz	G_v	typ.	69	dB
V_i = 100 µV: f = 5.5 MHz	G_v	>	66	dB
		typ.	69	dB
Start of limiting at f = 5.5 MHz	V_i	typ.	300	µV
Output current (peak to peak) at V_i = 5 mV	$I_{7(p-p)}$	typ.	2.8	mA
Input resistance	R_i	>	2.5	kΩ
Input capacitance	C_i	typ.	7	pF
		<	10	pF
Output resistance	R_o	>	10	kΩ
Output capacitance	C_o	typ.	4	pF
		<	6	pF
Total current	I_B	typ.	15	mA
		<	22	mA

Test circuit



APPLICATION INFORMATION

Circuit with the TAA450 in an i.f. -l.f. amplifier of a television receiver.



Primary: frame core AP3014/02
Secondary: no frame core
L1 = 19 turns 0.12 mm stranded Cu wire
L2 = 2 x 17 turns 0.12 mm stranded Cu wire; bifilarly wounded
L3 = 14 turns 0.12 mm stranded Cu wire; bifilarly wounded with L1
Top-top distance of frequency response curve: ≥ 250 kHz

Intermediate frequency	f_0	= 5.5 MHz
Frequency deviation	Δf	± 10 kHz
Modulation frequency	f_m	= 400 Hz
Ambient temperature	T_{amb}	= 25 °C

Start of limiting		V_i	typ.	300	μV
I.F. output voltage at pin 7 with $V_i \geq 300$ μV		V_7	typ.	1.2	V
L.F. output voltage at $V_i \geq 300$ μV		V_o	typ.	400	mV
A.M. suppression					
f_m = 1 kHz; m = 0.3; $V_i \geq 2$ mV			≥	40	dB
Volume control range		ΔV_o	≥	30	dB
Distortion at Δf ± 10 kHz	without volume control	d	typ.	0.01	
	with volume control	d	typ.	0.015	
Δf ± 50 kHz	without volume control	d	typ.	0.025	
	with volume control	d	typ.	0.05	

PROVISIONAL

TAA570

Development sample date

The TAA570 consists of a four-stage limiter-amplifier and an FM detector followed by a remote control stage.
Due to the differential lay-out of the amplifier and the use of current drive long-tailed pairs, excellent AM suppression is obtained.
The FM detector is a double phase φ detector.
The remote control stage enables a control range of about 80 dB of the AF output signal. The TAA570 is mounted in a 12 pins 4-in-line all plastic encapsulation (Fig. 4).

Quick reference data
(at a supply voltage of 12 V and a frequency of 5.5 MHz)

Total current drain	typ.	21 mA
Input limiting voltage	"	100 μV
AM rejection at V_i = 10 mV	"	45 dB
Input impedance at V_i = 10 mV	"	2 kΩ /6 pF
Remote control range	"	80 dB
Remote control voltage	"	2.8 - 3.3 V
Distortion for maximum frequency deviation	"	3 %

In Fig. 1 a block diagram is given of a TV receiver with the TAA570 as an intercarrier-sound IF amplifier and detector.

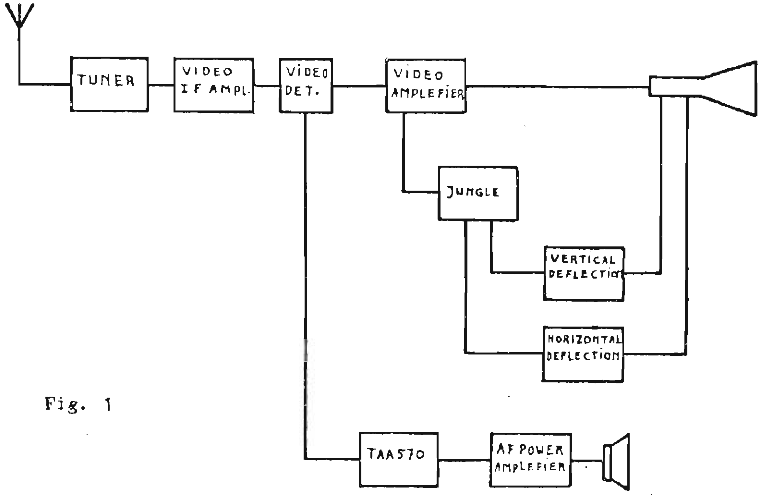


Fig. 1

Temperature and dissipation

Storage temperature	T_{stg}	- 25 to + 125 °C
Operating ambient temperature	T_{amb}	0 to + 125 °C
Dissipation		

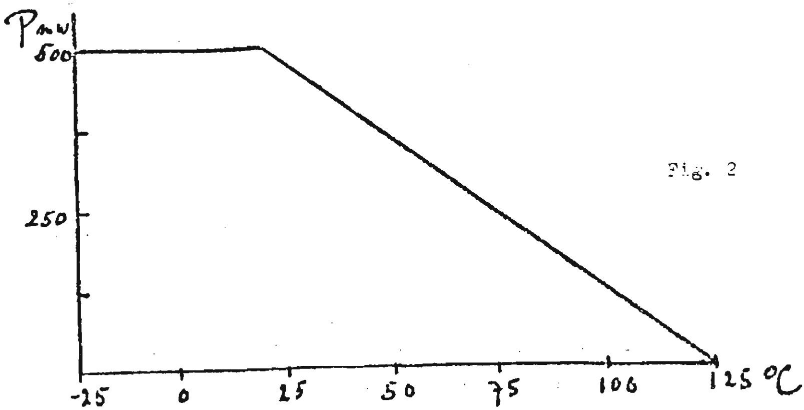


Fig. 2

Voltages

All voltages are given with respect to ground, terminal 5.

Terminal	Conditions	Limits
2	$I_2 \leqslant 1$ mA	0 to + 6 V
3	$I_2 \leqslant 1$ mA	0 to + 6 V
4		0 to + 6 V
7	do not apply external voltage source	
9	do not apply external voltage source	
10		0 to + 18 V
11	$-I_{11} \leqslant 1$ mA	0 to + 6 V
12		0 to + 18 V

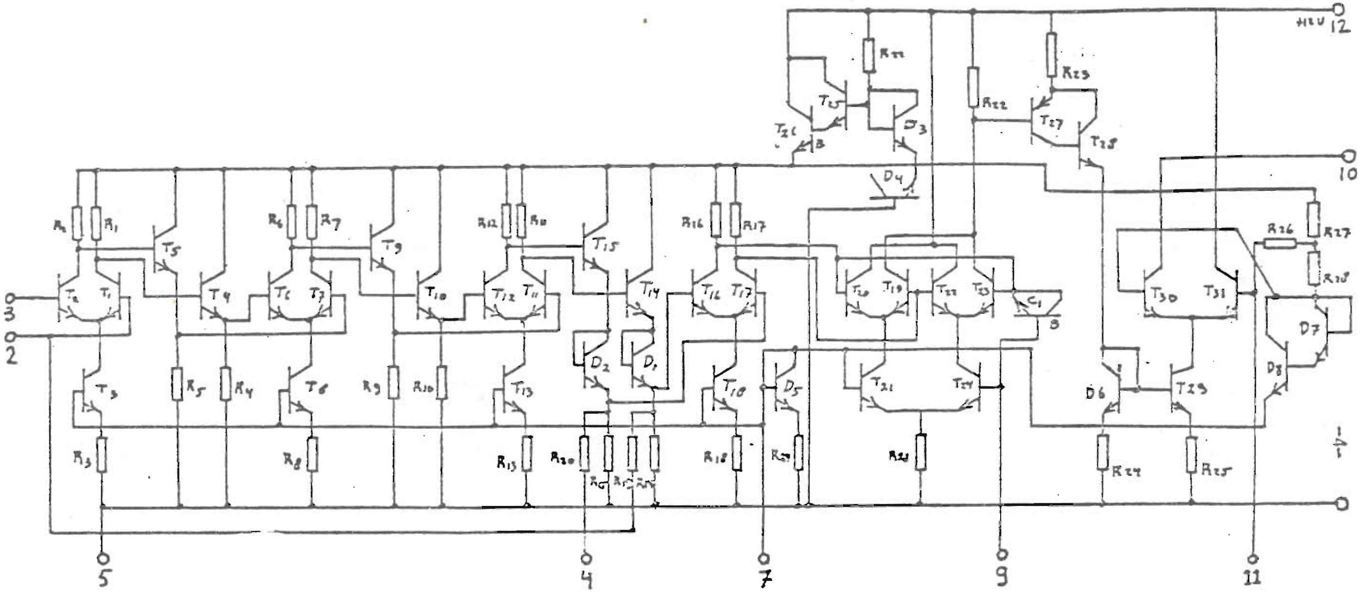


Fig. 3

SCHEMATIC DIAGRAM OF THE TAA 570

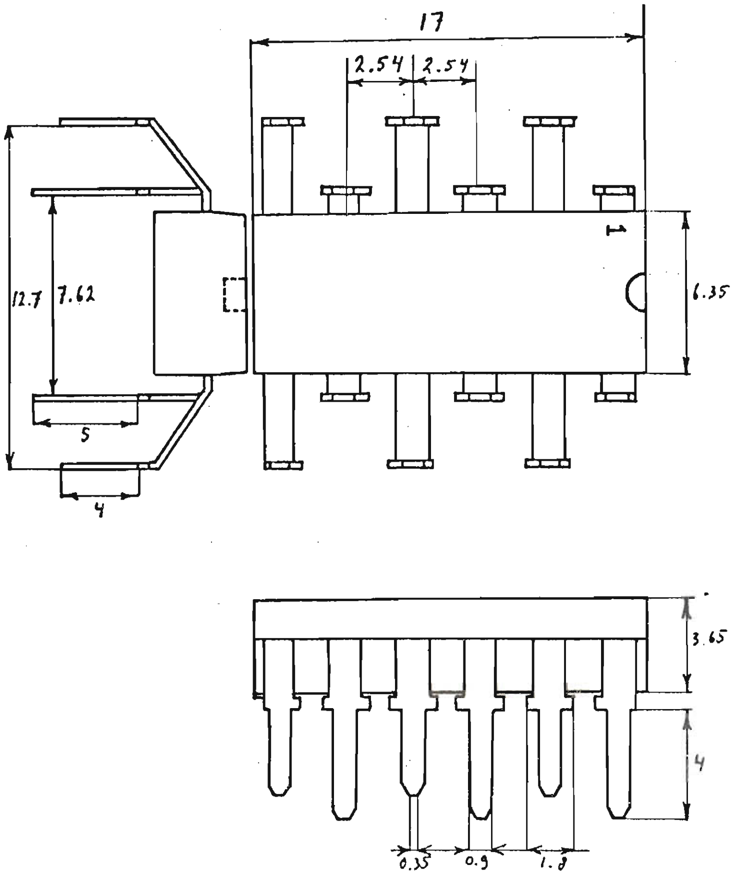


Fig. 4

MECHANICAL OUTLINE OF THE TAA 570

TAA550

PROVISIONAL

Voltage Stabilizer

The TAA550 is an integrated monolithic voltage stabilizer, especially designed to provide the supply voltage for varicaps in TV-tuners independent of supply voltage and temperature variations.

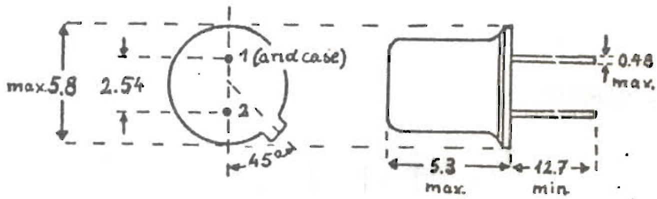
Quick reference data:

Supply current	I_1 = 5 mA
Stabilized voltage	V_{12} = min. 31V
	max. 35V
Differential internal resistance	r_{12} = 12 Ω

Package

TO-18, 2 pin

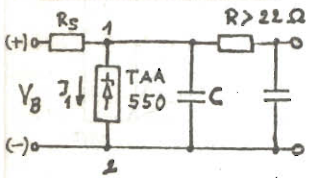
Dimensions in mm.



Absolute maximum ratings:

Storage temperature	-20°C to +150°C
Supply current	see derating curve
Ambient temperature	see derating curve
Case temperature	see derating curve

Recommended circuit:



e.g. V_B = +200V
R_S = 33 kΩ

$300\,pF \leq C \leq 4700\,pF$

Characteristics:

Supply current	I_1 = 5 mA
Stabilized voltage	V_{12} = min. 31V
	max. 35V
Differential internal resistance at 1KHz	r_{12} = 12 Ω (< 25 Ω)

Temperature coefficient $-3{,}1\frac{mV}{°C} \leq \frac{\Delta V_{12}}{\Delta t_{amb}} \leq +1{,}55\frac{mV}{°C}$

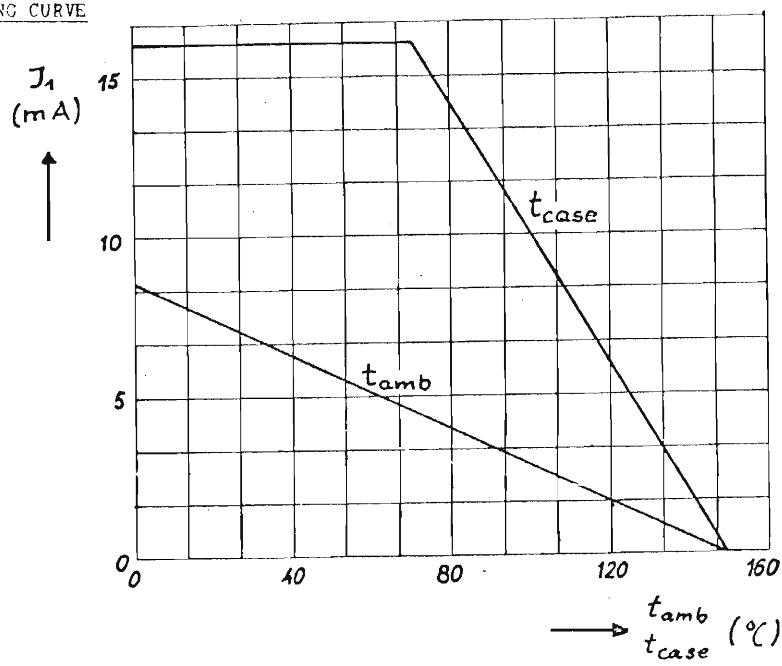
($10°C \leq t_{amb} \leq 50°C$)

The TAA550 is supplied in 3 voltage groups:

Stabilized voltage V_{12} :

	colour code
1) min. 31V - max 32V	red dot
2) min. 32V - max 34V	yellow dot
3) min. 34V - max 35V.	green dot

DERATING CURVE



PROVISIONAL

Description

The TAA700 is a silicon monolithic integrated signal processing circuit for television receivers. It combines the following functions:

- video pre-amplifier
- gated AGC detector supplying the AGC voltage for the vision IF amplifier and tuner (delayed)
- Noise gate for gating the AGC and sync separator circuits
- Sync separator
- Automatic horizontal synchronisation
- Vertical sync pulse separator
- Blanking facility for the video amplifier

The circuit is especially designed to be applied in hybrid television receivers with tubes in the deflection stages and (n.p.n.) transistors in the tuner and IF amplifier. The video output stage can be equipped either with a tube or a transistor.

Absolute maximum ratings

Storage temperature	T_{st}	-25 – + 125 °C	
Dissipation	P_{tot}	see Fig. 2	1)

Characteristics

Supply voltage	12 V $\pm$ 10%	2)

Video amplifier

Input signal V_{10-16}	2 V_{p-p}	3)
Detector load impedance (R_1 in Fig.1)	2.7 kohm $\pm$ 20%	
Input capacitance	< 1 pF	
Output voltage V_{12-16}	6 V_{p-p} $\pm$ 10%	4)
Output impedance	emitter follower	
Load impedance min.	1 kohm	
Variation black level at the output due to spread and temperature variation ΔV_{12-16}	600 mV	5)
Variation black level at the output with supply voltage $\Delta V_{12-16}/\Delta V_S$	0.75	

Bandwidth (3 dB)	> 5 MHz	
Video blanking: Input voltage V_{11-16}	$1 < V_i < 5\ V_{p-p}$	
Input impedance	1 kohm	

AGC circuit

Control voltage IF amplifier V_{4-16}	0 - + 8 V	6)
Control voltage tuner V_{6-16}	0 - + 7 V	6)
Signal expansion for full control of IF amplifier and tuner	< 15 %	6)
Gate pulse V_{3-16}	$1 < V_{gate} < 5V_{p-p}$	7)
Input impedance	1 kohm	

Synchronisation circuit

Sync separator		8)
Control voltage line oscillator V_{2-1}	± 3 V	9)
Output voltage vertical sync pulse separator V_{15-16}	> 10 V_{p-p}	
Output impedance	2 kohm	

1) During the warming-up period of the set the permissable dissipation may be increased to 700 mW.

2) During the warming-up period of the set a supply voltage up to 18V is allowed.

3) Negative going video signal (no pre-bias required for the detector).

4) Video signal with negative going sync; peak white level about 2V below the positive supply line. The video signal at the output will decrease about 15 mV/°C.

5) This figure is valid only for a video signal according to the CCIR standard.

6) These figures are obtained with a load impedance of 2 kohm for the IF control point (R_{4-16}) and 1 kohm for the tuner control point (R_{6-16}).
With these impedances the signal expansion for IF control and tuner control will be about the same. An increase of these impedances will decrease the signal expansion. Lower values of these impedances result in a lower available control voltage and a higher dissipation of the IC. Therefore, the minimum values must be restricted to 1.5 kohm for the IF control voltage and 750ohm for the tuner control voltage.

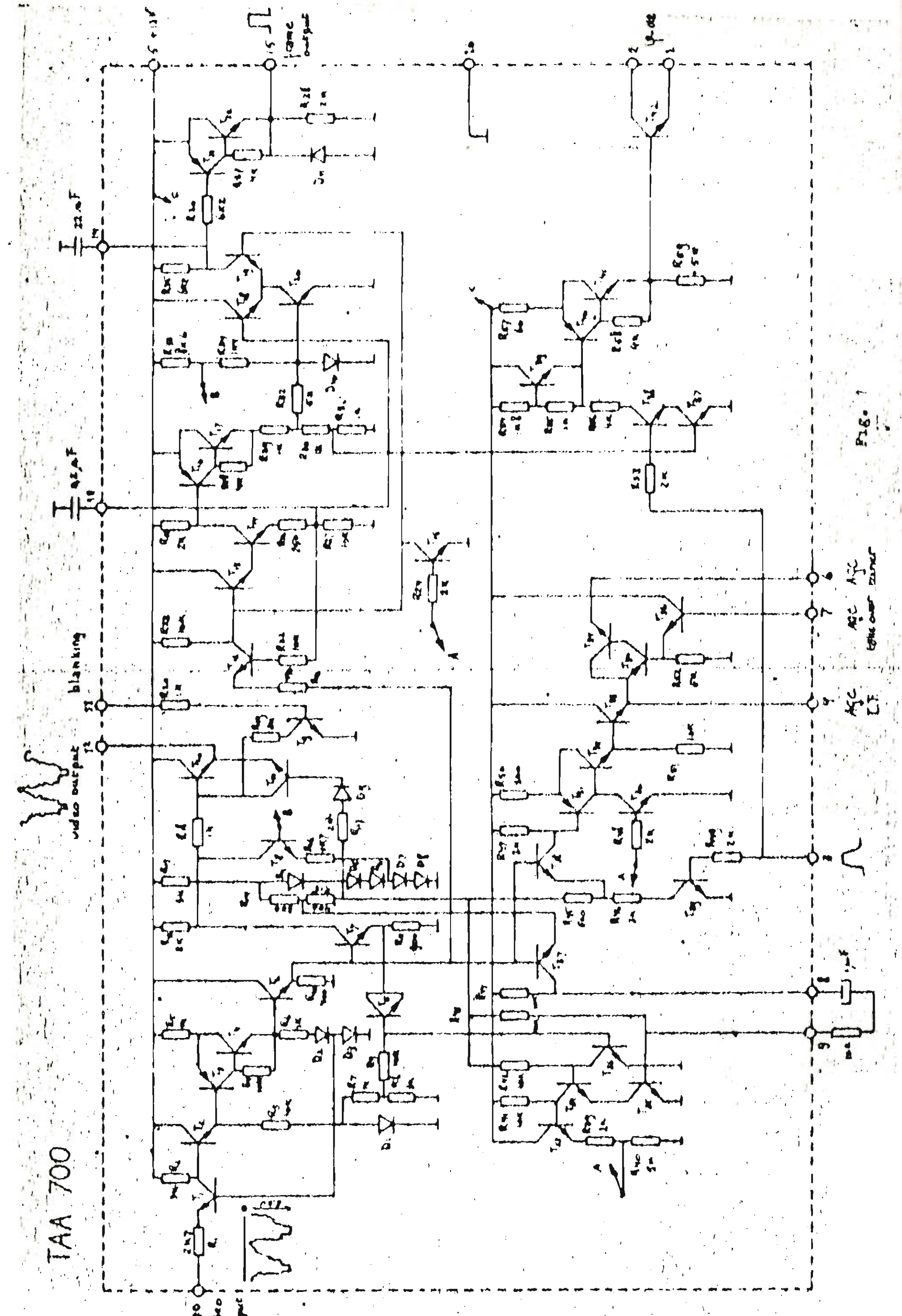
7) Operation of the IC without gating is possible. Then point 3 must be connected to the positive supply line via a resistor of a suitable value (e.g. 10kohm). However, it has the following consequences:

- The decoupling capacitors at the IF and tuner control points have to be increased to avoid ripple voltages due to the vertical sync pulses.
  As a consequence the AGC will not follow fast input signal fluctuations (airplane flutter).

- The phase detector will not operate as a frequency detector when the horizontal oscillator is out of sync. This results in a considerable decrease of the catching range.

8) The sync pulse is sliced about 30% below top sync level.

9) Required reference voltage (sawtooth or differentiated line flyback pulse) 7 V_{p-p}. For an oscillator-reactance stage with a control sensitivity of 400 Hz/V this gives a holding range of about $\pm$ 1000 Hz. By means of the gating circuit in the phase detector a catching range is obtained of $\pm$ 700 Hz without affecting the noise immunity. This latter value can be obtained only with a high-ohmic load (tube--equipped reactance stage).


TAA 700
video output
blanking

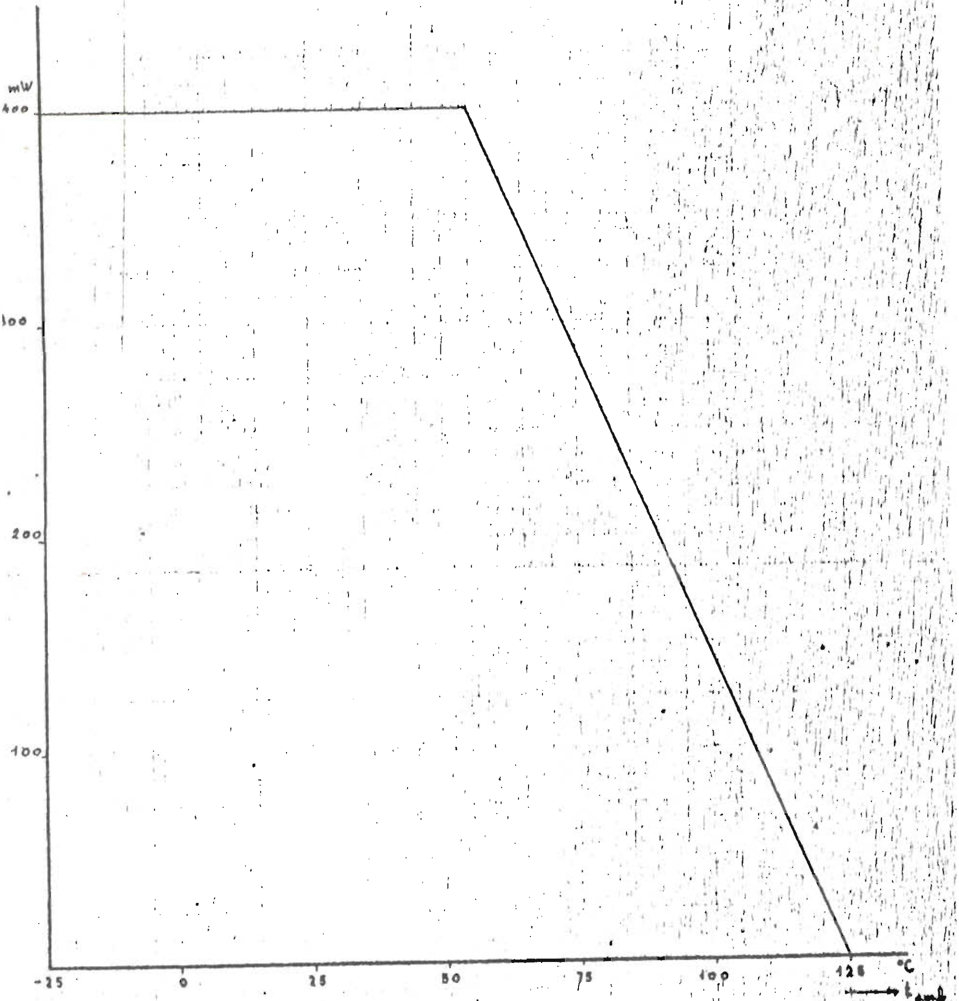
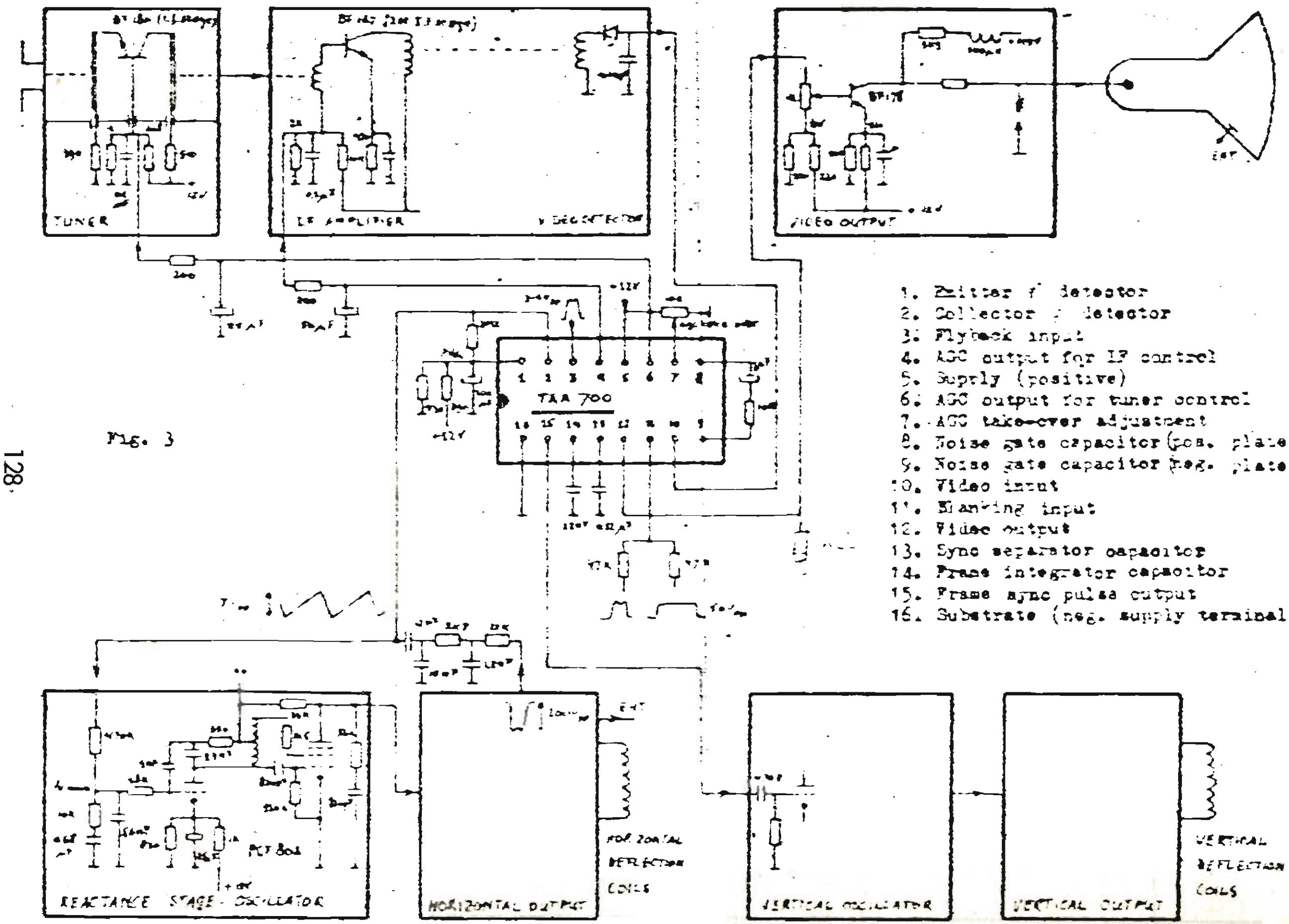


Fig. 2



1. Emitter f detector
2. Collector f detector
3. Flyback input
4. AGC output for IF control
5. Supply (positive)
6. AGC output for tuner control
7. AGC take-over adjustment
8. Noise gate capacitor (pos. plate of capacitor)
9. Noise gate capacitor (neg. plate of capacitor)
10. Video input
11. Blanking input
12. Video output
13. Sync separator capacitor
14. Frame integrator capacitor
15. Frame sync pulse output
16. Substrate (neg. supply terminal)

Fig. 3

MECHANICAL OUTLINE

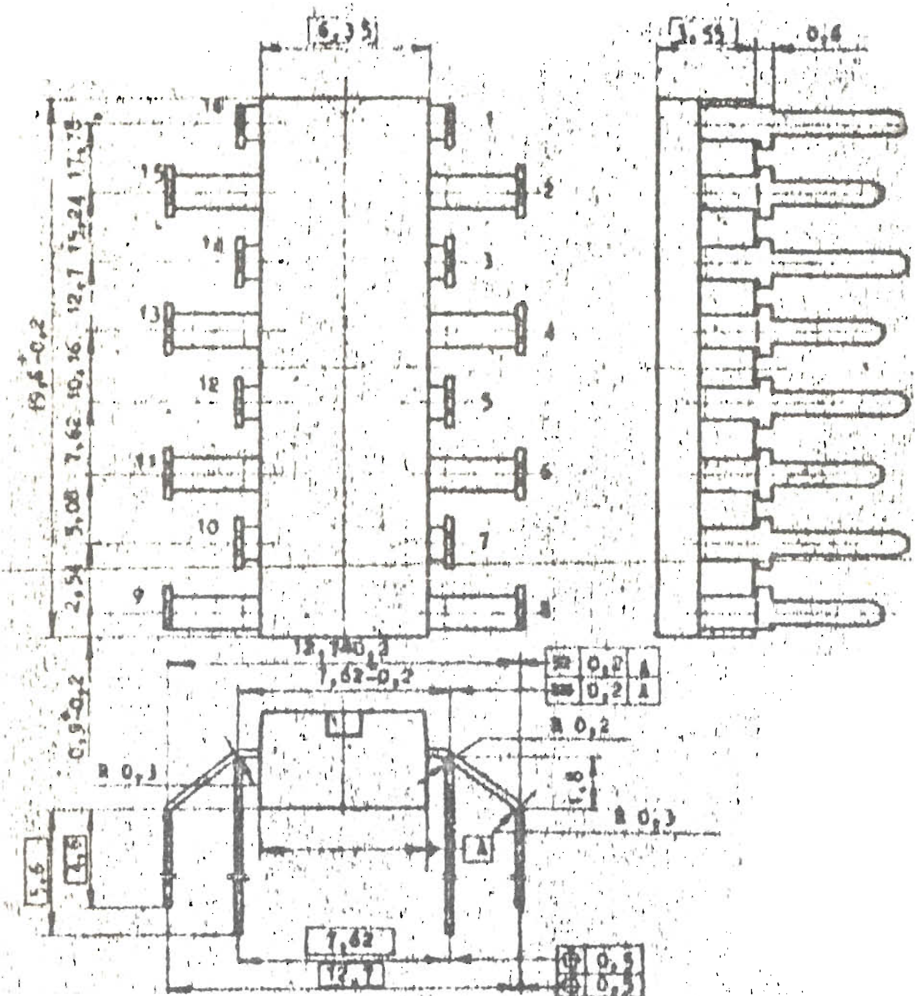


Fig. 4

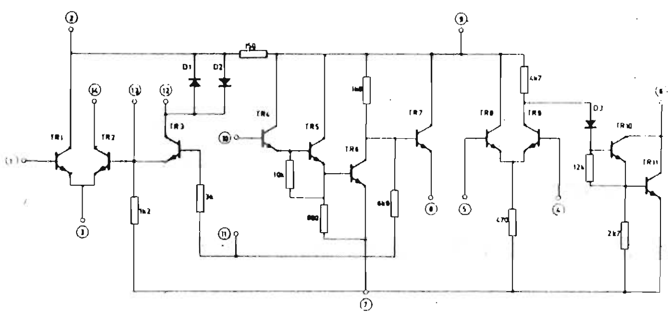
INTEGRATED A.M.-RADIO RECEIVER CIRCUIT

DEVELOPMENT SAMPLE DATA

The TAD100 is a monolithic integrated circuit primarily intended for a.m.-radio receivers. The circuit incorporates the mixer, oscillator, i.f. amplifier, a.g.c., detector and audio pre-amplifier and driver stages. The audio output transistors are not included. This enables the use of different power output stages to suit individual receiver requirements.

QUICK REFERENCE DATA				
Supply voltage	nom.	6.0	9.0	V
Output power at d_{tot} = 10% (with AC187/AC188)	typ.	0.7	1.5	W
Total quiescent receiver current	typ.	15	21	mA
Sensitivity (r.f. signal at Pin No. 1 to obtain 10 mV from detector)	typ.	4		μV

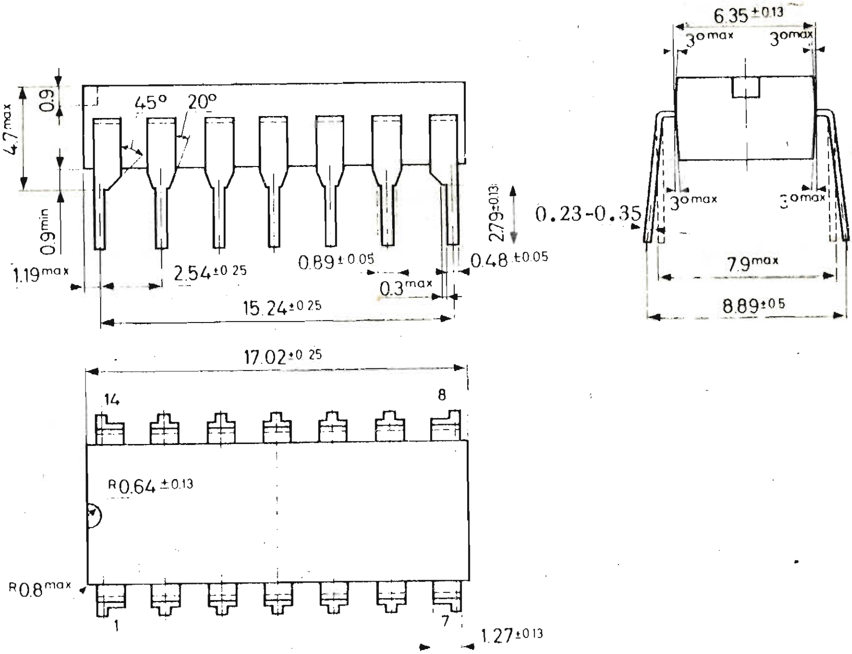
CIRCUIT DIAGRAM



These data, based on the specifications and measured performance of development samples, afford a preliminary indication of the characteristics to be expected of the described product. Distribution of development samples implies no guarantee as to the subsequent availability of the product

PACKAGE OUTLINE

Dimensions in mm



RATINGS (Limiting values) [1])

Temperatures

Storage temperature	-25 to +85 °C
Operating ambient temperature	-25 to +55 °C

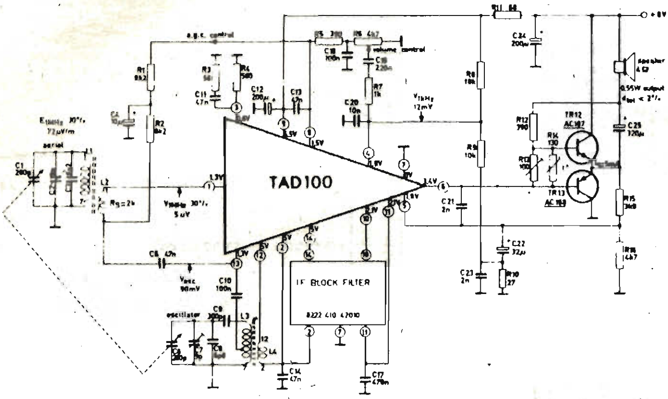
Voltages

Battery voltage applied to Pin No. 9 via 150 Ω	max.	10	V
Pin No. 6 voltage	max.	12	V

[1]) Limiting values according to the Absolute Maximum System as defined in IEC publication 134.

APPLICATION INFORMATION

Medium-wave receiver using the TAD100.



Output power at d_{tot} = 10%	typ. 0.7 W
Total receiver current	typ. 15 mA
Sensitivity at Pin No. 1	
f_0 = 1 MHz; m = 0.3; f_m = 1 kHz	
V_{out} of detector = 10 mV	typ. 4 μV
A.G.C. control range (for expansion in	
audio output of 10 dB)	> 60 dB
Input signal at Pin No. 1	
for a signal-noise ratio of 23 dB [1]	typ. 20 μV
26 dB [1]	typ. 30 μV
Distortion (over most of dynamic range)	< 2 %

HANDLING NOTES

1. Devices may be soldered directly into circuits with soldering irons. At iron temperatures below 245 °C the maximum soldering time should be less than 10 seconds and at iron temperatures between 245 °C and 400 °C the soldering time should be less than 5 seconds. In both cases the soldering iron should be applied below the seating plane.

2. Devices mounted up to the seating plane on a printed circuit board may be dip or flow soldered providing the solder temperature is below 245 °C and the time of immersion is less than 5 seconds. The body temperature should not be allowed to exceed the maximum storage temperature during soldering. If excessive preheat cycles are used, it may be necessary to cool the printed board immediately after leaving the solder bath/wave in order that this requirement be met.

---

[1]) Measured at volume control potentiometer.
The optimum r.f. source impedance for the mixer stage is 2 kΩ.

ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
- Voltage stabilizing and reference tubes		X						
- Logic elements in digital equipment				X				
- Nuclei in ferroxcube per trasformatori e chockes						X		
- Ferroxcube crosscores X22-X30-X35						X		
- Applications des cellules photosensibles		X						
- Amplificatori in corrente continua								
- Telecamera a transistor								
- Camera tubes		X						
- Scintillateurs								X(287)
- Design with IO series circuit blocks				X				
- (Thyratrons) - Ignitrons								257-258
- Electrometers tubes and miscellaneous								X(259)
- Special quality tubes								X(260)
- Nuclei ad olla della serie S e D						X		
- High and ultra high vacuum devices								X(275)
- Introduzione allo studio e all'impiego delle memorie magnetiche				X				
- Radiation counter and dosimeter tubes								X(286)
- Introduction to digital techniques				X				
- Circolatori e isolatori a ferrite								X(282)
- Cold cathode trigger tubes for industrial applications		X						
- Ignitrons		X						
- C.W. Magnetrons for microwave heating applications								X(276)
- Les emplois des thyratrons		X						
- Tubes for UHF and SHF								X(277)
- Hydrogen (Thyratrons) and high vacuum rectifiers		X						X(257)
- Noise and measuring diodes								X(278)

* Tra parentesi e' indicato il numero che lo sostituisce.

ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
I00 - Pulsed magnetrons								X(279)
I03 - Quick-heating tube for mobile transmitters		X						
I04 - Ultrasonic transducers in ferroxcube 7A2						X		
I09 - Continuous-wave magnetrons for the heating of food in microwave ranges		X						
I22 - Design with circuit blocks				X				
I3I - Detecteurs semiconducteurs		X						
I33 - Circuit blocks for ferrite core memory drive				X				
I36 - VDR-Voltage dependent resistors						X		
I38 - LDR-Light dependent resistors						X		
I45 - Ferroxcube memory cores								X(289)
I49 - Motorini C.C. e C.A.							X	
I5I - La logica negli automatismi industriali				X				
I55 - Small synchronous motors and gearboxes							X	
I59 - Diodi al germanio								X(266)
I60 - Tubi trasmittenti per apparecchiature mobili		X						
I67 - Circuiti d'applicazione dei circuit-blocks serie I				X				
I69 - Fotoelementi								X(269)
I7I - Altoparlanti						X		
I73 - Equivalenze semiconduttori professionali			X					
I74 - Amplificatori operazionali				X				
I75 - Testine magnetiche in ferrite				X				
I77 - Circuit blocks serie I0				X				
I78 - Linee di ritardo e loro applicazioni								X(284)
I79 - Circuit blocks serie 20				X				
I80 - Circuit blocks serie I				X				
I82 - Diodi al silicio								X(261)

* Tra parentesi e' indicato il numero che lo sostituisce.

ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
83 - Condensatori ceramici e combinazioni RC						X		
85 - Cinescopi per televisione	X							
87 - Circuiti d'applicazione dei circuit blocks serie 20				X				
89 - Termoferriti, generalita' e applicazioni						X		
90 - Accessori per tubi		X						
92 - Nuclei in ferroxcube ad H						X		
93 - Nuclei in ferroxcube ad olla serie P-PI4/8						X		
94 - Nuclei in ferroxcube ad olla serie P-PI8/II						X		
95 - Nuclei in ferroxcube ad olla serie P-P22/I3						X		
96 - Nuclei in ferroxcube ad olla serie P-P26/I6						X		
97 - Nuclei in ferroxcube ad olla serie P-P36/22						X		
98 - Nuclei in ferroxcube ad olla serie P-P42/29						X		
99 - Magneti permanenti						X		
0 - Valvole riceventi	X							
I - Commutatori rotativi								X(292)
2 - Alimentatori stabilizzati a transistor								X(268)
3 - Equivalenze semiconduttori per radio e TV								X(270)
4 - Diodi di potenza a valanga controllata			X					
5 - Transistor al silicio								280-28'
6 - Accessori per circuiti logici				X				
9 - Circuit blocks serie I00				X				
0 - Equivalenze tubi professionali		X						
I - Trasformatori variabili						X		
2 - Nuclei in ferroxcube ad olla serie P-P30/I9						X		
3 - Piezoxide								X(262)
4 - Matrici, platrici e stacks								X(283)

* Tra parentesi e' indicato il numero che lo sostituisce.

ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
215 - Memorie magnetiche complete								X(271)
216 - Rele' statici Norbits 2 - serie 60				X				
217 - Diodi Zener								X(285)
218 - Tubi Geiger Muller		X						
219 - Fotomoltiplicatori e scintillatori. Descrizione, misure, impieghi		X						
220 - Unita' di conteggio serie 50								X(237)
221 - Tubi a raggi catodici per oscilloscopi		X						
222 - Tubi a raggi catodici. Monitori, analizzatori per proiezione		X						
223 - Raddrizzatori e triodi per uso industriale Triodi di potenza in ceramica metallo		X						
224 - Tubi trasmittenti di piccola potenza		X						
225 - Tubi trasmittenti di media potenza		X						
226 - Tubi trasmittenti di alta potenza		X						
227 - Diodi di potenza			X					
228 - Semiconduttori per microonde			X					
229 - Elementi fotosensibili a semiconduttore			X					
230 - Condensatori fissi - Policarbonato - poliestere - Carta - Mica - Polistirene						X		
231 - Connettori per circuiti stampati						X		
232 - Circuiti integrati a semiconduttore Digitali: serie FJ								X(272)
233 - Nuova serie di cinescopi per TV in bianco e nero	X							X(294)
234 - Circuiti integrati a semiconduttore - Lineari								X(273)
235 - Circuiti integrati a semiconduttore - Digitali: serie FC								X(274)

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ELENCO DELLE "INFORMAZIONI TECNICHE DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
36 - Transistor al germanio			X					
37 - Unita' di conteggio serie 50				X				
38 - Circuiti d'applicazione dei circuit-blocks serie 10				X				
39 - Componenti elettromeccanici						X		
40 - Cristalli di quarzo e filtri						X		
41 - NTC - Resistori a coefficiente di temperatura negativo						X		
42 - Diodi controllati al silicio (Thyristor)								X(295)
43 - Elementi d'ingresso e di uscita				X				
44 - Rivelatori nucleari allo stato solido		X						
45 - Tubi raddrizzatori a bassa tensione		X						
46 - Klystron		X						
47 - Condensatori variabili e trimmer						X		
48 - Condensatori elettrolitici						X		
49 - Resistori variabili: Potenziometri a filo e a carbone - Trimmer potenziometrici miniatura						X		
50 - PTC - Resistori a coefficiente di temperatura positivo						X		
51 - Resistori fissi: a strato di carbone, a strato metallico, a filo						X		
52 - Thyristor a valanga controllata								X(297)
53 - Tubi trigger e diodi a gas		X						
54 - Tubi contatori, selettori e indicatori numerici		X						
55 - Accessori per semiconduttori professionali			X					
56 - Tubi fotomoltiplicatori								X(290)
57 - Thyratron		X						
58 - Ignitron		X						

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ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
259 - Miscellanea di tubi professionali		X						
260 - Tubi "Special Quality"		X						
261 - Diodi al silicio per correnti deboli								X(296
262 - Piezoxide						X		
263 - Guida dei tubi per ricerche nucleari e spaziali		X						
264 - Guida dei tubi industriali		X						
265 - Rele' statici Norbits - 2 (serie 60) Generalita' ed applicazioni				X				
266 - Diodi al germanio			X					
267 - Dati tecnici riassuntivi dei tubi professionali		X						
268 - Alimentatori stabilizzati a transistor				X				
269 - Fotoelementi		X						
270 - Equivalenze semiconduttori per Radio e TV			X					
271 - Memorie magnetiche complete				X				
272 - Circuiti integrati a semiconduttore. Digitali: serie FJ								X(291
273 - Circuiti integrati a semiconduttore - Lineari								X(29
274 - Circuiti integrati a semiconduttore - Digitali: serie FC								X(291
275 - Vuoto ed alto vuoto: pompe - misuratori - sistemi completi - accessori		X						
276 - Magnetron a onda continua per il riscaldamento a microonde		X						
277 - Tubi per UHF e SHF		X						
278 - Diodi di misura e generatori di rumore		X						
279 - Magnetron ad impulsi		X						
280 - Transistor al silicio per commutazione e impieghi generali			X					

* Tra parentesi e' indicato il numero che lo sostituisce.

ELENCO DELLE "INFORMAZIONI TECNICHE" DISPONIBILI

	Valvole riceventi e cinescopi (testata verde)	Tubi professionali (testata magenta)	Semiconduttori (testata rossa)	Microelettronica (testata arancione)	Parti staccate TV e fono (testata blu)	Componenti passivi (testata bruno seppia)	Motori elettrici (testata gialla)	Numeri annullati *
281 - Transistori al silicio per telecomunicazioni			X					
282 - Circolatori ed isolatori a ferrite				X				
283 - Matrici, platrici e stacks				X				
284 - Linee di ritardo e loro applicazioni				X				
285 - Diodi Zener			X					
286 - Tubi Geiger Müller - Caratteristiche		X						
287 - Scintillatori - Tecnologia, applicazioni, caratteristiche		X						
288 - Fotoscintillatori		X						
289 - Nuclei in ferroxcube per memorie magnetiche						X		
290 - Tubi fotomoltiplicatori		X						
291 - Circuiti integrati digitali: serie FC, serie FJ, serie FH				X				
292 - Commutatori rotativi				X				
293 - Ferriti per radio-TV e bassa frequenza						X		
294 - Serie cinescopi autoprotetti per primo equipaggiamento	X							
295 - Diodi controllati al silicio e diac			X					
296 - Diodi al silicio per correnti deboli			X					
297 - Thyristor a valanga controllata			X					
298 - Tubi indicatori - Principi di funzionamento e applicazioni		X						
299 - Circuiti integrati lineari				X				

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Ufficio Documentazioni Tecniche della Sezione ELCOMA

Elenco delle Pubblicazioni

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Contengono i dati tecnici riguardanti tutti i prodotti trattati dalla sezione ELCOMA. Hanno come frontespizio l'ormai nota « greca » in colore con la scritta « **Informazioni tecniche Philips** ». Queste documentazioni sono suddivise in 7 categorie, ciascuna comprendente i dati tecnici dei prodotti trattati dal rispettivo reparto.

I colori scelti per la « greca » sono i seguenti:

Rosso	: prodotti	trattati	dal	Rep.	Semiconduttori
Verde	: »	»	»	»	Valvole riceventi e cinescopi
Blu	: »	»	»	»	Parti staccate TV e fono
Arancio	: »	»	»	»	Microelettronica
Magenta	: »	»	»	»	Tubi Professionali
Giallo	: »	»	»	»	Motori elettrici
Bruno seppia:	»	»	»	»	Componenti passivi

Tutte queste documentazioni hanno il formato ridotto (A5). Il colore del cartoncino è uguale per **tutte** ed è un martellato bianco. Per distinguere, a colpo d'occhio, le documentazioni trattate dai vari reparti, quando queste venissero sistemate negli scaffali, ciascun fascicolo porta una striscia colorata orizzontale tutt'intorno alla parte inferiore del dorso. Il colore di questa striscetta è identico a quello della « greca ». Ogni fascicolo ha un indice generale nel quale i fascicoli pubblicati sono disposti in ordine di comparizione (numero progressivo). In senso verticale sono invece indicati, nello stesso indice, i Reparti che trattano i rispettivi materiali e nella colonna in fondo, è posta un'indicazione riguardante l'eventuale ristampa, o la nuova edizione del fascicolo in questione.
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