OPERATIONAL AMPLIFIER

The TDA1034 is a high-performance general purpose operational amplifier. Compared to most of the standard operational amplifiers (e.g. μA741, TBA221, LM301A and LM307), it shows better noise performance, improved output drive capability and considerably higher small-signal and power bandwidth.
This makes the device especially suitable for application in high quality and professional audio equipment, in instrumentation and control circuits and telephone channel amplifiers.
The op amp is internally compensated for gain equal to, or higher than, three.
The frequency response can be optimized with an external compensation capacitor for various applications (unity gain amplifier, capacitive load, slew-rate, low overshoot, etc.).
If very low noise is of prime importance, it is recommended that the TDA1034N version be used which has guaranteed noise specifications and somewhat lower input current.

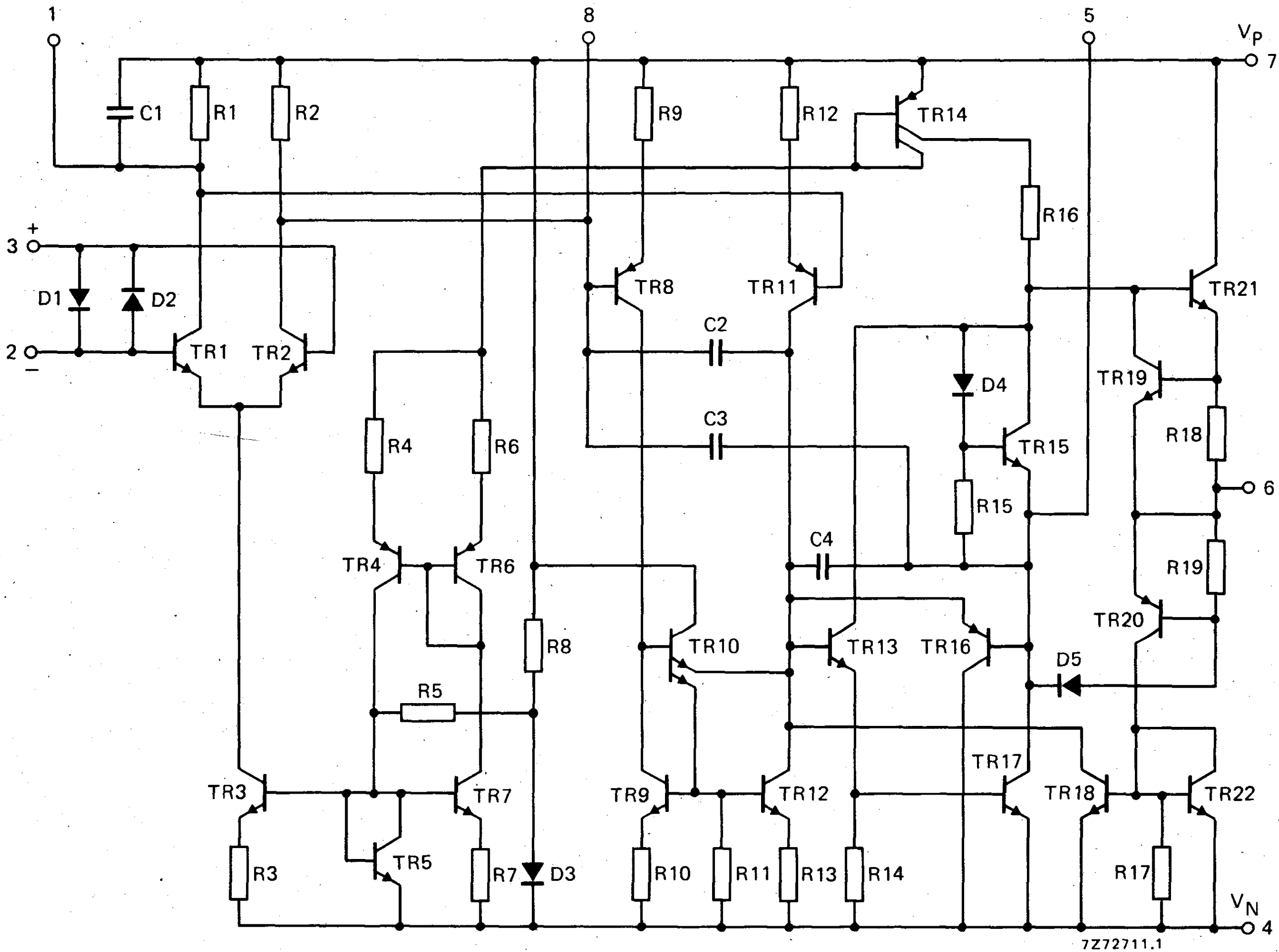
Features

- Small-signal bandwidth : 10 MHz
- Output drive capability : 600 Ω, 10 V (r.m.s.) at $V_P = -V_N = 18$ V
- Input noise voltage : 4 nV/$\sqrt{\text{Hz}}$
- D.C. voltage gain : 100 000
- A.C. voltage gain : 6000 at 10 kHz
- Power bandwidth : 200 kHz
- Slew-rate : 13 V/μs
- Large supply voltage range : ±3 to ±20 V

PACKAGE OUTLINES (see general section).

TDA1034; N : TO-99 (8-lead metal envelope).
TDA1034B; NB : SOT-97 (plastic 8-lead dual in-line).
TDA1034D; ND : SO-8 (SOT-96A) (plastic 8-lead flat pack).

CIRCUIT DIAGRAM



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

Voltages

Positive supply voltage	V_P	max.	20	V
Negative supply voltage	V_N	max.	20	V
Common mode input voltage (pins 2 and 3)		V_P to $-V_N$		
Differential input voltage	V_{2-3}	max.	±0,5	V [1]

Temperatures

Operating ambient temperature	T_{amb}	-25 to +85	°C
Storage temperature; metal envelope	T_{stg}	-65 to +150	°C
plastic envelope	T_{stg}	-65 to +125	°C

Maximum power dissipation in free air

package	mounting	max. power dissipation at T_{amb} = 50 °C (mW)	derating factor for T_{amb} > 50 °C (mW/°C)	max. junction temperature (°C)	thermal resistance $R_{th\ j\text{-}a}$ (°C/W)
TO-99	on PC board	625	6,25	150	160
	with 33 °C/W cooling fin; on PC board	1100	11	150	90
SOT-97	on PC board	450	6	125	165
SOT-96A	on ceramic substrate of 4 cm^2	500	6,7	125	150
	on PC board of 4 cm^2	325	4,3	125	230

[1]) Diodes protect the inputs against over-voltage. Therefore, unless current-limiting resistors are used, large currents will flow if the differential input voltage exceeds 0,6 V.

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

Input offset voltage	V_{io}	typ. <	0,5 4,0	mV mV
Input bias current	I_i	typ. <	0,5 1,5	μA μA
Input offset current	I_{io}	typ. <	0,02 0,3	μA μA
Input voltage range	V_i	> typ.	+12; −13 +13; −14	V V
Differential input resistance	R_i	> typ.	30 100	kΩ kΩ
Common mode rejection ratio	CMRR	> typ.	80 100	dB dB
Power supply voltage rejection ratio	PSRR	typ. <	10 50	μV/V μV/V
Large-signal voltage gain $R_L = 600\ \Omega$; $V_o = \pm 10$V	G_v	> typ.	30 000 100 000	
Output voltage swing at $R_L = 600\ \Omega$	V_o	> typ.	± 12 ± 13	V V
Output resistance; closed loop $G_v = 30$ dB; f = 10 kHz; $R_L = 600\ \Omega$; $C_C = 22$ pF	R_o	typ.	0,3	Ω
Output short-circuit current	I_{sc}	typ.	38	mA
Supply current at $I_o = 0$	$I_{P;\,N}$	typ. <	4 6,5	mA mA
Transient response (voltage follower) $V_i = 50$ mV; $R_L = 600\ \Omega$; $C_C = 22$ pF; $C_L = 100$ pF				
rise time	t_r	typ.	20	ns
overshoot		typ.	20	%
$V_i = 50$ mV; $R_L = 600\ \Omega$; $C_C = 47$ pF; $C_L = 500$ pF				
rise time	t_r	typ.	50	ns
overshoot		typ.	35	%
A.C. gain at f = 10 kHz; $C_C = 0$	G_v	typ.	6000	
at f = 10 kHz; $C_C = 22$ pF	G_v	typ.	2200	
Unity gain frequency at $C_C = 22$ pF; $C_L = 100$ pF	f	typ.	10	MHz
Slew-rate at $C_C = 0$	S	typ.	13	V/μs
at $C_C = 22$ pF	S	typ.	6	V/μs
Power bandwidth at $V_{o(p-p)} = 20$ V				
$C_C = 0$	B	typ.	200	kHz
$C_C = 22$ pF	B	typ.	95	kHz

CHARACTERISTICS (continued)

Input noise voltage at f = 30 Hz	V_n	typ.	7	$nV/\sqrt{Hz}$
at f = 1 kHz	V_n	typ.	4	$nV/\sqrt{Hz}$
Input noise current at f = 30 Hz	I_n	typ.	2,5	$pA/\sqrt{Hz}$
at f = 1 kHz	I_n	typ.	0,6	$pA/\sqrt{Hz}$

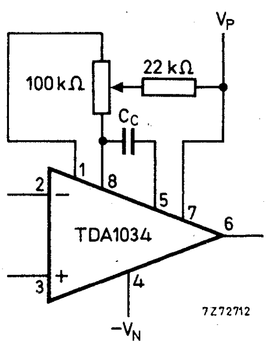
CHARACTERISTICS at $V_P = 18$ V; $-V_N = 18$ V; $T_{amb} = 25$ °C unless otherwise specified

Output voltage swing at $R_L = 600\ \Omega$	V_o	>	± 15	V
		typ.	± 16	V
Supply current at $I_o = 0$	$I_{P;N}$	typ.	4,2	mA
		<	7	mA
Power bandwidth at $V_{o(p-p)} = 28$ V $R_L = 600\ \Omega$; $C_C = 22$ pF	B	typ.	70	kHz

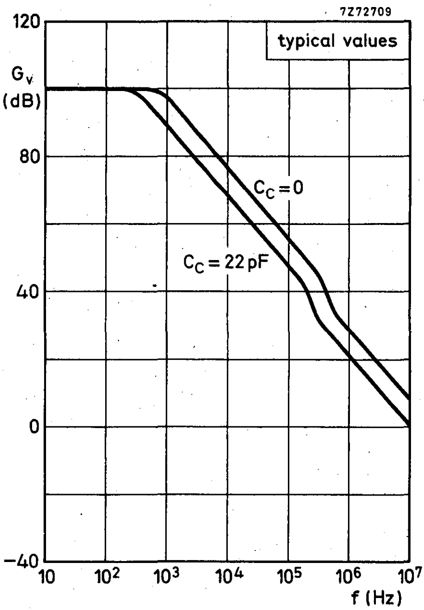
TDA1034N version

The TDA1034N version has the same electrical specifications as the TDA1034, with the following exceptions:

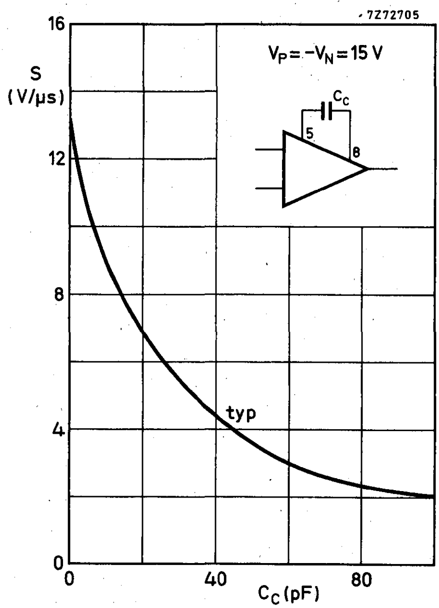
Input bias current	I_i	typ.	0,4	μA
		<	0,8	μA
Input offset current	I_{io}	typ.	0,01	μA
		<	0,2	μA
Input noise voltage at f = 30 Hz	V_n	typ.	5,5	$nV/\sqrt{Hz}$
		<	7	$nV/\sqrt{Hz}$
at f = 1 kHz	V_n	typ.	3,5	$nV/\sqrt{Hz}$
		<	4,5	$nV/\sqrt{Hz}$
Input noise current at f = 30 Hz	I_n	typ.	1,5	$pA/\sqrt{Hz}$
at f = 1 kHz	I_n	typ.	0,4	$pA/\sqrt{Hz}$
Broadband noise figure f = 10 Hz to 20 kHz; $R_S = 5$ kΩ	F	typ.	0,9	dB



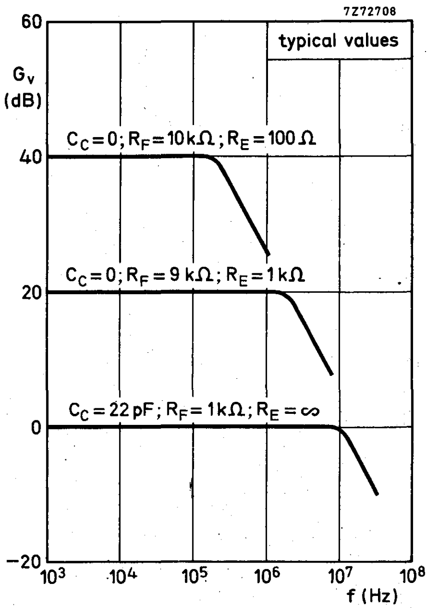
Frequency compensation and offset voltage adjustment circuit.

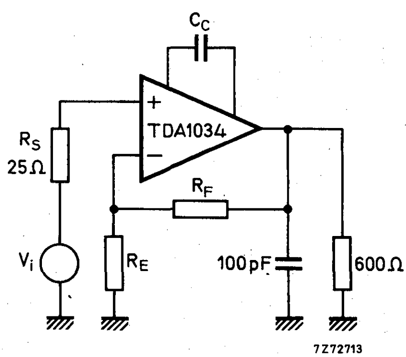


Open loop frequency response.

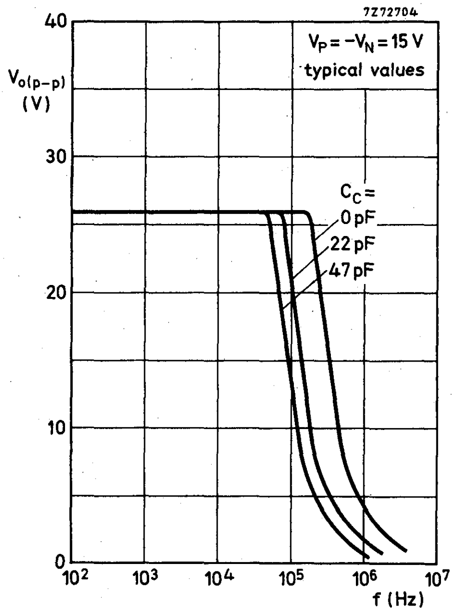


Slew-rate as a function of compensation capacitance.

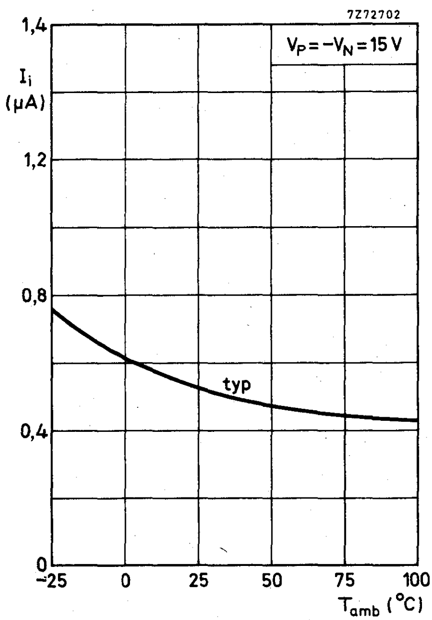




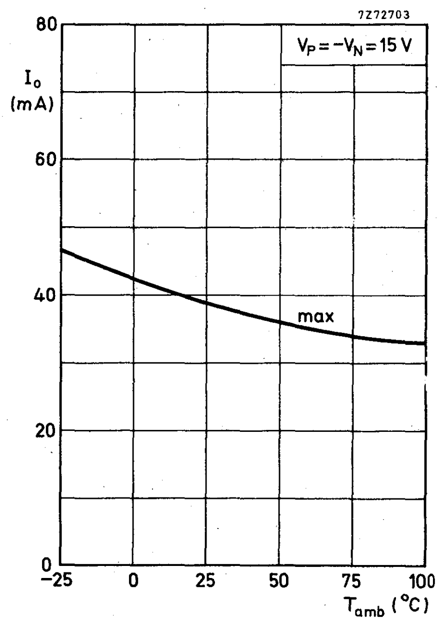
Closed loop frequency response.



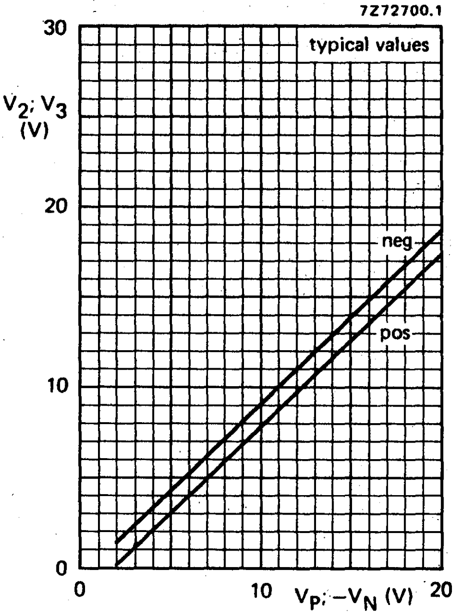
Large-signal frequency response.



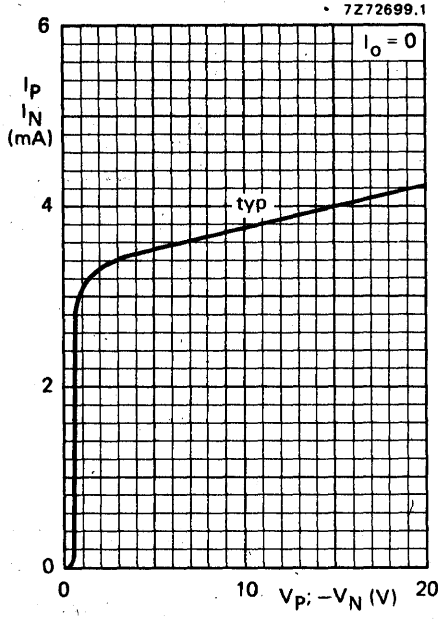
Input bias current.



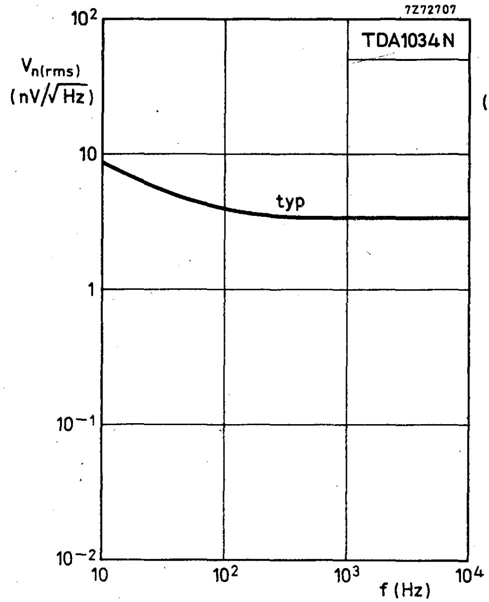
Output short-circuit current.



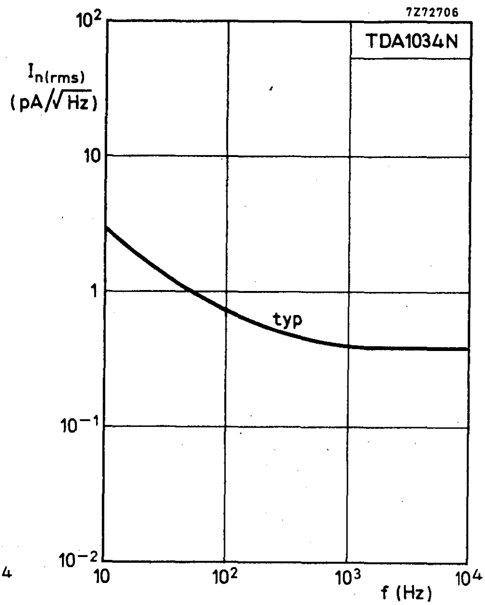
Input common mode voltage range.



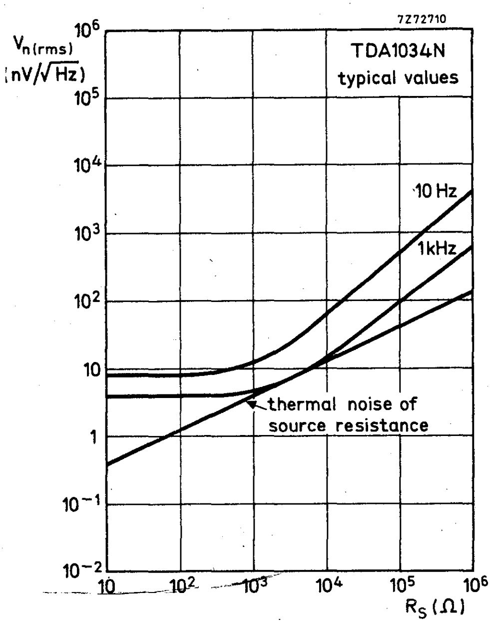
Supply current.



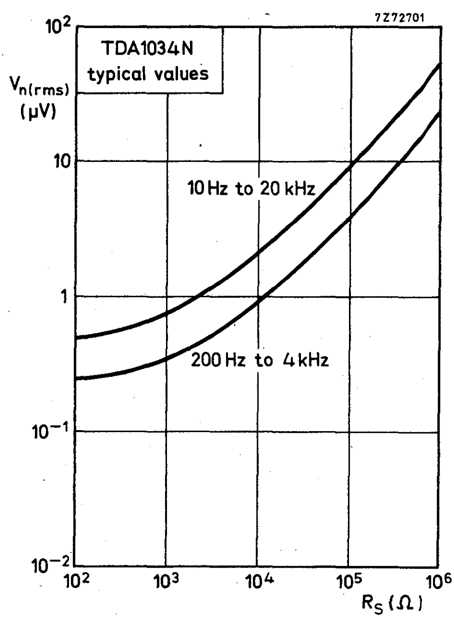
Input noise voltage density.



Input noise current density.



Total input noise density.



Broadband input noise voltage.