OPERATIONAL AMPLIFIER

The TDA0748D is a high-performance, silicon, monolithic, operational amplifier for use in a wide range of analogue applications. The device is mounted in a microminiature envelope, especially designed for use in thick and thin-film circuits.
Ability to accept a large common mode voltage, together with freedom from latch-up, makes it an ideal voltage follower.
Owing to its high gain and wide operating voltage range, it also offers superior performance in integration, summing, and general feedback applications.
Features:
- suitable for use in thick and thin-film hybrid circuits
- short-circuit protection
- offset voltage null capability
- large common-mode and differential voltage ranges
- low power consumption
- no latch-up

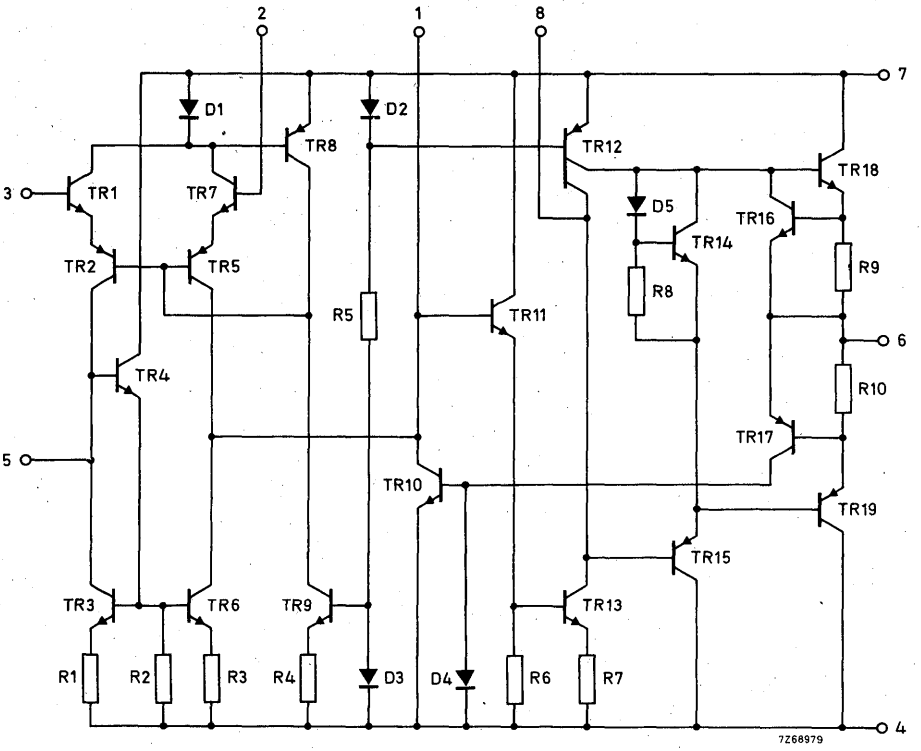
The TDA0748D is equivalent to μA748. It is similar to TBA221D, which has internal frequency compensation.

QUICK REFERENCE DATA				
Positive supply voltage	V_P	typ.	15	V
Negative supply voltage	V_N	typ.	15	V
Characteristics at T_{amb} = 25 °C				
Voltage gain at $R_L \geq 2$ kΩ; $V_o = \pm 10$ V	G_v	typ.	150 000	
Common mode rejection ratio at $R_S \leq 10$ kΩ	CMRR	typ.	90	dB
Input resistance	R_i	typ.	2	MΩ
Output voltage swing at $R_L \geq 10$ kΩ	$\pm V_o$	>	12	V
Input voltage range	$\pm V_i$	>	12	V
Total power consumption	P_{tot}	typ.	60	mW

PACKAGE OUTLINE

SOT-96A (plastic 8-lead flat pack) (see general section).

CIRCUIT DIAGRAM



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

Voltages

Positive supply voltage	V_P	max.	18	V	
Negative supply voltage	V_N	max.	18	V	
Common mode input voltage	$\pm V_i$	max.	15	V	1)
Differential input voltage	$\pm V_{2-3}$	max.	30	V	
→ Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	470	mW	2)
Output short-circuit duration	t	max.	60	s	3)

1) For supply voltage less than ± 15 V, the absolute maximum input voltage is equal to the supply voltage.

2) When soldered on a ceramic substrate. In free air the maximum dissipation is 310 mW.

3) Short circuit is allowed to ground or either supply during this period.

RATINGS (continued)

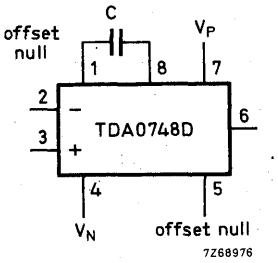
Temperatures				
Storage temperature	T_{stg}	−55 to +125		°C
Operating ambient temperature	T_{amb}	0 to +85		°C
Lead temperature (soldering time < 60 s)	T_{lead}	max.	260	°C

CHARACTERISTICS V_P = 15 V; V_N = 15 V; T_{amb} = 25 °C; C = 30 pF unless otherwise specified

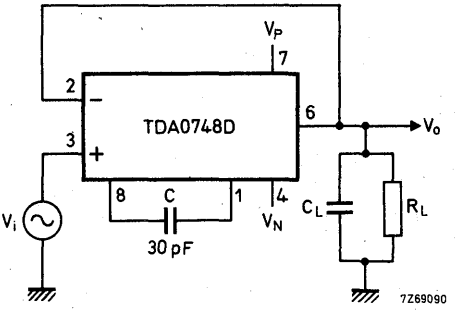
Input offset voltage at $R_S \leq 10$ kΩ	V_{io}	typ. <	2,0 6,0	mV mV
Input offset current	I_{io}	typ. <	20 200	nA nA
Input bias current	I_i	typ. <	80 500	nA nA
Input resistance	R_i	> typ.	0,3 2,0	MΩ MΩ
Input capacitance	C_i	typ.	2,0	pF
Offset voltage adjustment range	$\pm V_{io}$	typ.	15	mV
Large signal voltage gain at $R_L \geq 2$ kΩ; $\pm V_o$ = 10 V	G_v	> typ.	20 000 150 000	
Output resistance	R_o	typ.	75	Ω
Output short-circuit current	I_{sc}	typ.	25	mA
Supply current	$I_{P;N}$	typ. <	1,9 2,8	mA mA
Total power consumption	P_{tot}	typ. <	60 85	mW mW
Transient response at G_v = 1 (voltage follower)				
V_i = 20 mV; C = 30 pF; R_L = 2 kΩ $C_L \leq 100$ pF				
rise time	t_r	typ.	0,3	μs
overshoot		typ.	5,0	%
Slew rate at G_v = 1 (voltage follower); $R_L \geq 2$ kΩ	S	typ.	0,5	V/μs
Transient response at G_v = 10 (voltage follower)				
V_i = 20 mV; C = 3,5 pF; R_L = 2 kΩ $C_L \leq 100$ pF				
rise time	t_r	typ.	0,3	μs
overshoot		typ.	5,0	%
Slew rate at G_v = 10 V (voltage follower); $R_L \geq 2$ kΩ	S	typ.	5,5	V/μs

CHARACTERISTICS V_P = 15 V; V_N = 15 V; T_{amb} = 0 to +70 °C; C = 30 pF unless otherwise specified

Input offset voltage at $R_S \leq 10$ kΩ	V_{io}	<	7,5	mV
Input offset current	I_{io}	<	300	nA
Input bias current	I_i	<	800	nA
Input voltage range	$\pm V_i$	>	12	V
		typ.	13	V
Common mode rejection ratio at $R_S \leq 10$ kΩ	CMRR	>	70	dB
		typ.	90	dB
Supply voltage rejection ratio at $R_S \leq 10$ kΩ	SVRR	typ.	30	μV/V
		<	150	μV/V
Large signal voltage gain at $R_L \geq 2$ kΩ; $\pm V_o = 10$ V	G_v	>	15 000	
Output voltage swing at $R_L \geq 10$ kΩ	$\pm V_o$	>	12	V
		typ.	14	V
at $R_L \geq 2$ kΩ	$\pm V_o$	>	10	V
		typ.	13	V
Total power consumption	P_{tot}	typ.	60	mW
		<	100	mW

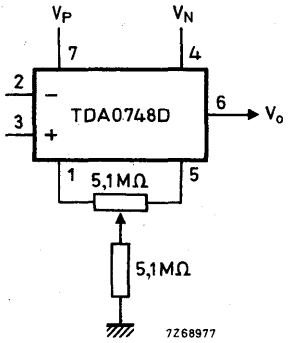


Basic circuit

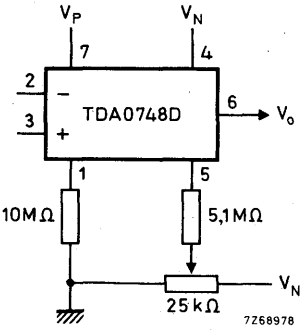


Transient response test circuit

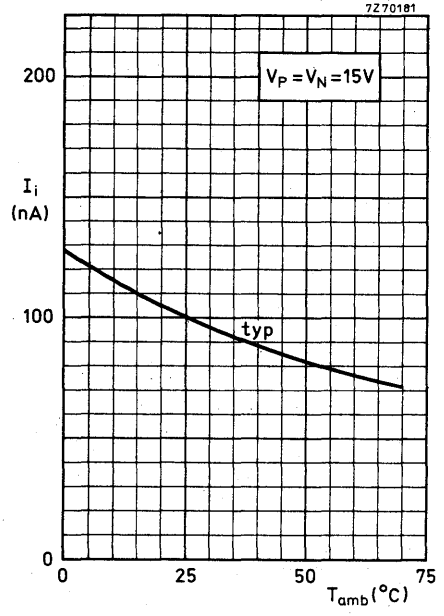
Offset voltage null circuit

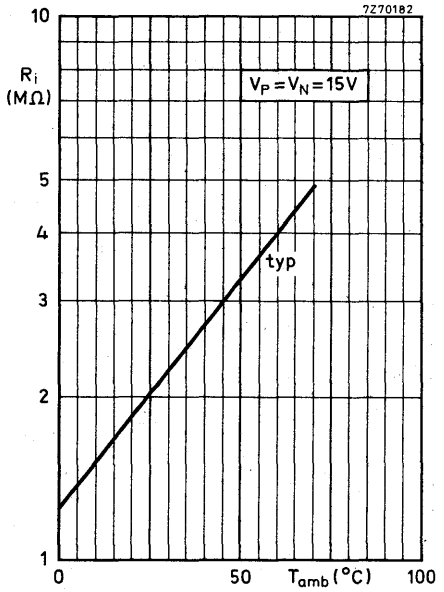


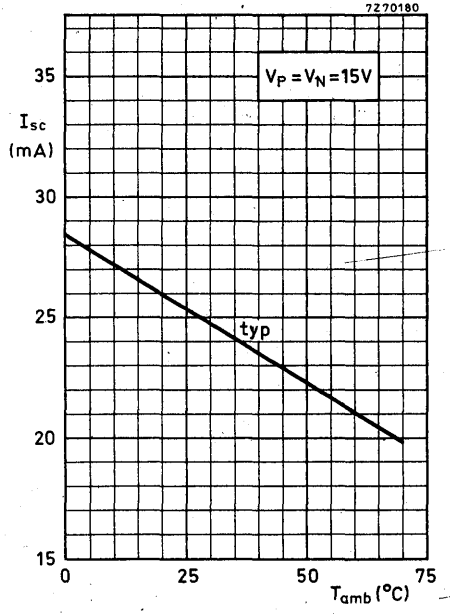
Recommended circuit

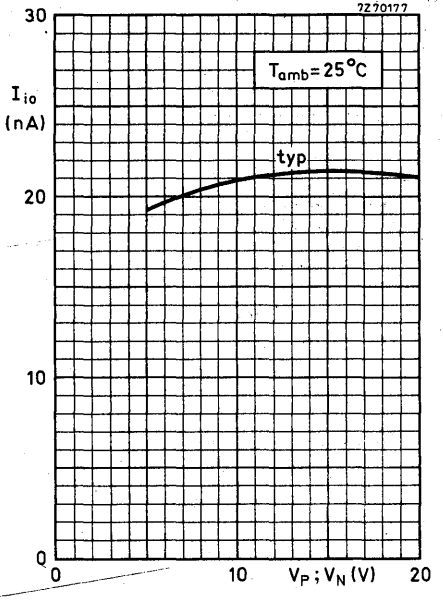


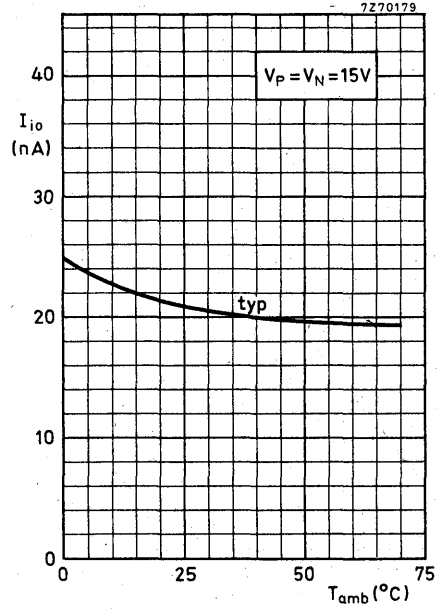
Alternate circuit

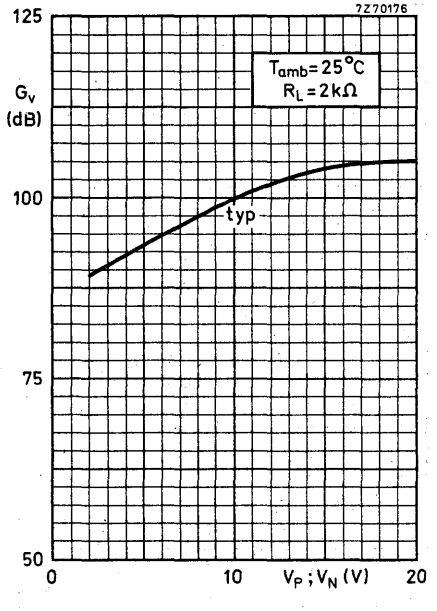


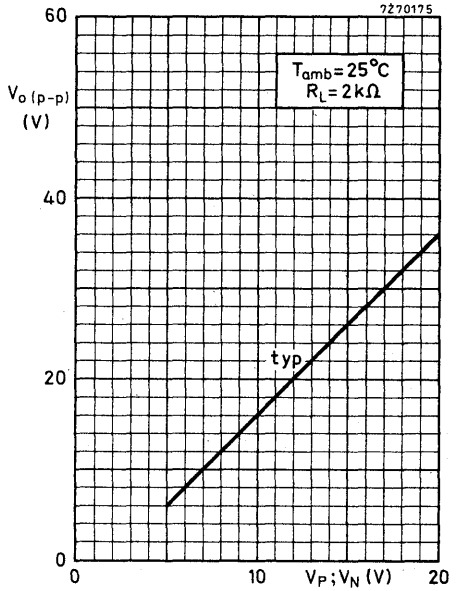


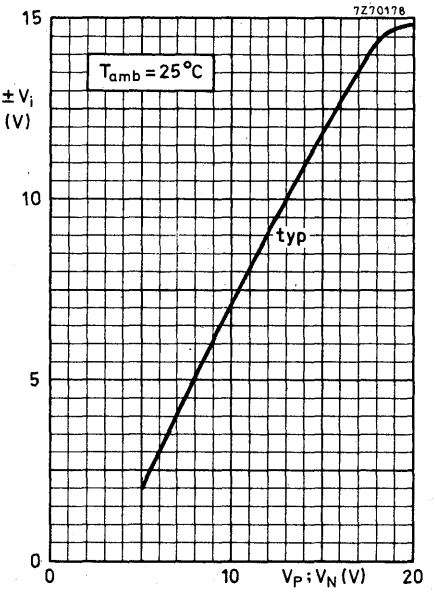

7Z70180
$V_P = V_N = 15V$
I_{sc} (mA)
35
30
25
20
15
typ
0
25
50
75
T_{amb} (°C)

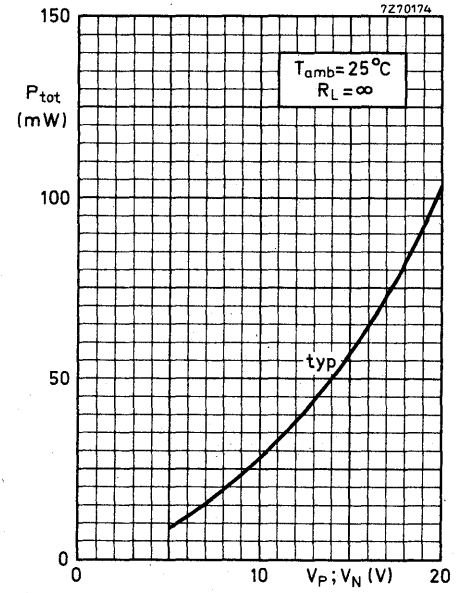

7Z70177
$T_{amb} = 25°C$
I_{io} (nA)
30
20
10
0
typ
0
10
20
V_P ; V_N (V)

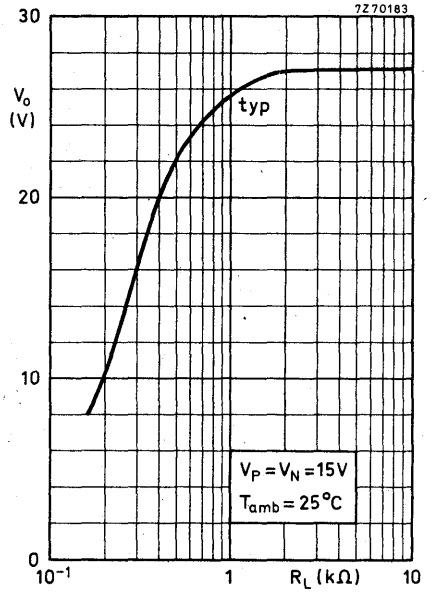

7Z70179
$V_P = V_N = 15V$
I_{io} (nA)
40
30
20
10
0
typ
0
25
50
75
T_{amb} (°C)

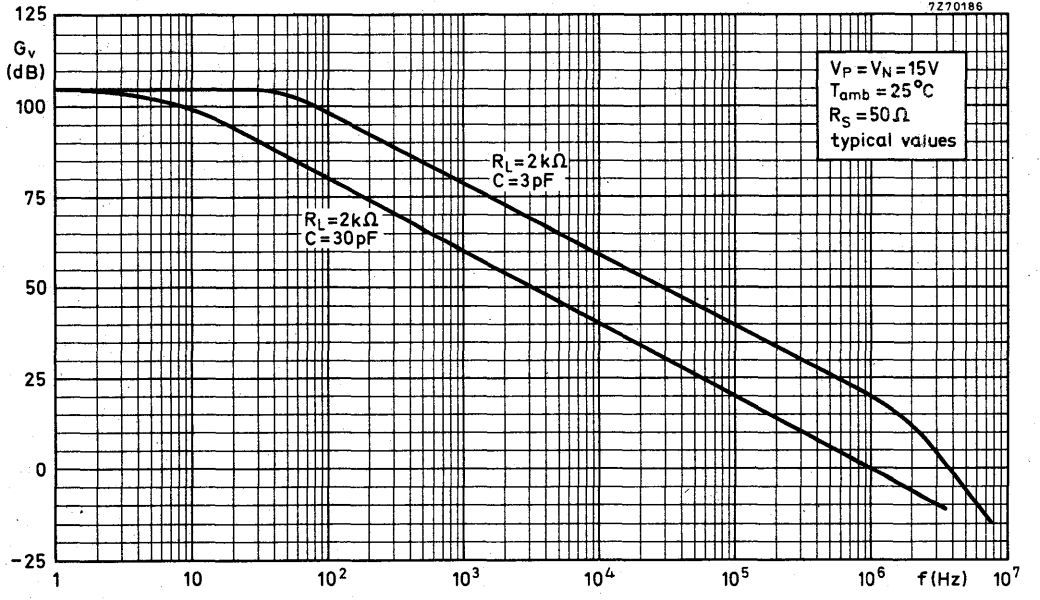

7Z70176
$T_{amb} = 25°C$
$R_L = 2k\Omega$
G_v (dB)
125
100
75
50
typ
0
10
20
V_P ; V_N (V)

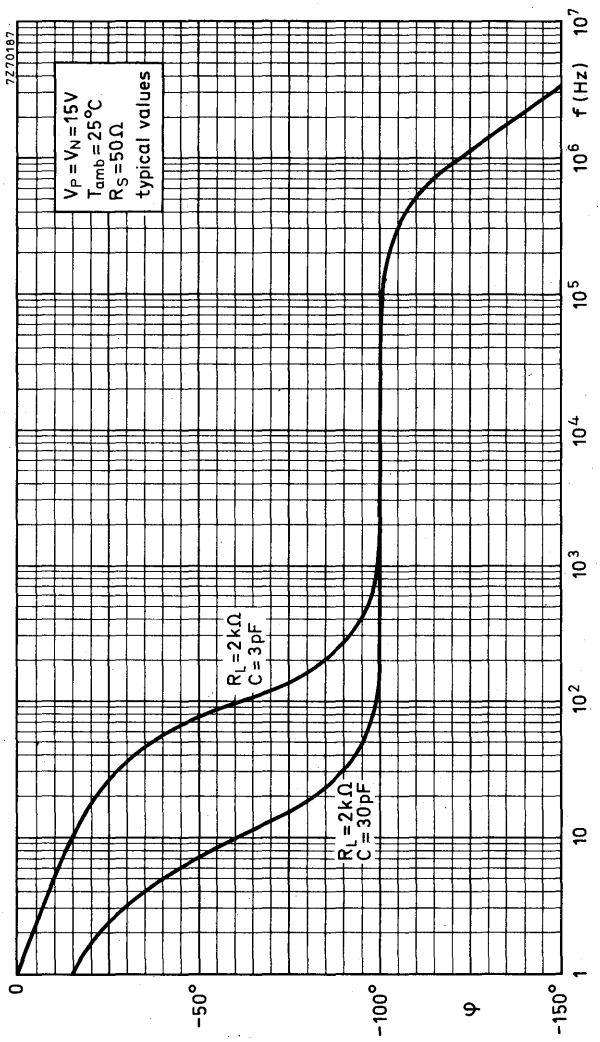

7Z70175
T_{amb}=25°C
R_L=2kΩ
typ
$V_{o\,(p-p)}$ (V)
60
40
20
0
0
10
20
V_P; V_N (V)

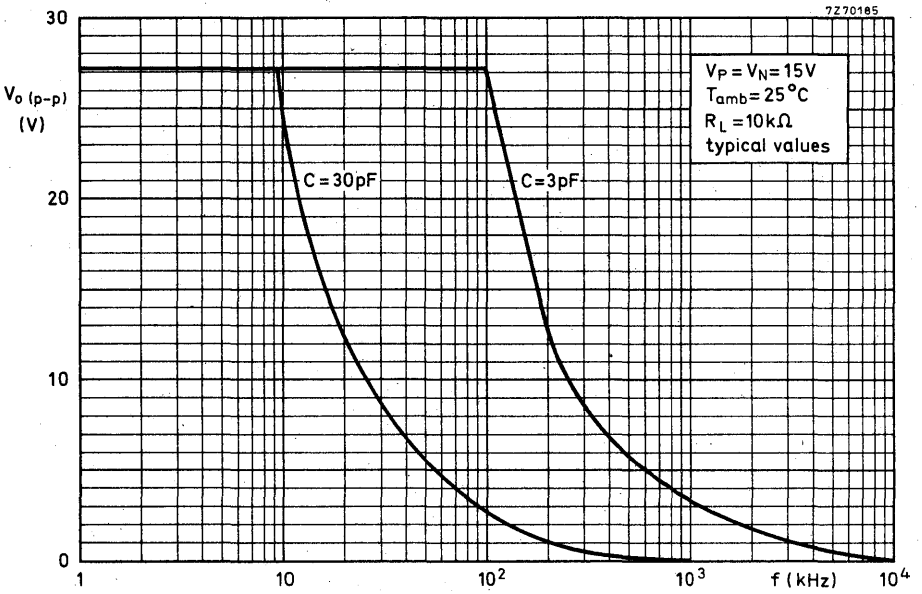

7Z70178
T_{amb} = 25°C
typ
± V_i (V)
15
10
5
0
0
10
20
V_P; V_N (V)

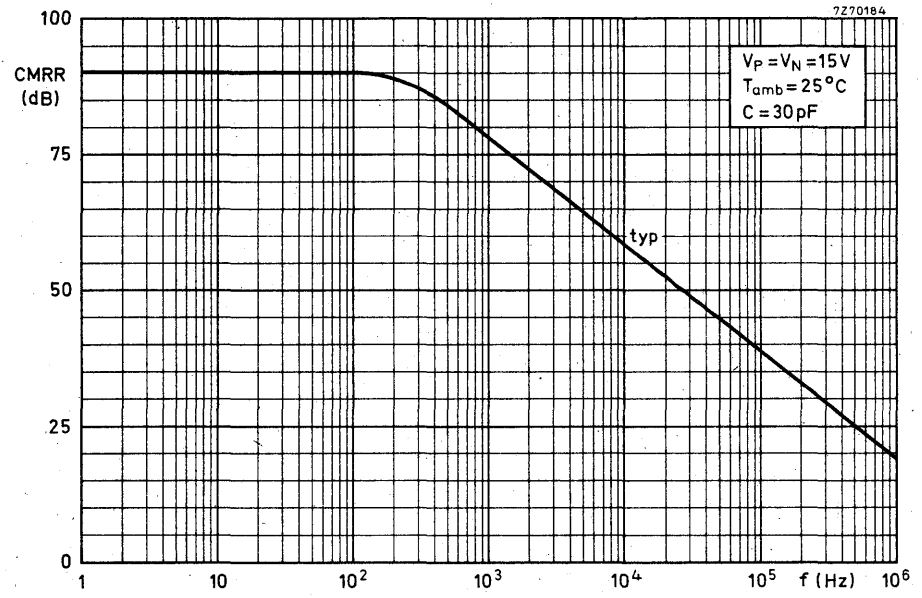

7Z70174
T_{amb}=25°C
R_L=∞
typ
P_{tot} (mW)
150
100
50
0
0
10
20
V_P; V_N (V)


7Z70183
typ
V_o (V)
30
20
10
0
10^{-1}
1
10
R_L (kΩ)
V_P = V_N = 15V
T_{amb} = 25°C


7Z70186
125
G_v (dB)
100
75
50
25
0
-25
1
10
10^2
10^3
10^4
10^5
10^6
f (Hz)
10^7
$V_P = V_N = 15V$
$T_{amb} = 25°C$
$R_S = 50\Omega$
typical values
$R_L = 2k\Omega$
$C = 3pF$
$R_L = 2k\Omega$
$C = 30pF$


7Z70187
$V_P = V_N = 15V$
$T_{amb} = 25°C$
$R_S = 50\Omega$
typical values
$R_L = 2k\Omega$
$C = 3pF$
$R_L = 2k\Omega$
$C = 30pF$
0
-50°
-100°
-150°
φ
1
10
10^2
10^3
10^4
10^5
10^6
10^7
f (Hz)


7Z70185
30
20
10
0
V_o (p-p)
(V)
$V_P = V_N = 15V$
$T_{amb} = 25°C$
$R_L = 10k\Omega$
typical values
C = 30pF
C = 3pF
1
10
10^2
10^3
f (kHz)
10^4


7Z70184
100
75
50
25
0
CMRR
(dB)
$V_P = V_N = 15V$
$T_{amb} = 25°C$
C = 30pF
typ
1
10
10^2
10^3
10^4
10^5
f (Hz)
10^6