INTEGRATED CIRCUITS

DATA SHEET

TDA1029
Signal-sources switch

Product specification
File under Integrated Circuits, IC01

January 1980

Philips
Semiconductors

PHILIPS

Signal-sources switch TDA1029

The TDA1029 is a dual operational amplifier (connected as an impedance converter) each amplifier having 4 mutually switchable inputs which are protected by clamping diodes. The input currents are independent of switch position and the outputs are short-circuit protected.

The device is intended as an electronic two-channel signal-source switch in a.f. amplifiers.

QUICK REFERENCE DATA

Supply voltage range (pin 14)	V_P		6 to 23	V
Operating ambient temperature	T_{amb}		–30 to + 80	°C
Supply voltage (pin 14)	V_P	typ.	20	V
Current consumption	I_{14}	typ.	3,5	mA
Maximum input signal handling (r.m.s. value)	$V_{i(rms)}$	typ.	6	V
Voltage gain	G_v	typ.	1	
Total harmonic distortion	d_{tot}	typ.	0,01	%
Crosstalk	α	typ.	70	dB
Signal-to-noise ratio	S/N	typ.	120	dB

PACKAGE OUTLINE

16-lead DIL; plastic (SOT38); SOT38-1; 1996 July 18.

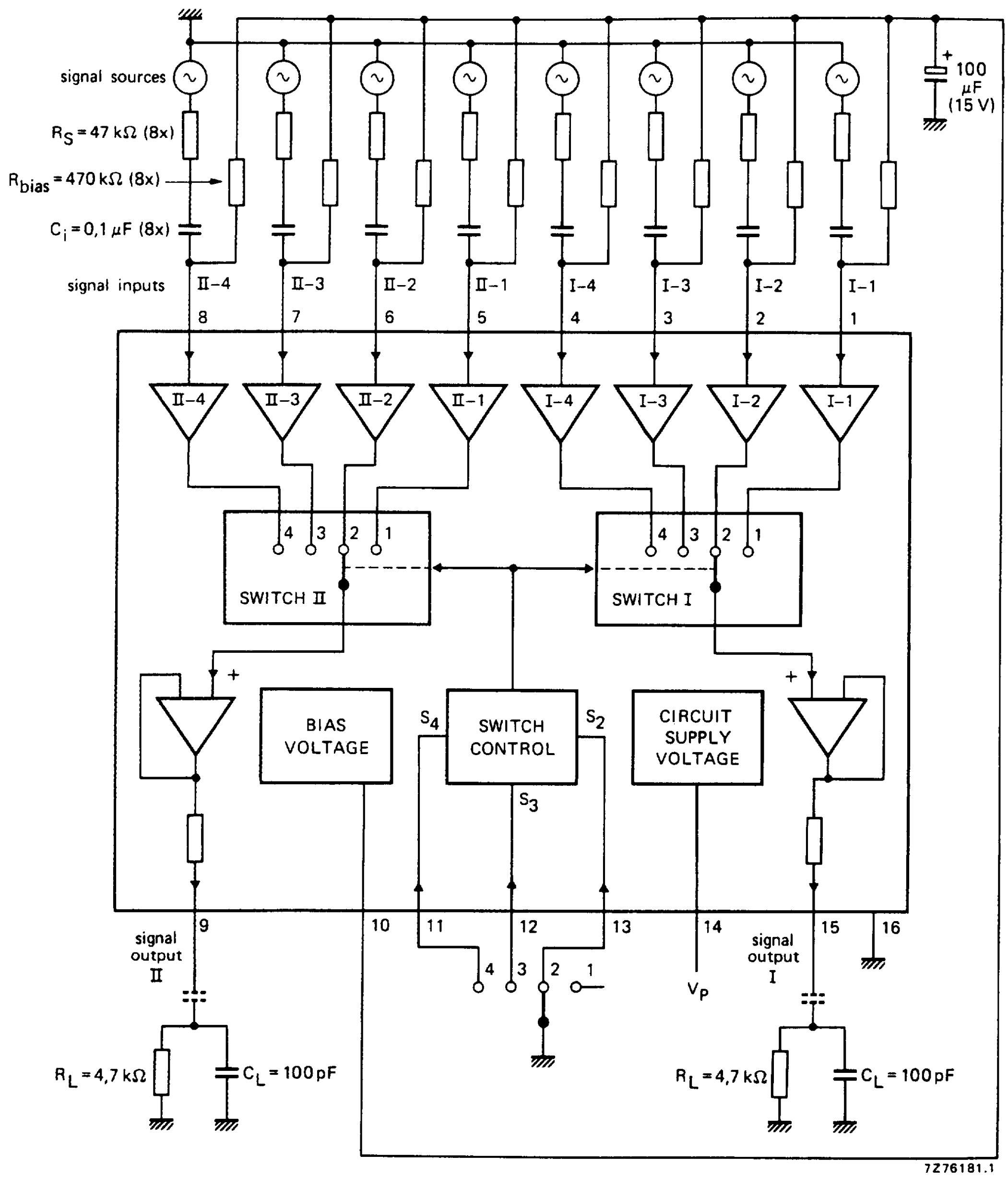


Fig.1 Block diagram.

RATINGS

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

Supply voltage (pin 14)	V_P	max.	23 V
Input voltage (pins 1 to 8)	V_I	max.	V_P
	$-V_I$	max.	0,5 V
Switch control voltage (pins 11, 12 and 13)	V_S		0 to 23 V
Input current	$\pm I_I$	max.	20 mA
Switch control current	$-I_S$	max.	50 mA
Total power dissipation	P_{tot}	max.	800 mW
Storage temperature	T_{stg}		–55 to + 150 °C
Operating ambient temperature	T_{amb}		–30 to + 80 °C

CHARACTERISTICS

V_P = 20 V; T_{amb} = 25 °C; unless otherwise specified

Current consumption	I_{14}	typ.	3,5 mA
without load; $I_9 = I_{15} = 0$			2 to 5 mA
Supply voltage range (pin 14)	V_P		6 to 23 V

Signal inputs

Input offset voltage			
of switched-on inputs	V_{io}	typ.	2 mV
$R_S \leq 1$ kΩ		<	10 mV
Input offset current	I_{io}	typ.	20 nA
of switched-on inputs		<	200 nA
Input offset current			
of a switched-on input with respect to a	I_{io}	typ.	20 nA
non-switched-on input of a channel		<	200 nA
Input bias current	I_i	typ.	250 nA
independent of switch position		<	950 nA
Capacitance between adjacent inputs	C	typ.	0,5 pF
D.C. input voltage range	V_I		3 to 19 V
Supply voltage rejection ratio; $R_S \leq 10$ kΩ	SVRR	typ.	100 µV/V
Equivalent input noise voltage			
R_S = 0; f = 20 Hz to 20 kHz (r.m.s. value)	$V_{n(rms)}$	typ.	3,5 µV
Equivalent input noise current			
f = 20 Hz to 20 kHz (r.m.s. value)	$I_{n(rms)}$	typ.	0,05 nA
Crosstalk between a switched-on input			
and a non-switched-on input;			
measured at the output at R_S = 1 kΩ; f = 1 kHz	α	typ.	100 dB

Signal amplifier

Voltage gain of a switched-on input			
at $I_9 = I_{15} = 0$; $R_L = \infty$	G_v	typ.	1
Current gain of a switched-on amplifier	G_i	typ.	10^5

Signal outputs

Output resistance (pins 9 and 15)	R_o	typ.	400 Ω
Output current capability at V_P = 6 to 23 V	$\pm I_9$; $\pm I_{15}$	typ.	5 mA
Frequency limit of the output voltage			
$V_{i(p-p)}$ = 1 V; R_S = 1 kΩ; R_L = 10 MΩ; C_L = 10 pF	f	typ.	1,3 MHz
Slew rate (unity gain); $\Delta V_{9-16}/\Delta t$; $\Delta V_{15-16}/\Delta t$			
R_L = 10 MΩ; C_L = 10 pF	S	typ.	2 V/µs

Bias voltage

D.C. output voltage	V_{10-16}	typ.	11 V[(1)]
			10,2 to 11,8 V
Output resistance	R_{10-16}	typ.	8,2 kΩ

Switch control

switched-on inputs	interconnected pins	control voltages		
		V_{11-16}	V_{12-16}	V_{13-16}
I-1, II-1	1-15, 5-9	H	H	H
I-2, II-2	2-15, 6-9	H	H	L
I-3, II-3	3-15, 7-9	H	L	H
I-4, II-4	4-15, 8-9	L	H	H
I-4, II-4	4-15, 8-9	L	L	H
I-4, II-4	4-15, 8-9	L	H	L
I-4, II-4	4-15, 8-9	L	L	L
I-3, II-3	3-15, 7-9	H	L	L

In the case of offset control, an internal blocking circuit of the switch control ensures that not more than one input will be switched on at a time. In that case safe switching-through is obtained at $V_{SL} \leq 1,5$ V.

Control inputs (pins 11, 12 and 13)

Required voltage				
HIGH	V_{SH}	>	3,3	V[2]
LOW	VSL	<	2,1	V
Input current				
HIGH (leakage current)	I_{SH}	<	1	µA
LOW (control current)	$-I_{SL}$	<	250	µA

Notes

1. $V_{10\text{-}16}$ is typically $0{,}5 \cdot V_{14\text{-}16} + 1{,}5 \cdot V_{BE}$.
2. Or control inputs open ($R_{11,12,13-16} > 33$ MΩ).

APPLICATION INFORMATION

V_P = 20 V; T_{amb} = 25 °C; measured in Fig.1; R_S = 47 kΩ; C_i = 0,1 µF; R_{bias} = 470 kΩ; R_L = 47 kΩ; C_L = 100 pF (unless otherwise specified)

Voltage gain	G_v	typ.	–1,5	dB
Output voltage variation when switching the inputs	ΔV_{9-16}; ΔV_{15-16}	typ.	10	mV
		<	100	mV
Total harmonic distortion				
over most of signal range (see Fig.4)	d_{tot}	typ.	0,01	%
V_i = 5 V; f = 1 kHz	d_{tot}	typ.	0,02	%
V_i = 5 V; f = 20 Hz to 20 kHz	d_{tot}	typ.	0,03	%
Output signal handling				
d_{tot} = 0,1%; f = 1 kHz (r.m.s. value)	$V_{o(rms)}$	>	5,0	V
		typ.	5,3	V
Noise output voltage (unweighted)				
f = 20 Hz to 20 kHz (r.m.s. value)	$V_{n(rms)}$	typ.	5	µV
Noise output voltage (weighted)				
f = 20 Hz to 20 kHz (in accordance with DIN 45405)	V_n	typ.	12	µV
Amplitude response				
V_i = 5 V; f = 20 Hz to 20 kHz; C_i = 0,22 µF	$\Delta V_{9\text{-}16}$; $\Delta V_{15\text{-}16}$	<	0,1	dB[1]
Crosswalk between a switched-on input and a non-switched-on input; measured at the output at f = 1 kHz	α	typ.	75	dB[2]
Crosswalk between switched-on inputs and the outputs of the other channels	α	typ.	90	dB[2]

Notes

1. The lower cut-off frequency depends on values of R_{bias} and C_i.
2. Depends on external circuitry and R_S. The value will be fixed mostly by capacitive crosstalk of the external components.

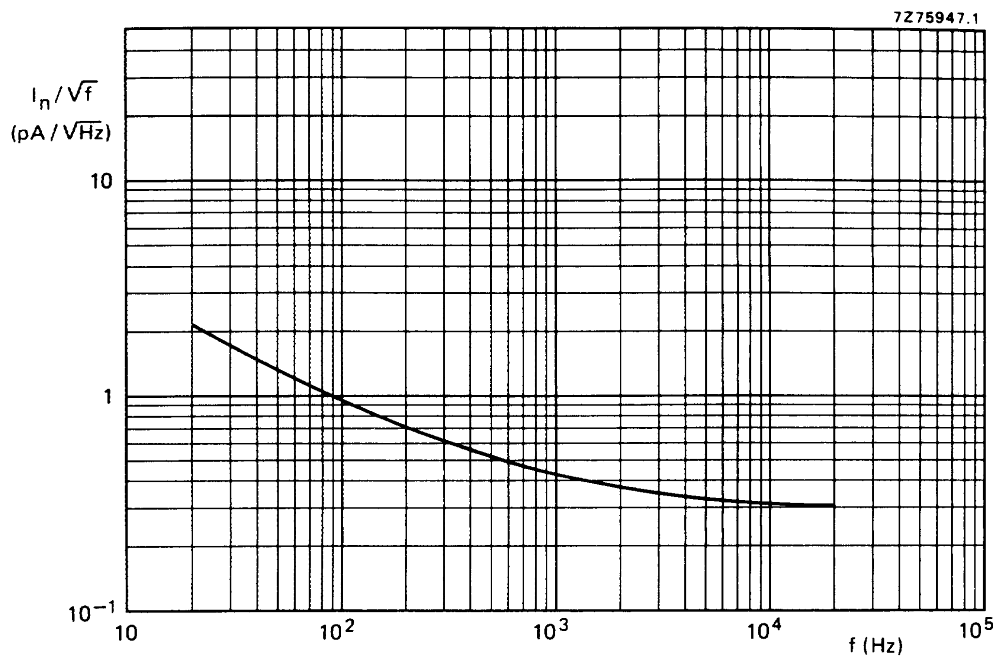


Fig.2 Equivalent input noise current.

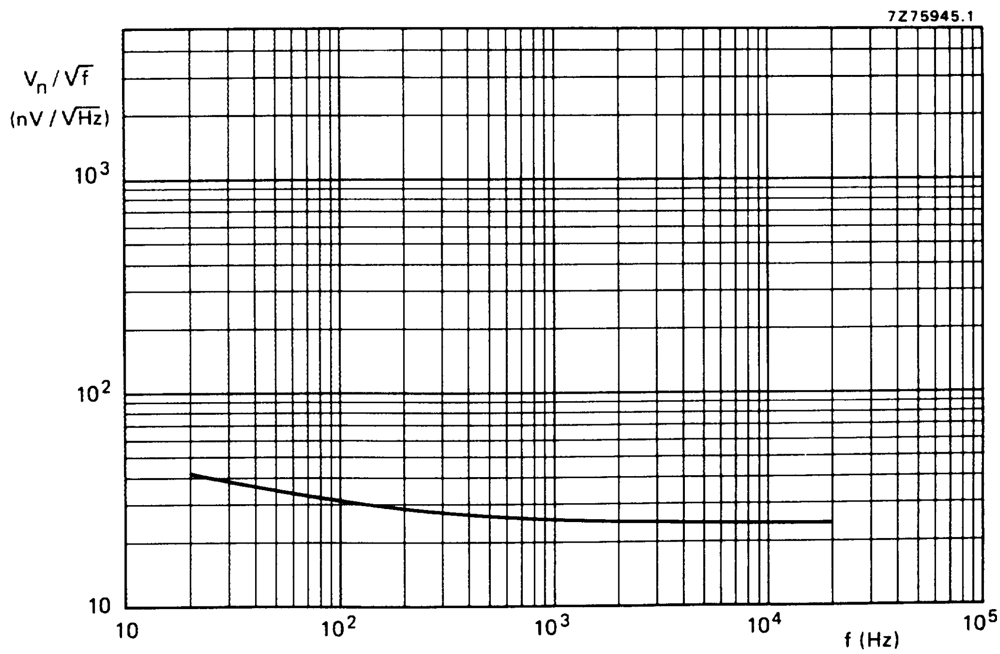


Fig.3 Equivalent input noise voltage.

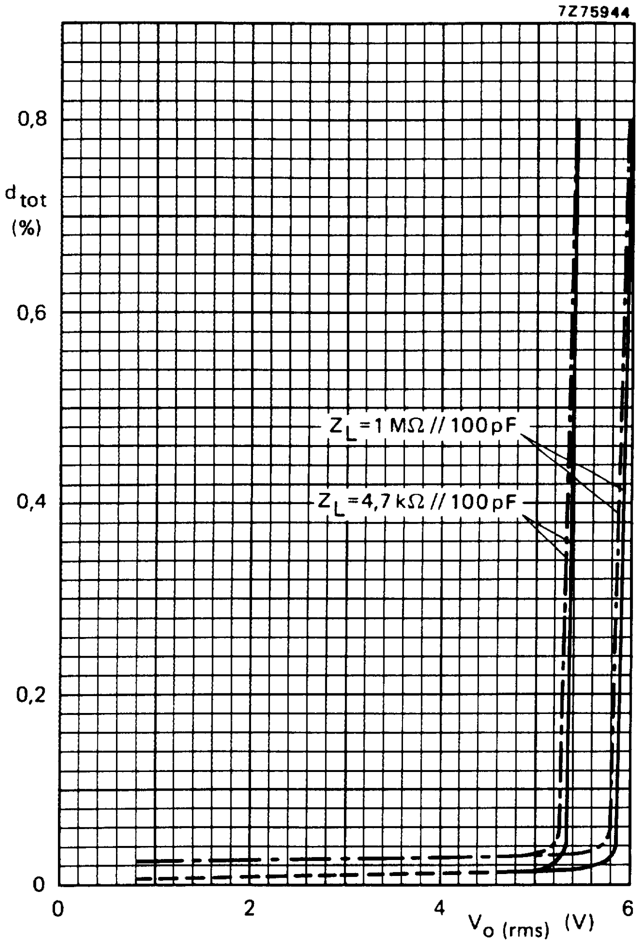


Fig.4 Total harmonic distortion as a function of r.m.s output voltage. — f = 1 kHz; — - — - f = 20 kHz.

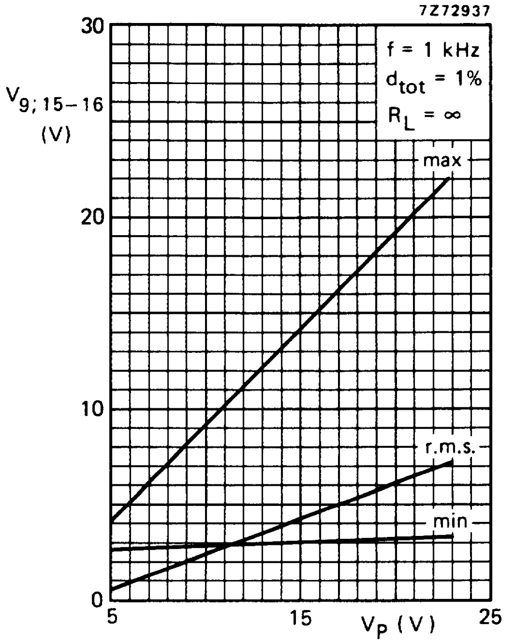


Fig.5 Output voltage as a function of supply voltage.

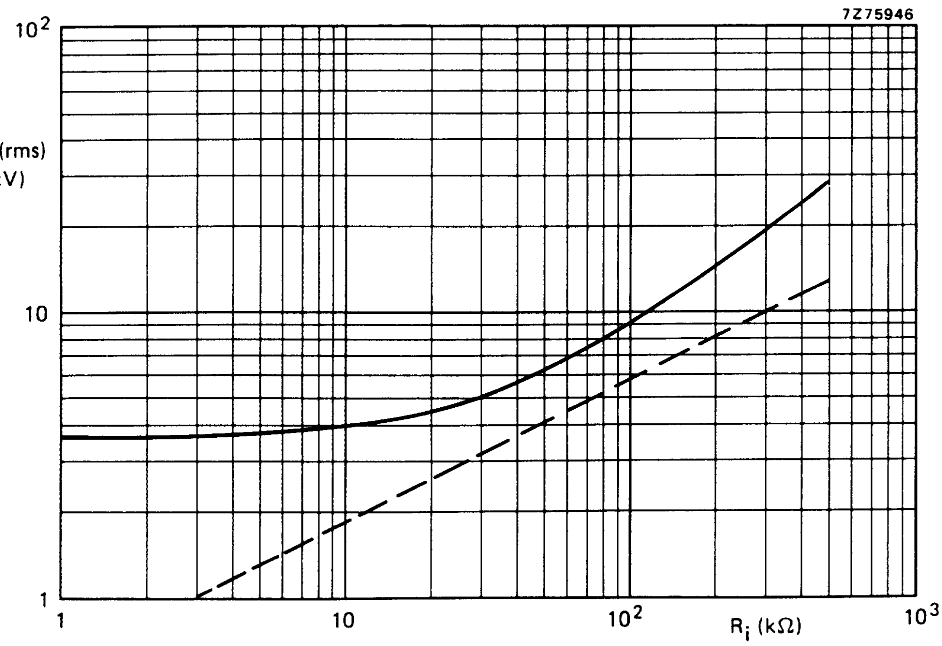


Fig.6 Noise output voltage as a function of input resistance; $G_V = 1$; f = 20 Hz to 20 kHz.
— V_n (output); – – – V_n (R_S).

APPLICATION NOTES

Input protection circuit and indication

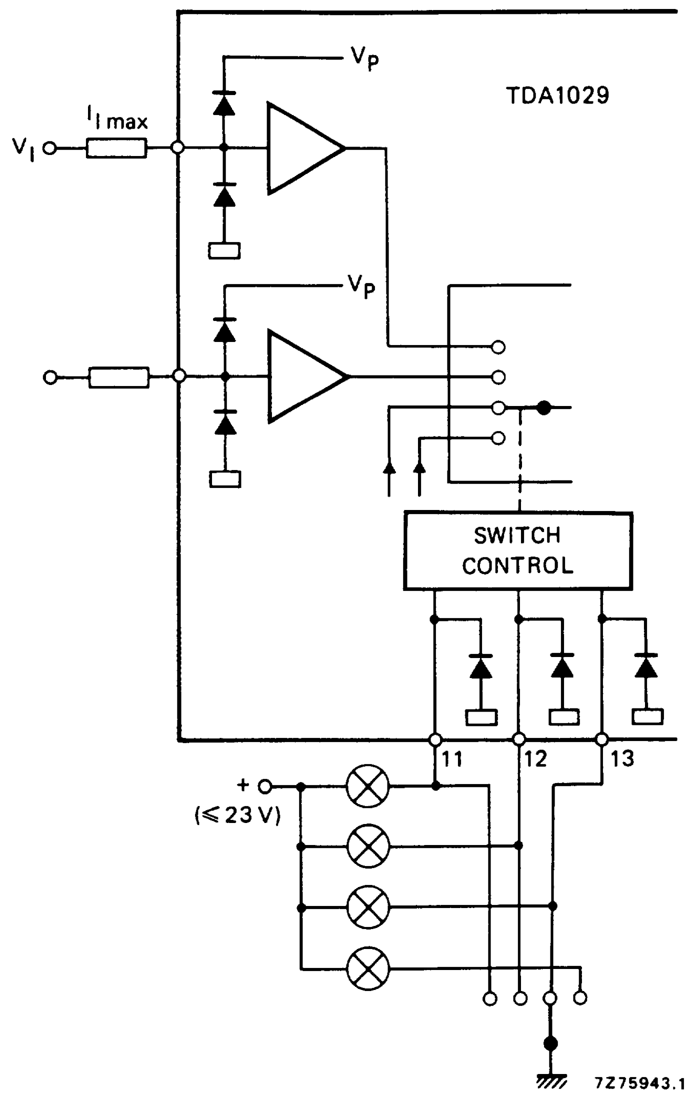


Fig.7 Circuit diagram showing input protection and indication.

Unused signal inputs

Any unused inputs must be connected to a d.c. (bias) voltage, which is within the d.c. input voltage range; e.g. unused inputs can be connected directly to pin 10.

Circuits with standby operation

The control inputs (pins 11, 12 and 13) are high-ohmic at $V_{SH} \leq 20$ V ($I_{SH} \leq 1$ μA), as well as, when the supply voltage (pin 14) is switched off.

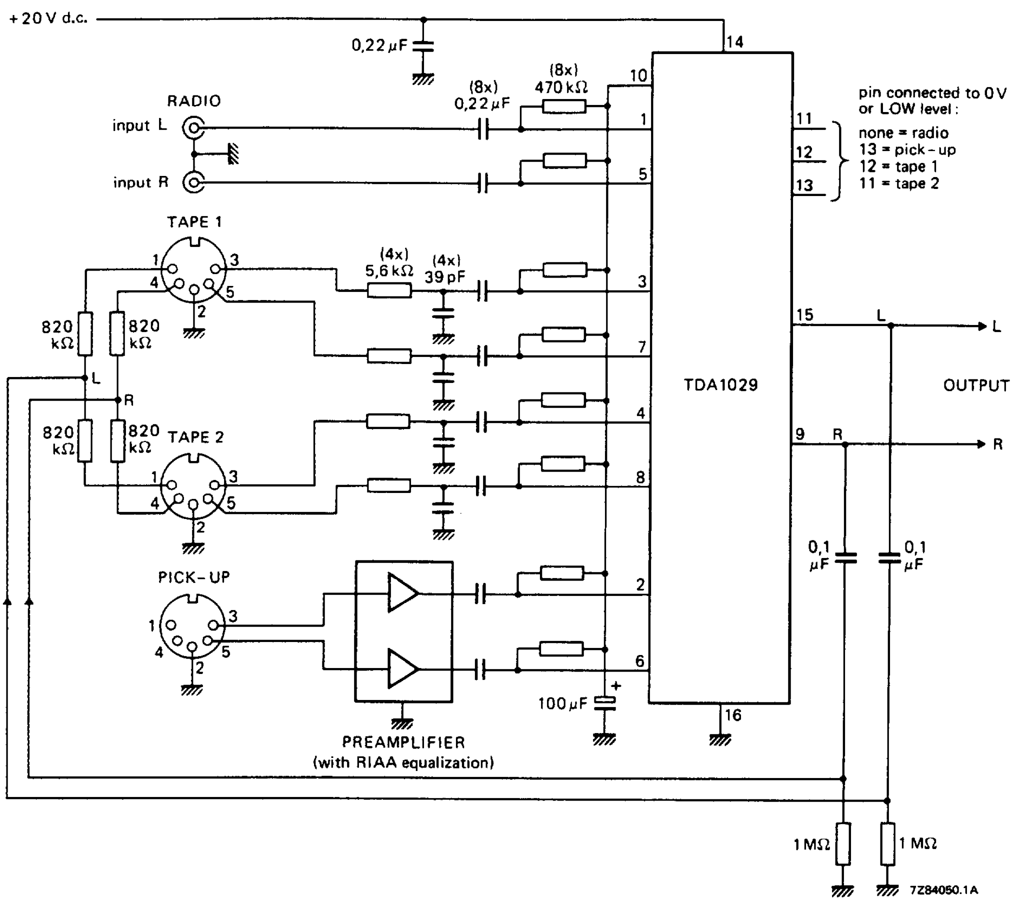


Fig.8 TDA1029 connected as a four input stereo source selector.

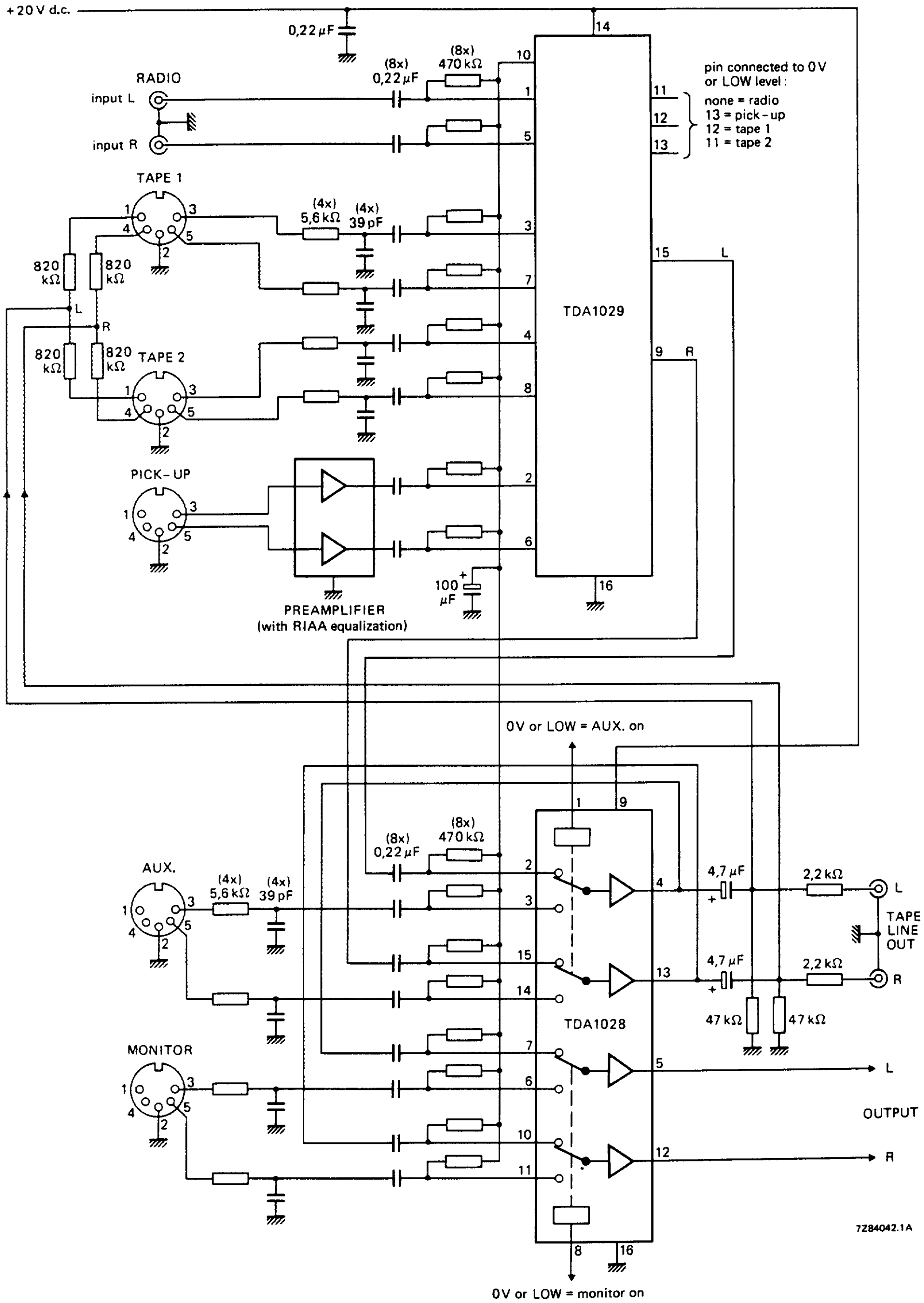


Fig.9 TDA1029 and TDA1028 connected as a five input stereo source selector with monitoring facilities.

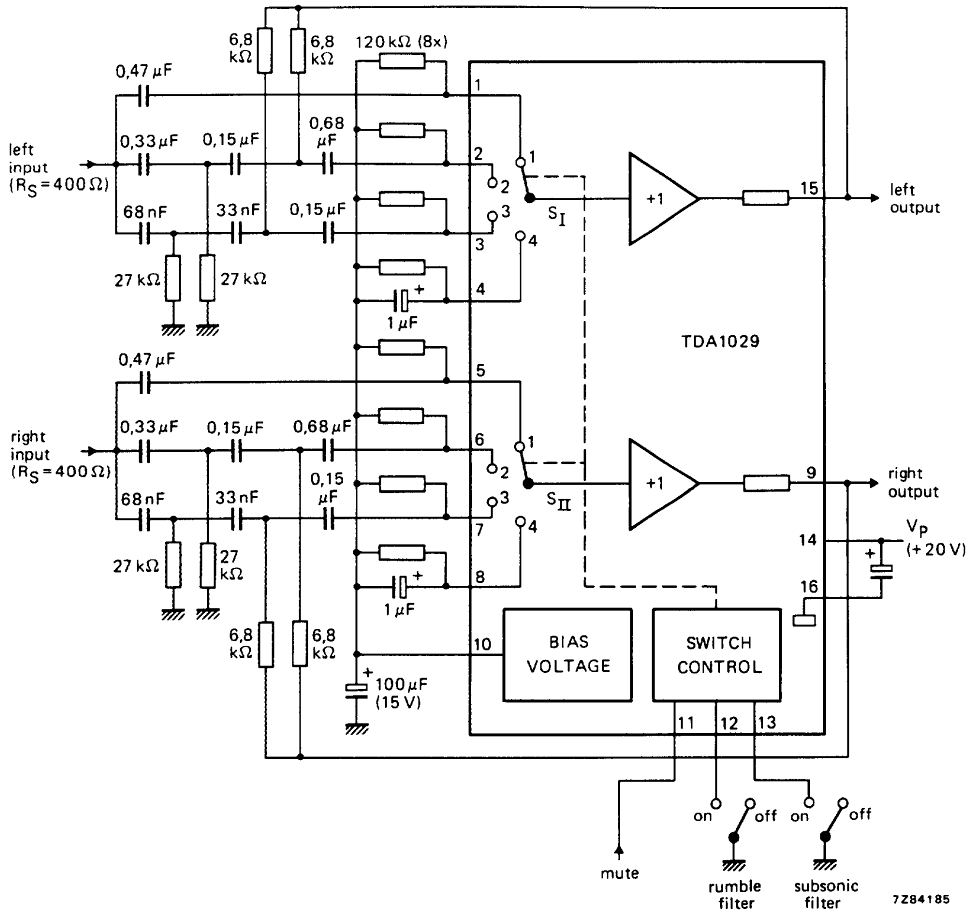


Fig.10 TDA1029 connected as a third-order active high-pass filter with Butterworth response and component values chosen according to the method proposed by Fjällbrant. It is a four-function circuit which can select mute, rumble filter, subsonic filter and linear response.

Switch control

function	V_{11-16}	V_{12-16}	V_{13-16}
linear	H	H	H
subsonic filter ‘on’	H	H	L
rumble filter ‘on’	H	L	X
mute ‘on’	L	X	X

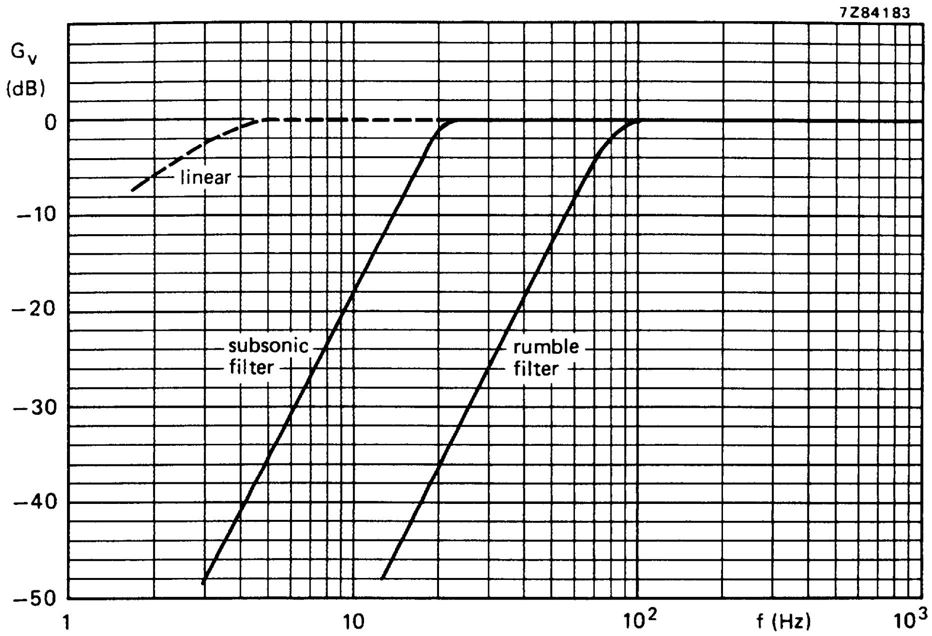
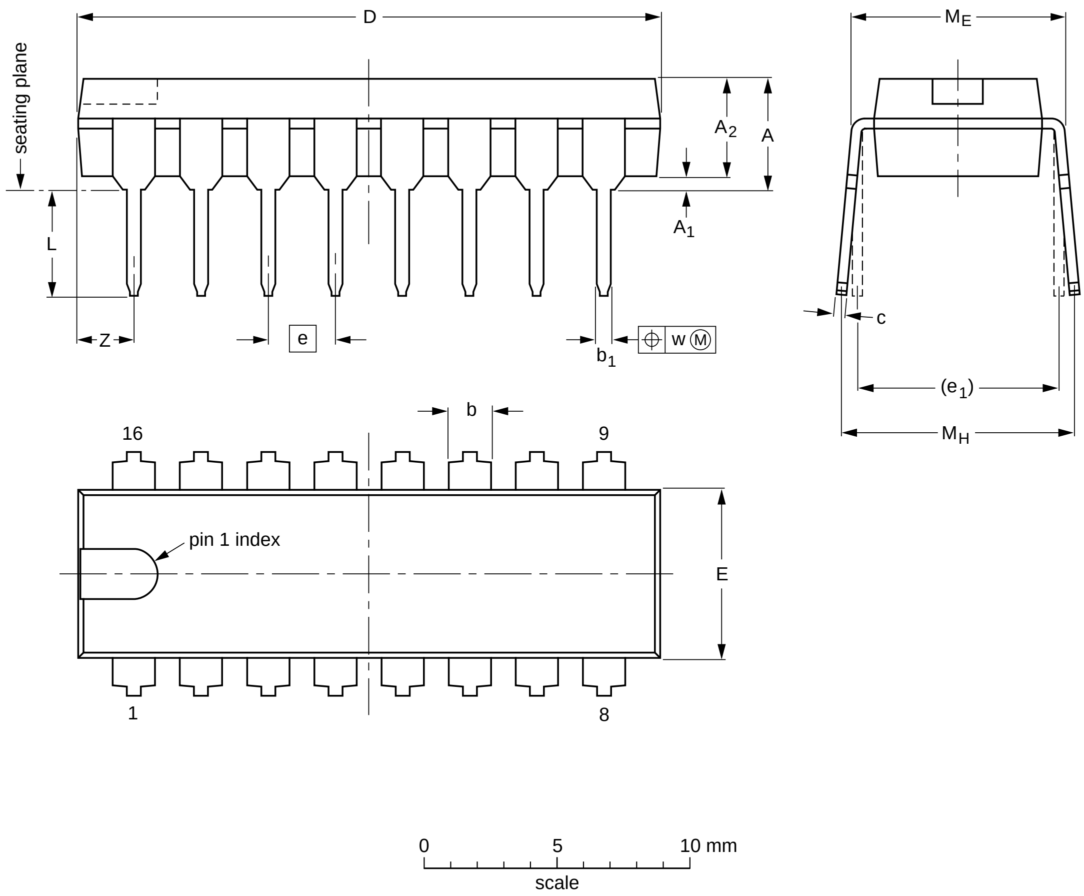


Fig.11 Frequency response curves for the circuit of Fig.10.

PACKAGE OUTLINE

DIP16: plastic dual in-line package; 16 leads (300 mil); long body **SOT38-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.7	0.51	3.7	1.40 1.14	0.53 0.38	0.32 0.23	21.8 21.4	6.48 6.20	2.54	7.62	3.9 3.4	8.25 7.80	9.5 8.3	0.254	2.2
inches	0.19	0.020	0.15	0.055 0.045	0.021 0.015	0.013 0.009	0.86 0.84	0.26 0.24	0.10	0.30	0.15 0.13	0.32 0.31	0.37 0.33	0.01	0.087

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT38-1	050G09	MO-001AE				~~92-10-02~~ 95-01-19

SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *"IC Package Databook"* (order code 9398 652 90011).

Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg\ max}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

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