BTSC-STEREO / SAP / DBX DECODER

GENERAL DESCRIPTION

The TDA3830 is a sound processor for stereo/second audio programme (SAP) baseband signals in accordance with the BTSC-standard for TV receivers and VTRs.

Features

- DBX-decoder, MPX-decoder and SAP-decoder on-chip
- Extensive switching possibilities for the AF outputs and the extra headphone output
- Stereo and SAP signal available at the same time
- Reliable stereo/SAP identification by means of noise detectors
- Integrated filters
- Shrink DIL 32-pin package
- Supply voltage of 5 V
- Power consumption of 0.2 W (typ.)
- DAC control possible for most alignments
- Few external components

QUICK REFERENCE DATA

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage		V_P	–	5	–	V
Supply current		I_P	–	42	–	mA
AF output voltage, pins 23, 24, 7-25*		V_O	–	500	–	mV
Signal-to-noise ratio, weighted		S/N(W)	–	50	–	dB
Stereo channel separation		α	–	26	–	dB
Crosstalk attenuation		αL/N	–	60	–	dB
Total harmonic distortion pins 23 and 24		THD	–	0.5	–	%

* Composite baseband RMS input voltage (100% modulated mono): typ. 100 mV.

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PACKAGE OUTLINE

32-lead shrink DIL; plastic (SOT232)

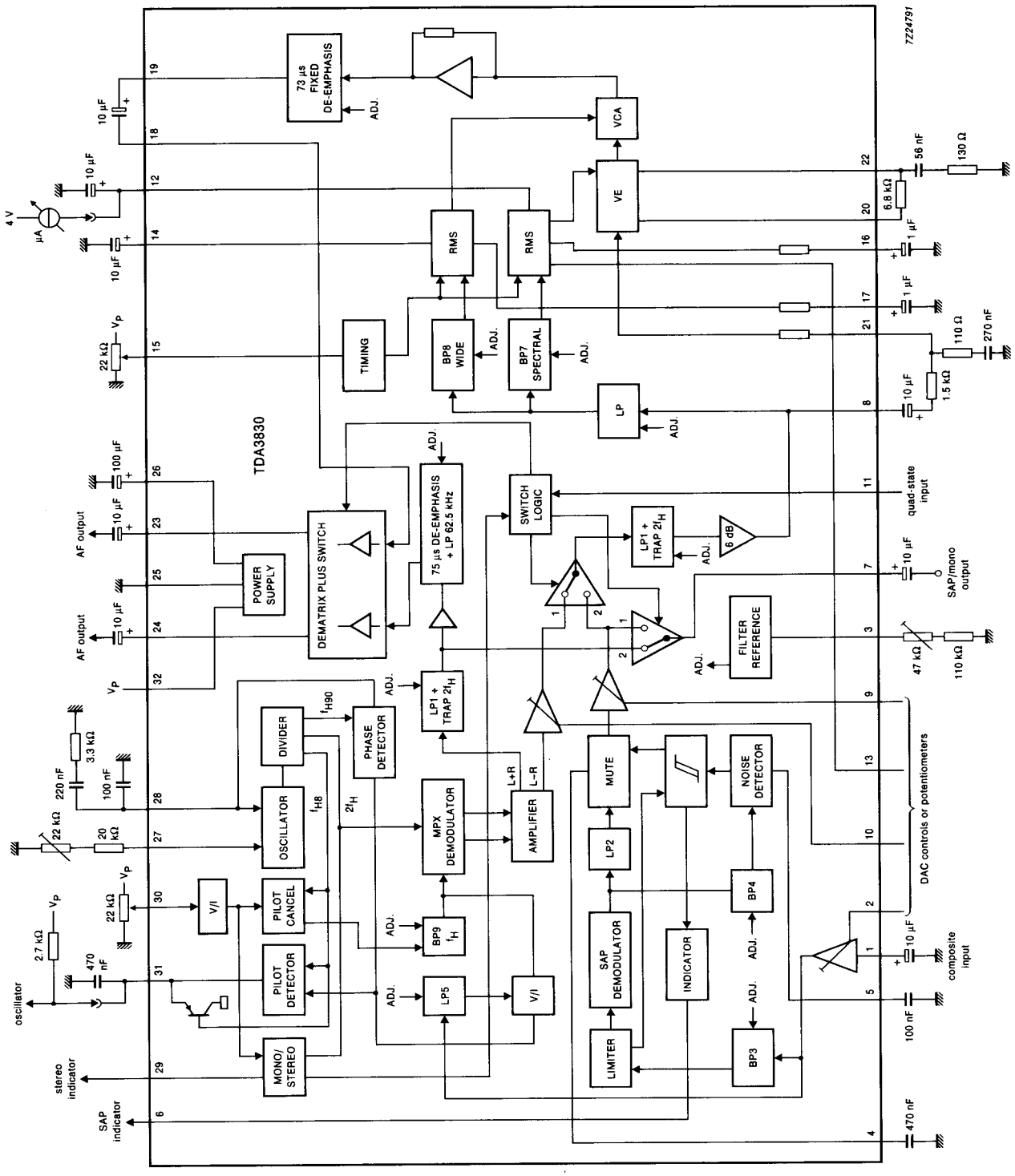


Fig.1 Block diagram.

PHILIPS

PINNING

pin	description
1	Composite input
2	Input level control
3	Filter adjustment
4	SAP identity smoothing
5	SAP noise detector smoothing
6	SAP indicator output
7	Headphone output
8	Output of SAP/(L + R) without DBX
9	SAP level control
10	(L + R) level control
11	Quad-state input
12	Timing capacitor
13	DBX spectral adjustment
14	Timing capacitor
15	Timing adjustment
16	Spectral RMS-detector smoothing
17	Wideband RMS-detector smoothing
18	Dematrix input
19	DBX-output
20	Time constant for variable emphasis
21	Time constant for variable emphasis
22	DBX-input
23	AF-out (R, SAP or mono)
24	AF-out (L, SAP or mono)
25	Ground
26	Reference voltage smoothing
27	VCO free running frequency adjustment
28	Phase detector loop filter
29	Stereo indicator output
30	Pilot cancelling adjustment
31	Pilot identity smooting and VCO/4 output
32	Power supply

DEVELOPMENT DATA

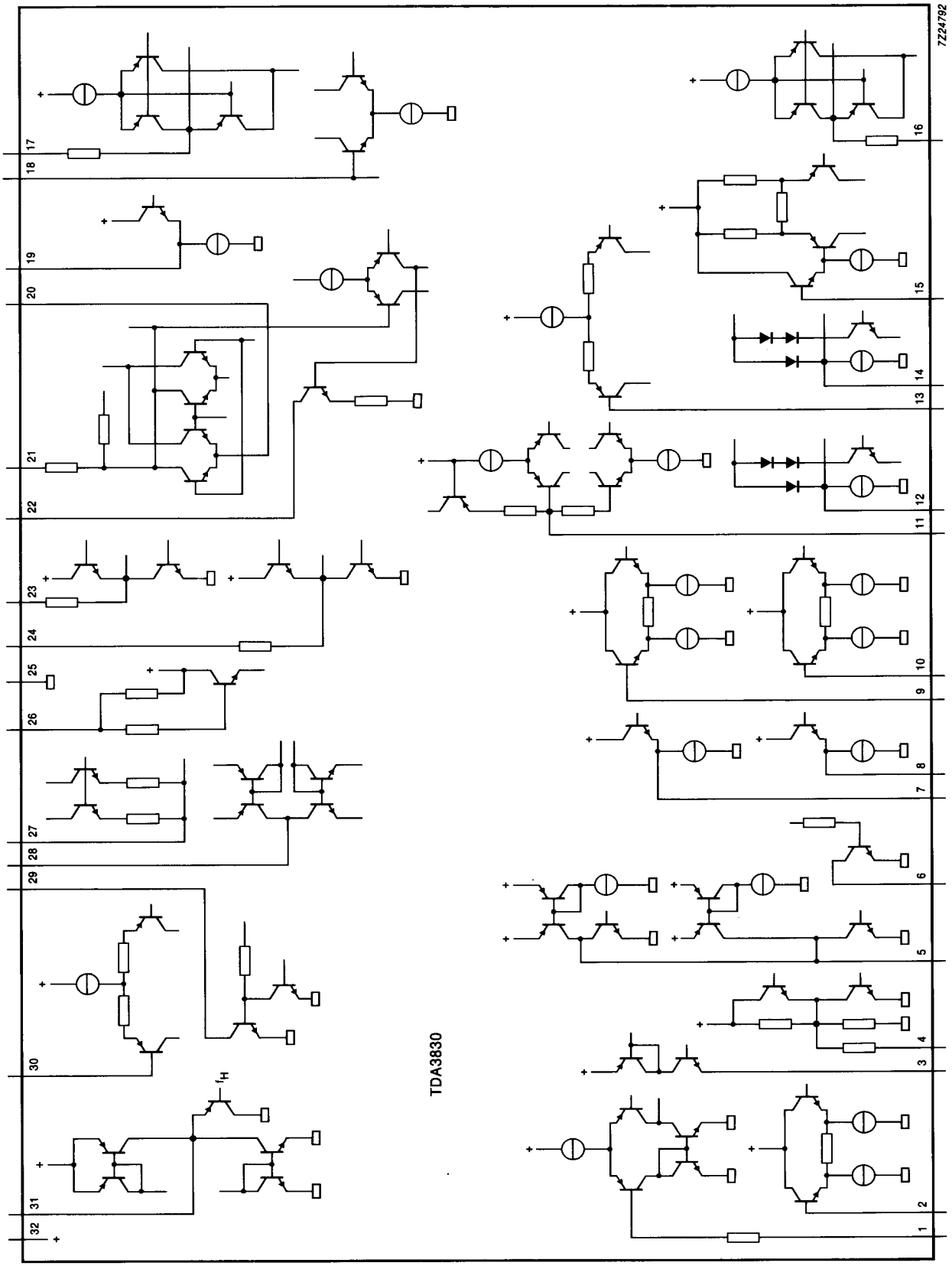


Fig.2 Input/output loading diagram.

RATINGS

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

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage		V_P	–	–	8	V
Output current (pins 23, 24, 7-25)		I_O	–	–	5	mA
Composite input		V_{1-25}	–	–	V_P	V
Quad-state input		V_{11-25}	–	–	8	V
Stereo/SAP indication		$I_{6,29}$	–	–	5	mA
Total power dissipation		P_{tot}	–	–	500	mW
Storage temperature range		T_{stg}	−55	–	+150	°C
Operating ambient temperature range		T_{amb}	0	–	+70	°C
ESD protection (all pins)	1.5 kΩ; 100 pF; 5 pulses	V_{ESD}	–	–	±4000	V

DEVELOPMENT DATA

CHARACTERISTICS

Conditions: T_{amb} = 25 °C; V_P = 5 V; MPX: Δf = 25 kHz for L + R (100% modulation), f_{mod} = 1 kHz; SAP: Δf = 10 kHz, f_{mod} = 1 kHz, unless otherwise specified. Measured in the test circuit of Fig.3.

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage		V_P	4.75	5.0	5.35	V
Supply current		I_P	–	42	–	mA
DC input, –output level for pins 1, 7, 8, 21, 19, 18, 23 and 24		$V_{I/O}$	–	0.5 V_P	–	V
Operating ambient temperature range		T_{amb}	0	25	70	°C
Composite input						
Composite input resistance		R_I	14	20	34	kΩ
Composite input signal (RMS) (L + R, all other signals according to BTSC system specification)			70	100	140	mV
Adjustment range			±5	±7.5	–	dB
Control input voltage range			–	1 to 4	–	V
Input current	control voltage = 0.5 V_P	I_I	–	–	5	μA
Pilot threshold (RMS value)	stereo on		–	–	14	mV
	stereo off		5	–	–	mV
Hysteresis			–	2.5	–	dB
Pilot threshold (RMS value)	SAP on		–	–	45	mV
	SAP off		18	–	–	mV
Hysteresis			–	2.0	–	dB
Stereo indication						
Stereo present						
Output voltage		V_O	–	–	0.5	V
Output current		I_O	3	–	–	mA
Stereo not present						
Output voltage		V_O	V_P–0.5	–	V_P	V

DEVELOPMENT DATA

parameter	conditions	symbol	min.	typ.	max.	unit
SAP indication						
SAP present						
Output voltage		V_O	–	–	0.5	V
Output current		I_O	3	–	–	mA
SAP not present						
Output voltage		V_O	V_P–0.5	–	V_P	V
Quad-state terminal	see Table 1					
Quad-state level						
Mono						
Input voltage		V_I	V_P + 1.4	–	8	V
Input current	V_{11} = 7.2 V	I_I	–	–	0.3	mA
Stereo						
Input voltage		V_I	$V_P/2$ + 1	–	V_P	V
Input current		I_I	–	–	5	μA
Mono/SAP						
Input voltage		V_I	0	–	$V_P/2$–1	V
Input current		I_I	–	–	15	μA
SAP						
Input voltage		V_I	$V_P/2$–0.4	–	$V_P/2$ + 0.4	V
Input current		I_I	–	–	15	μA
SAP/mono output						
Output level (RMS value)	note 1	V_O	–	500	–	mV
Output resistance		R_O	70	100	130	Ω
Load resistance		R_L	10	–	–	kΩ
Load capacitance		C_L	–	–	500	pF
Frequency response 50 Hz to 10 kHz (Mono, external 75 μs de-emphasis)			–3	–	–	dB
Total harmonic distortion (1 kHz)	SAP - signal	THD	–	1	–	%
Total harmonic distortion (1 kHz)	Mono - signal	THD	–	0.5	–	%
Signal-to-noise ratio, weighted (CCIR 468-2)	Δf = 25 kHz; f_{mod} = 1 kHz; 75 μs de-emphasis; mono	S/N(W)	–	50	–	dB

CHARACTERISTICS (continued)

parameter	conditions	symbol	min.	typ.	max.	unit
Audio outputs						
Output voltage (RMS value)	note 1	V_O	–	500	–	mV
Output voltage headroom			–	6	–	dB
Output resistance		R_O	–	100	130	Ω
Load resistance		R_L	10	–	–	kΩ
Load capacitance		C_L	–	–	500	pF
Switching offset voltage (stereo/mono/SAP)			–	–	150	mV
L, R frequency response	50 Hz to 10 kHz		–3	–	–	dB
	12 kHz related to 1 kHz		–	–	–3	dB
SAP frequency response	50 Hz to 8 kHz		–3	–	–	dB
Total harmonic distortion for L, R (1 kHz)		THD	–	0.5	–	%
Total harmonic distortion for SAP (1 kHz)		THD	–	0.25	–	%
Signal-to-noise ratio weighted for mono (CCIR 468-2)	L + R: Δf = 25 kHz; f_{mod} = 1 kHz	S/N(W)	–	50	–	dB
Crosstalk, L, R into SAP at 1 kHz			50	60	–	dB
Crosstalk, SAP into L, R at 1 kHz			50	60	–	dB
Output voltage difference between L and R	250 Hz to 6.3 kHz		–	–	3	dB
Output voltage difference if switched from L, R to SAP	250 Hz to 6.3 kHz		–	–	3	dB
Channel separation						
According to DBX requirements: 10% 75 μs equiv. input modulation	100 Hz to 5 kHz		20	26	–	dB
1% to 100% 75 μs equiv. input modulation	100 Hz to 5 kHz		15	20	–	dB

parameter	conditions	symbol	min.	typ.	max.	unit
DBX section						
Control input voltage range						
Stereo wideband level			–	1 to 4	–	V
SAP wideband level			–	1 to 4	–	V
Spectral band level			–	1.8 to 3.2	–	V
Input current	control voltage = 0.5 V_P		–	–	5	μA
Wideband RMS detector release rate			112.5	125	137.5	dB/s
Spectral RMS detector release rate			343	381	419	dB/s
Timing current for nominal release rate of spectral RMS detector		I_{12}	–	22.5	–	μA
Adjustment range	note 2		–	11 to 45	–	μA
Timing current for nominal release rate of wideband RMS detector		I_{14}	–	$7.5(I_{12}/3)$	–	μA
Adjustment range	note 2		–	4 to 15	–	μA
Adjustment voltage			–	1.5 to 3.8	–	V
Voltage controlled oscillator						
Nominal VCO frequency	note 3	f_{VCO}	–	$62.94(4f_H)$	–	kHz
Capture range (nominal pilot)			–	–	1	kHz
Temperature coefficient			–	–	50	10^{-6}/K

DEVELOPMENT DATA

Notes to the characteristics

1. Can also be aligned to 600 mVrms (Identification threshold and AF output headroom will be decreased by 1.6 dB).
2. I_{12}, I_{14} can be measured via an ammeter connected to 4 V (3.5 to 4.1 V).
3. Adjustable at pin 27, measurement (f_H) at pin 7 with a 2.7 kΩ resistor connected between V_P and pin 31.
4. Requirements for the MPX/SAP input signal to ensure proper system performance:
   a. Maximum variation of MPX/SAP signal under operating conditions: to be found (1 dB)
   b. 3 dB bandwidth, Δf = 25 kHz: 50 Hz to 100 kHz
   c. THD (L + R, Δf = 25 kHz, f_{mod} = 1 kHz): to be found (0.2%).
   d. S/N CCIR 468-2 weighted (L + R, Δf = 25 kHz for sound carrier f_{mod} = 1 kHz, 75 μs de-emphasis; with critical picture modulation): > 44 dB.
   e. Spectral spurious attenuation, (mainly nxf_H; L + R, Δf = 25 kHz for sound carrier, f_{mod} = 1 kHz, 50 Hz to 100 kHz, no de-emphasis): 30 dB.
   f. Maximum white-noise level (unweighted, 200 Hz to 100 kHz) to avoid malfunctioning of the identification circuits: 500 mVrms.

Table 1 Quad-state terminal

quad-state	SAP carrier	AF outputs		SAP/mono output
		pin 24	pin 23	pin 7
mono	on	mono	mono	SAP without DBX
stereo	on	L	R	SAP without DBX
SAP	on	SAP	SAP	mono
mono/SAP	on	mono	SAP	SAP without DBX
mono	off	mono	mono	mono
stereo	off	L	R	mono
SAP	off	L	R	mono
mono/SAP	off	mono	mute	mono

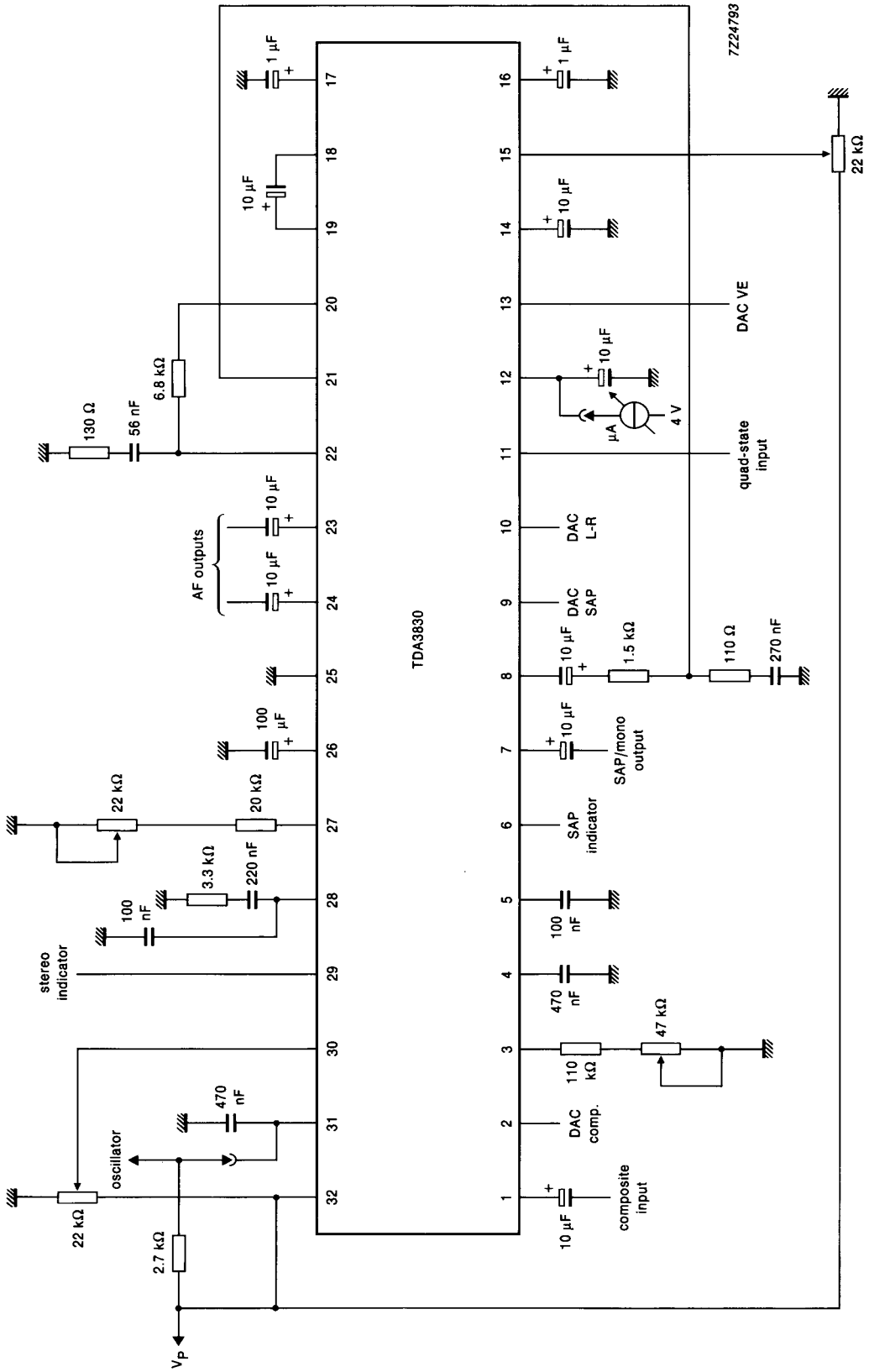
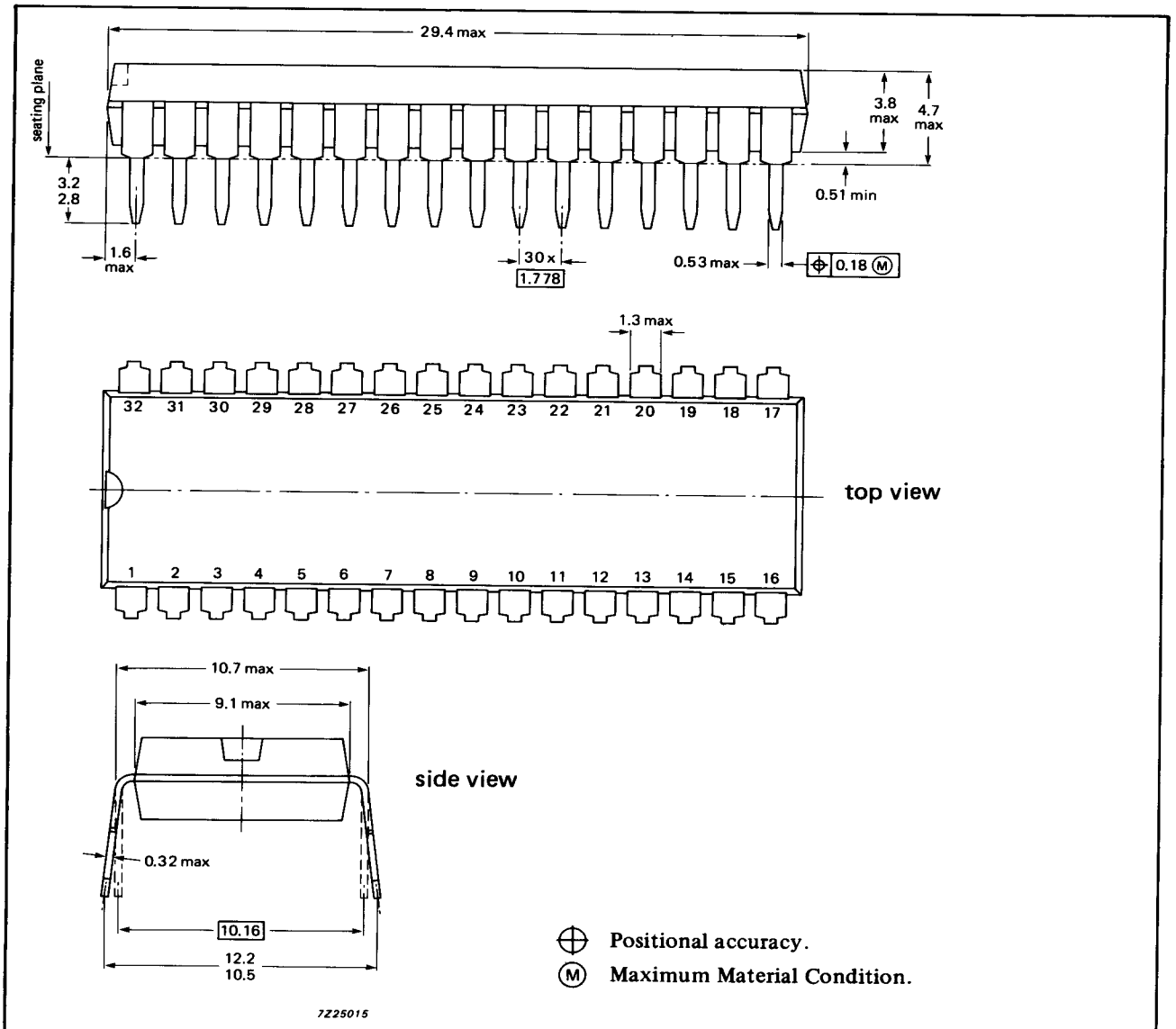


Fig.3 Test circuit.

PHILIPS

DEVELOPMENT DATA

32-LEAD SHRINK DUAL IN-LINE; PLASTIC (SOT232)



⊕ Positional accuracy.

Ⓜ Maximum Material Condition.

Dimensions in mm

SOLDERING PLASTIC DUAL IN-LINE PACKAGES

1. By hand

Apply the soldering iron below the seating plane (or not more than 2 mm above it). If its temperature is below 300 °C it must not be in contact for more than 10 seconds; if between 300 and 400 °C, for not more than 5 seconds.

2. By dip or wave

The maximum permissible temperature of the solder is 260 °C; 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 storage maximum. 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.

3. Repairing soldered joints

The same precautions and limits apply as in (1) above.