

## TDA 5950X

## Signatures

Typenteam Elektrik	<b>Hr. Kühn</b>	gez.	Datum
Typenteam Layout	Hr. Cross	gez.	Datum
Typenteam Prüftechnik	Hr. Hämmerling	gez.	Datum
Marketing	Hr. Morneburg	gez.	Datum
Projektleiter	Hr. Wondra	gez.	Datum
Produktentwicklung	Hr. Schwendt	gez.	Datum
Qualitätssicherung	Hr. Dr. Schaafhausen	gez.	Datum
HL-Geschäftszweigleiter	Hr. Lange	gez.	Datum

**Verteiler:**

Hr. Klunker	HL BR AZ	Hr. Klink	HL DOK
Hr. Dr. Schaafhausen	HL BR QS PD 1	Projektleiter:	
Hr. Lange	HL UE	Hr. Wondra	HL UE PE 21
Hr. Wolff	HL UE PM	<i>Bearbeiter Marketing:</i>	
Hr. Geffcken	HL UE AT	Hr. Morneburg	HL UE PM 1
Hr. Schwendt	HL UE PE	<i>Typenteam:</i>	
Hr. Strauch	HL BR PRT UE	Hr. Kühn	HL UE PE 22
		Hr. Hämmerling	HL BR PRT UE
		Hr. Cross	HL UE PE 23
		Hr. Grobecker	HL UE AT 1

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**SIEMENS AG****IC-SPECIFICATION****TDA 5950X**

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**Differences to the last edition**

Last Edition:                   **DOK-Nr. V66047-S679-A100-V1**                   date:26.8.92

Page 2:                            Frequency range changed.

Page 11:                         Supply voltage max.value changed.

Page 15:                         Pos. 46 max. aux input voltage added.

## TDA 5950X

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## Video- + Sound- IF + A / V Switch

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## This specification replaces the previous editions

DOK-Nr.	date	DOK-Nr.	date
V66047-S679-A100-V1	26.8.92		
V66047-S679-C100-G1	14.6.94		

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**Functional Description, Application****Video IF Section**

Video IF broadband amplifier followed by a quasi-synchronous demodulator for negative modulated IF signals. A video switch interface is included in the video section. A separate video output after the demodulator permits the installation of one or more sound traps at the input of the video switch. The tuner AGC threshold is set by means of a potentiometer, all other functions can be switched with open collector transistors.

**Sound IF Section**

FM IF limiter with FM PLL demodulator for the frequency range of 5.5 MHz to 6.5 MHz. The AF section includes an audio switch followed by an audio buffer output.

**Application**

The TDA 5950 is suitable for application in television receivers or video tape recorders with A / V switches.

## TDA 5950X

## Circuit Description

**Video IF Section**

The video IF section incorporates a four-stage, capacitively coupled, symmetrical and controlled amplifier, a limiter with selection and a mixer for quasi-synchronous demodulation of negative modulated IF signals followed by a video output amplifier. The video demodulator output and the video switch input are connected by means of a sound trap. The video switch has two inputs (for signals from video demodulator and from external source) and two outputs. Parallel to the video output amplifier the video signal is used for generating the AGC voltage. The control circuit is designed on the integralaction AGC principle, employing a noise-free peak value detector. A delayed tuner AGC voltage with positive control direction is derived from the AGC voltage via a threshold amplifier that is set by means of an external potentiometer. An AFC push pull output current is generated from picture carrier tank circuit.

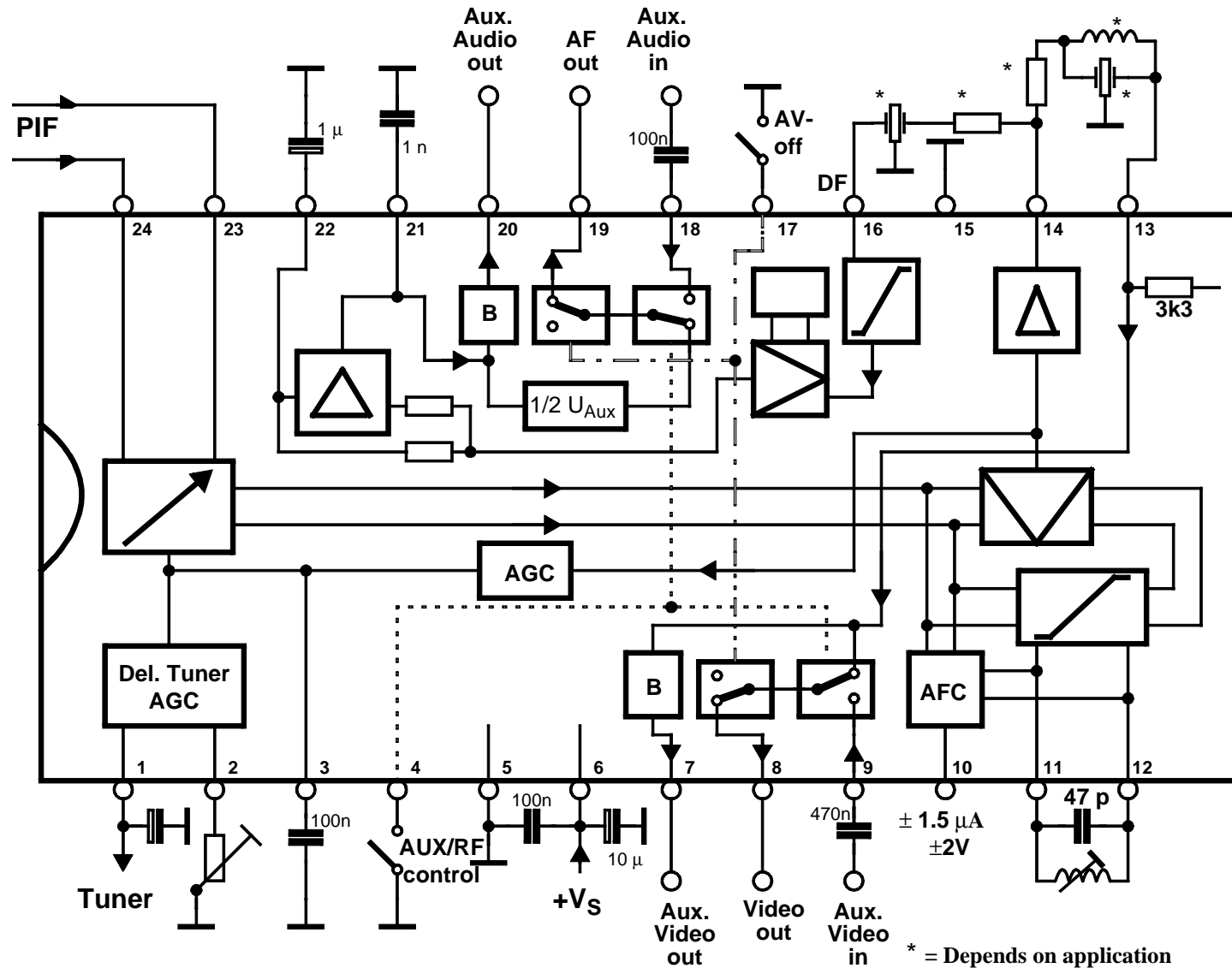
**Sound IF Section**

The sound IF section incorporates a five-stage, symmetrical limiter amplifier followed by a PLL demodulator. The AF section contains an audio switch followed by an output buffer.

**Switch-Matrix**

AUX/RF-Control (Pin 4)	AV-off (Pin 17)	Output (Pin 8 / Pin 19)
0	0	muted
0	1	IF
1	0	muted
1	1	SCART

Block Diagram



## TDA 5950X

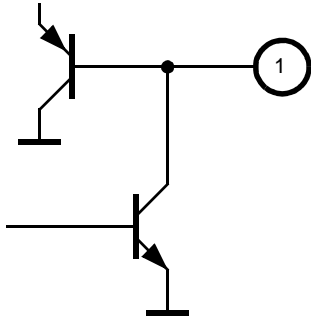
## Pin Assignment

Pin No.	Function
1	Delayed tuner AGC output
2	Delayed tuner AGC threshold
3	AGC time constant
4	Aux / RF- control
5	Ground
6	+ V <sub>Supply</sub>
7	Auxiliary video output
8	Video output
9	Auxiliary video input
10	AFC output
11	Demodulator tank circuit
12	Demodulator tank circuit
13	Video input at sound trap output
14	Video demodulator output
15	Sound IF ground
16	Sound IF input
17	AV-off
18	Auxiliary Audio input
19	Audio output
20	Auxiliary Audio output
21	De-emphasis capacitor
22	Lowpass Capacitor
23	Video IF input
24	Video IF input

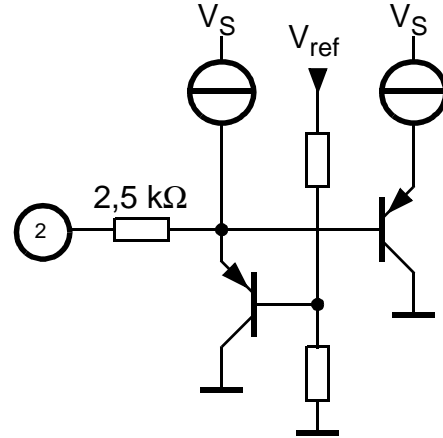
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Pin Description

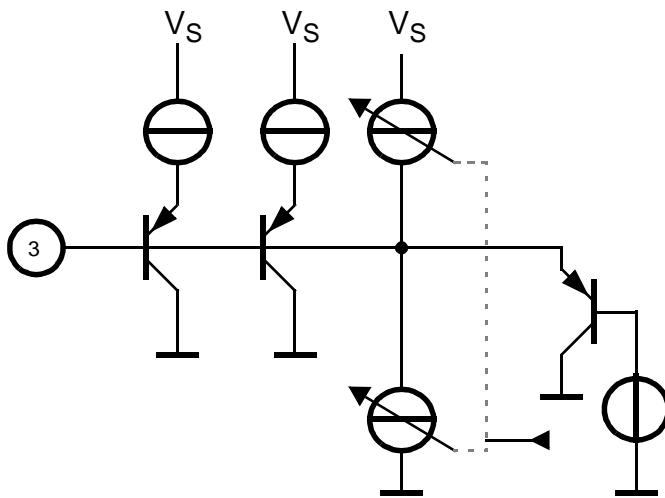
1. Delayed tuner AGC output:



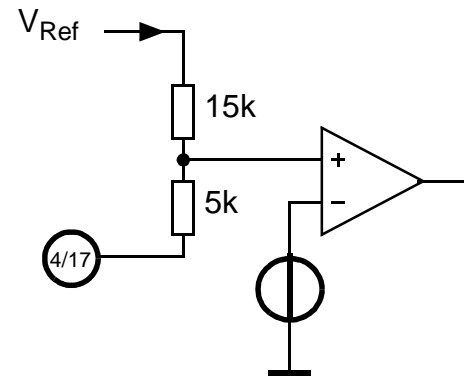
2. Delayed tuner AGC threshold:



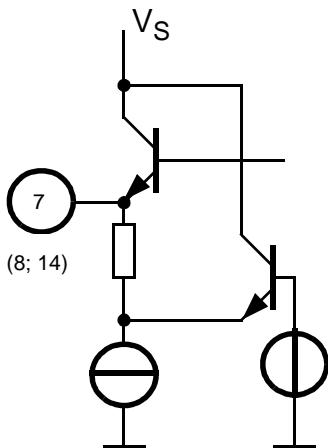
3. AGC time constant:



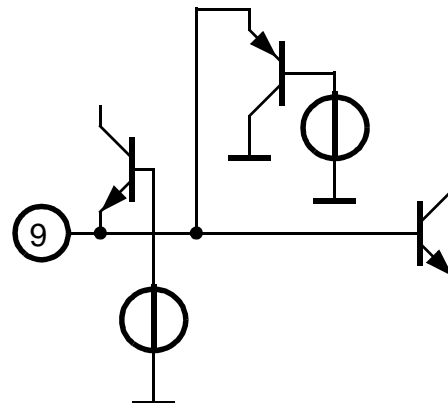
4. ; 17. AUX./ RF ; AV-off



7. / 8. / 14. Video out:



9. Aux. Video in:

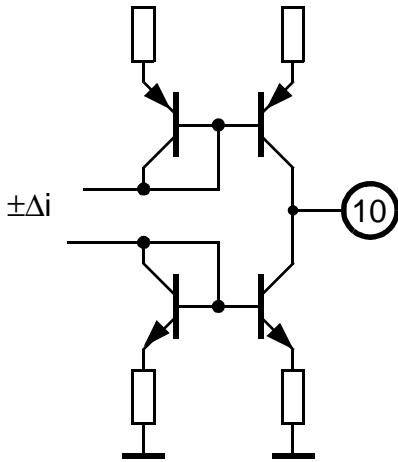




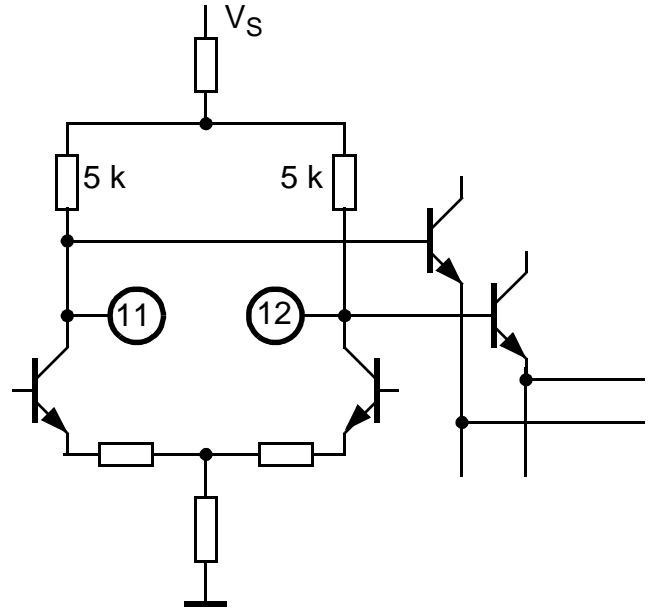
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Pin Description

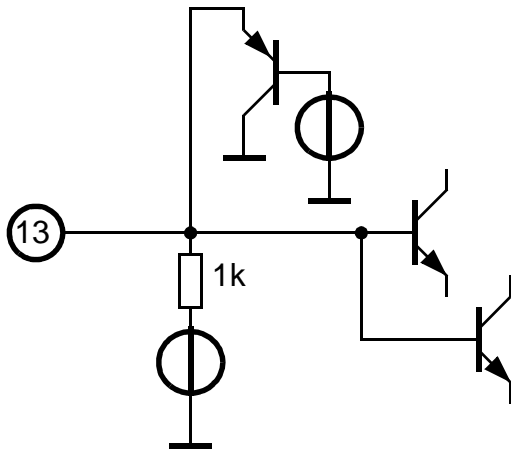
10. AFC out:



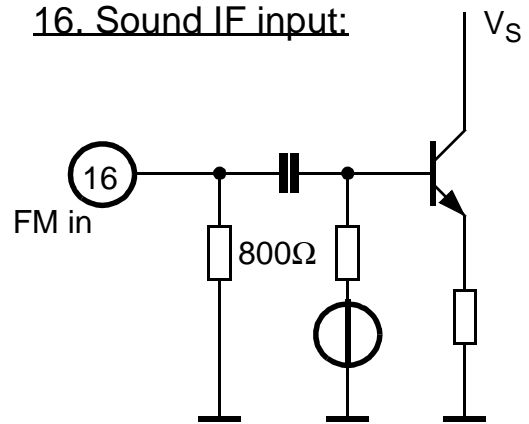
11. / 12. Demodulator tank circuit:



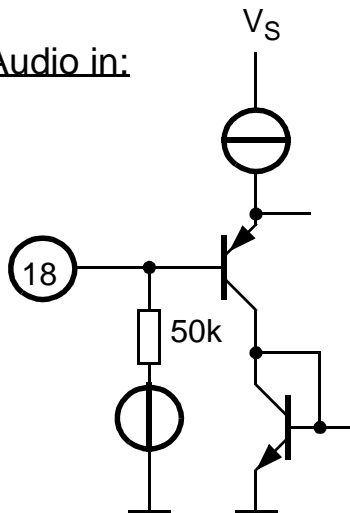
13. Sound trap video in:



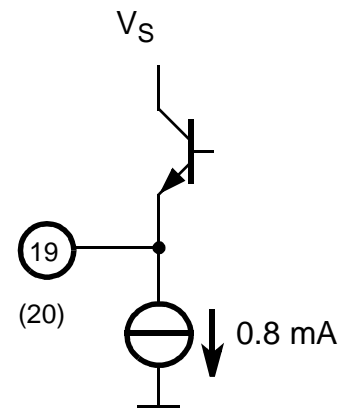
16. Sound IF input:



18. Aux. Audio in:



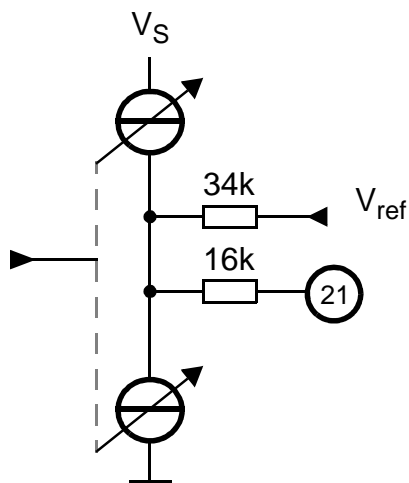
19. / 20. Aux. Audio out / AF out:



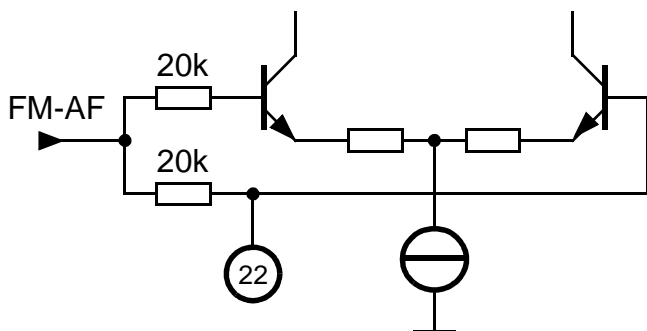
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Pin Description

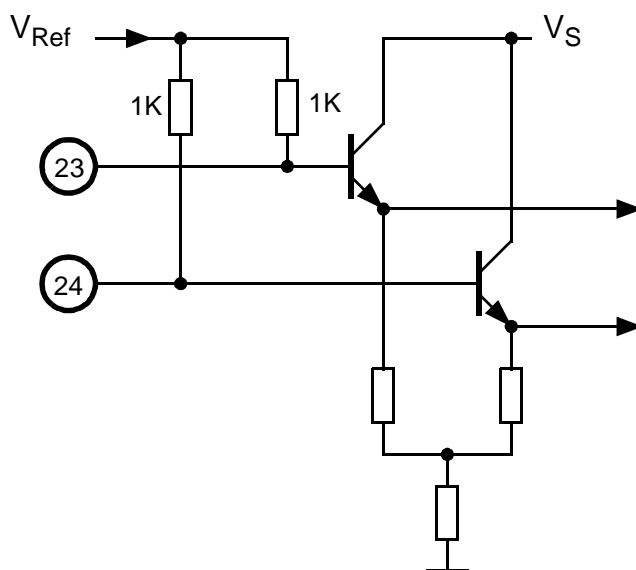
21. Deemphasis capacitor:



22. Lowpass capacitor



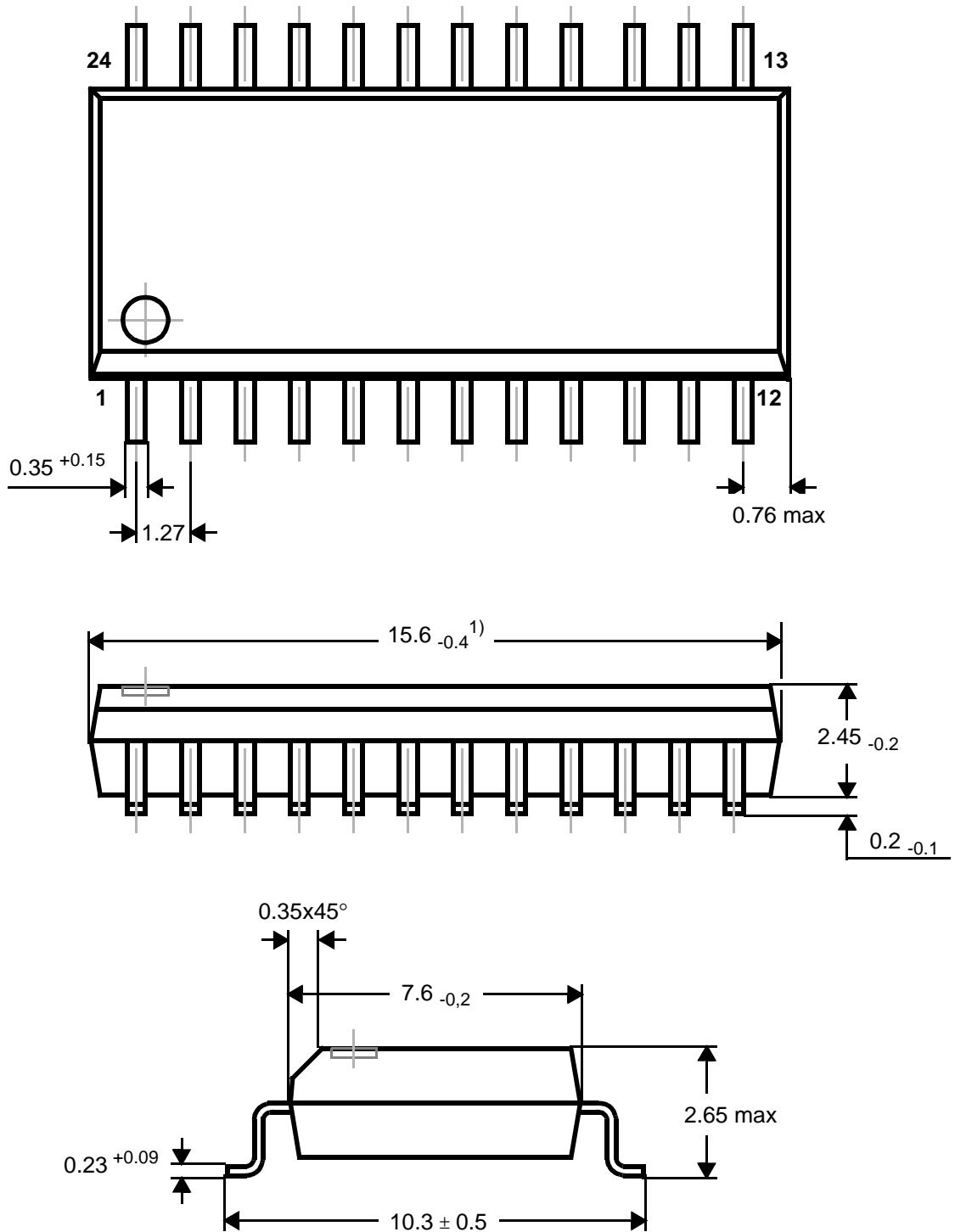
23. / 24. Video IF input:



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Package Outline

Plastic Package, P-DSO-24-1  
(Dual-in-Line-Package, Small-Outline)



1) Does not include plastic or metallic protusions of 0.15 max per side

## TDA 5950X

## Absolute Maximum Ratings

*The maximal ratings may not be exceeded under any circumstances, not even momentarily and individually, as permanent damage to the IC will result.*

#	Max. Ratings for ambient temperature $T_{amb}$ 0 °C to 70 °C	Symbol	Min	Max	Units	Remarks
1	Supply voltage	$V_6$	0	8.8	V	
2	Junction temperature	$T_j$		150	°C	
3	ESD-voltage all pins HBM (R=1.5k $\Omega$ , C=100pF)	$V_{ESD}$ 1...24	-4	4	kV	
4	Storage temperature	$T_{stg}$	-40	125	°C	
5	Thermal resistance	$R_{th\ jamb}$		70	K/W	

## TDA 5950X

## Operational Range

*Within the operational range the IC operates as described in the circuit description. The AC / DC characteristic limits are not guaranteed.*

#	Parameter	Symbol	Min	Max	Units	Remarks
1	Supply voltage	$V_6$	4.5	8	V	
2	Supply voltage delayed tuner AGC	$V_1$	1	13.2	V	
3	Ambient temperature during operation	$T_A$	0	70	°C	
4	Input frequency range	$f_{IF}$	12	80	MHz	

## TDA 5950X

## AC / DC Characteristics

AC / DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
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**Supply voltage**  
**Ambient temperature**

$V_S=5.0\text{ V}$   
 $T_{\text{amb}}=0\text{ °C to }70\text{ °C}$

**DC Parameters:**

1	Total current	$I_6$			47	55	63	mA
2	DC Voltage; Pin 1	$V_1$					12	V
3	Aux / RF switch (Pin 4), $V_{4/17}$ AV-off switch (Pin 17)		High or open-circuit Low		2.4 0		5.5 1.5	V V
4	Synch tip level; Pin 7	$V_7$	$RL \geq 2.7\text{k}\Omega \parallel 10\text{pF}$		1.35	1.5	1.65	V
5	Synch tip level; Pin 8	$V_8$	$RL \geq 2.7\text{k}\Omega \parallel 10\text{pF}$		1.35	1.5	1.65	V
6	Synch tip level; Pin 9	$V_9$			1.35	1.5	1.65	V
7	DC Voltage; Pin 10	$V_{10}$			0.4		$V_6-0.4$	V
8	DC Voltage; Pin 11	$V_{11}$				$V_6-1.3$		V
9	DC Voltage; Pin 12	$V_{12}$				$V_6-1.3$		V
10	Synch tip level; Pin 13	$V_{13}$			1.35	1.5	1.65	V
11	Synch tip level; Pin 14	$V_{14}$			1.15	1.3	1.45	V
12	DC Voltage; Pin 16	$V_{16}$				0		V
13	DC Voltage; Pin18	$V_{18}$			1.6	2	2.4	V
14	DC Voltage; Pin19	$V_{19}$			1.6	2	2.4	V
15	DC Voltage; Pin 20	$V_{20}$			1.6	2	2.4	V
16	DC Voltage; Pin 21	$V_{21}$			1.6	2	2.4	V
17	DC Voltage; Pin 22	$V_{22}$				2.2		V
18	DC Voltage; Pin 23	$V_{23}$				3.6		V
19	DC Voltage; Pin 24	$V_{24}$				3.6		V

## TDA 5950X

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#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units	
<b>AC Parameter</b>									
<b>Video IF Section</b>									
20	IF input sensitivity	$V_{23/24}$	$V_{\text{Video}} -3\text{dB}$			70	100	$\mu\text{V}$	
21	max. IF input voltage	$V_{23/24}$	$V_{\text{Video}} +3\text{dB}$		100	140		mV	
22	IF control range	$\Delta V_{\text{IF}}$			60	66	72	dB	
23	Typical CVBS output signal on pin 14	$V_{\text{pp}}$	$V_{\text{IFin}} = 10 \text{ mV}$		1.35	1.5	1.65	V	
				upper video clipping				3.6	V
				zero carrier level				3.0	V
				lower video clipping				1.1	V
				sync tip level				1.3	V
24	-3dB video bandwidth	$B_{14}$	$C_L < 20\text{pF}, R_L > 1\text{k}\Omega$		8	10		MHz	
25	Output impedance	$R_{14}$					10	$\Omega$	
26	Output sink current	$I_{14}$	DC and AC				2	mA	
	Output source current	$I_{14}$	DC and AC				-3	mA	
<b>SCART SWITCH</b>									
30	Input impedance	$Z_{13}$				1    2		$\text{k}\Omega    \text{pF}$	
31	Gain of Video switch								
	Aux. $V_{\text{IN}}$ -Video output	$g_{9-8}$			0.9	1	1.1		
	Video $_{\text{IN}}$ -Aux. output	$g_{13-7}$			0.9	1	1.1		
	Video $_{\text{IN}}$ -Video output	$g_{13-8}$			0.9	1	1.1		
	$f_{\text{mod}}=5\text{MHz}$								
32	-3dB video bandwidth	$B_7$	$C_L < 20\text{pF}, R_L > 1\text{k}\Omega$		8	10		MHz	
	-3dB video bandwidth	$B_8$	$C_L < 50\text{pF}, R_L > 1\text{k}\Omega$		8	10		MHz	
33	Cross talk attunation	$a_{9-8}$	$V_4=0\text{V}$		50			dB	
	$f_{\text{mod}}=5\text{MHz}$								
34	Intermodulation	$\alpha_{7/8}$	$f_{1.07\text{MHz}} = f_{\text{SC}} - f_{\text{CC}}$		54	60		dB	
35	Suppression of video signal harmonics				35	40		dB	
36	Signal to noise ration (weighted)	$S/N_{7/8}$	CCIR - 567		56	60		dB	
37	Ripple rejection on pin 7 and 8	$RR_{7/8}$	$f_{\text{VS}}=0\dots 100 \text{ kHz}$		35	40		dB	
38	Max. input current	$i_9$				0.5	1	$\mu\text{A}$	

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## AC / DC Characteristics

AC / DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
<b>AFC</b>								
39	AFC-control steepness	$\Delta I_{10}/\Delta f$			0.6	0.8	1.0	$\mu\text{A}/\text{kHz}$
<b>Tuner AGC</b>								
40	Sink current	$I_1$	no tuner gain reduction		0		10	$\mu\text{A}$
			max. tuner gain reduction		2.5	3.5		mA
41	Threshold range for del.Tuner-AGC	$V_{IF}$	$R_2 = 4.7\text{k}\Omega$ $R_2 = 0\Omega$		50		5	mV mV

**Alignment Instructions**

At a video carrier input level of  $V_{23/24} = 4 \text{ mV}_{\text{rms}}$ ,  $f_{\text{PC}} = 38,9 \text{ MHz}$ , and a superimposed AGC voltage of  $V_3 = 1,5 \text{ V}$ , the demodulator tank circuit is preliminarily aligned until a max. video signal  $V_{14\text{pp}}$  is obtained at the video output. Any suitable video test signal can be used for modulation. The AGC voltage  $V_3$  is reduced until the signal is approx.  $1 \text{ V}_{\text{pp}}$  and the max. videosignal is obtained when fine-aligning the demodulator tank circuit. The alignment is not critical due to relatively large bandwidth of the demodulator tank circuit. Fine-tuning to intercarrier S/N, differential phase or 2T pulse characteristics is possible.



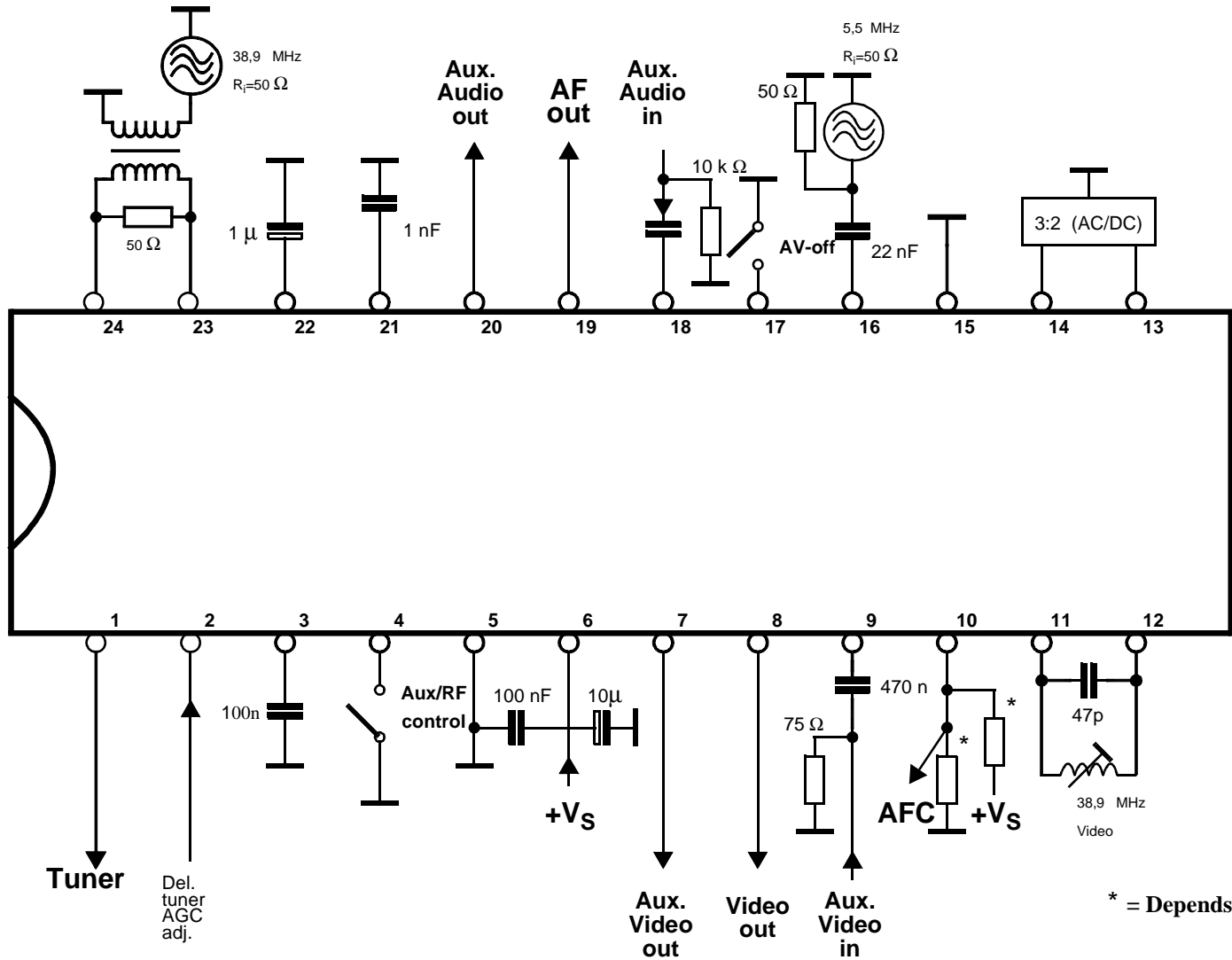
## TDA 5950X

## AC / DC Characteristics

AC / DC characteristics involve the spread of values guaranteed within the specified supply voltage and ambient temperature range. Typical characteristics are the median of the production.

#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
<b>Sound IF Section</b>								
Characteristics are valid only for a stand alone operation of the Sound IF Section.								
42	min. sound IF Input voltage (min. control)	$V_{16}$				70	100	$\mu\text{V}$
43	AF output voltage	$V_{19}$	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}\dots 6.5\text{MHz}$		175	250	350	mV
44	Aux. AF output voltage	$V_{20}$	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}\dots 6.5\text{MHz}$		350	500	700	mV
45	Total harmonic distortion	$\text{THD}_{\text{AF0}}$	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}\dots 6.5\text{MHz}$			0.2	0.3	%
46	Max. Aux. input voltage	$V_{18\text{rms}}$					1	V
47	Gain audio switch	$g_{18-19}$				1		
48	AM-Suppression	$\alpha_{\text{AM}19/20}$	$f_{\text{mod}}=1\text{kHz}$ $m=30\%$ $V_{16}=1\text{mV}\dots 100\text{mV}$		50	55		dB
49	Signal to noise ratio (weighted)	$\text{S/N}_{19/20}$	$V_{16}=500\mu\text{V}\dots 1\text{mV}$ $V_{16}=1\text{mV}\dots 100\text{mV}$		50	55		dB
					60	65		dB
50	Ripple rejection	$\text{RR}_{19/20}$			35	40		dB
51	Input impedance	$Z_{18}^*$				50		$\text{k}\Omega$
*	Design hints							

Test Circuit



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Application Circuit

