

SIEMENS AG

IC-SPECIFICATION

TDA 5950X

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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

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Teamsprecher in Fettdruck

Änderungen sind gelb unterlegt.

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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.

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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.

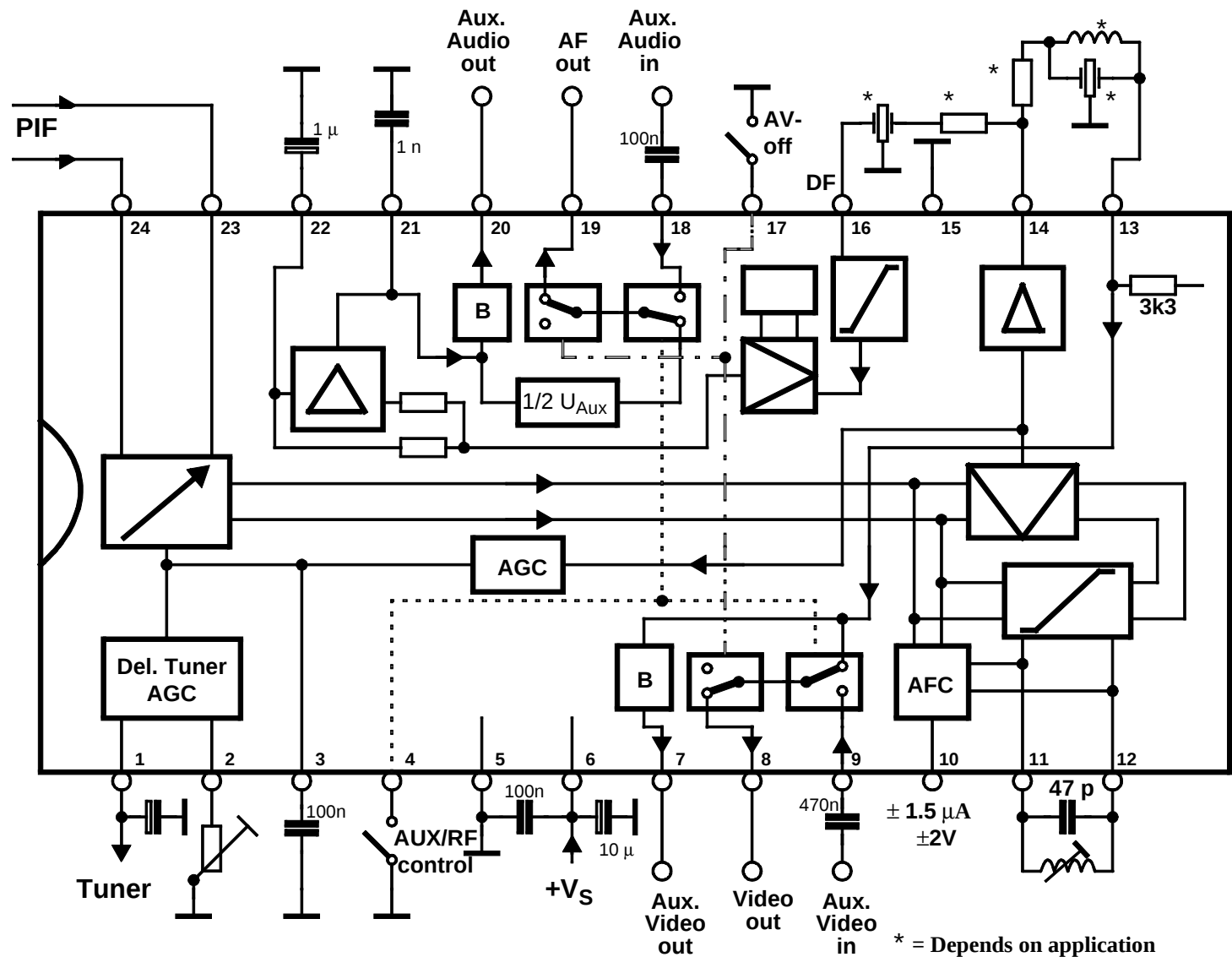
Sound IF Section

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

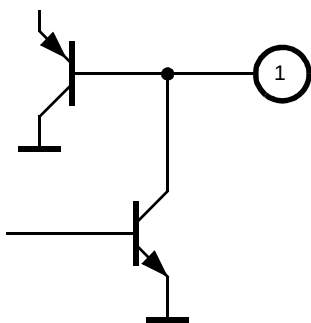
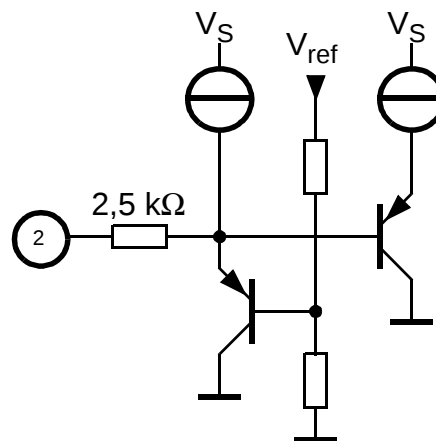
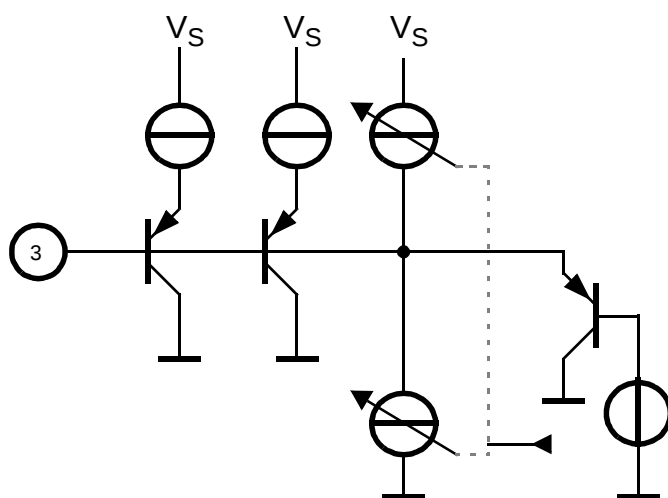
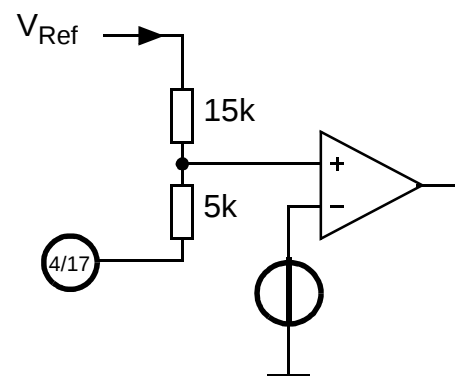
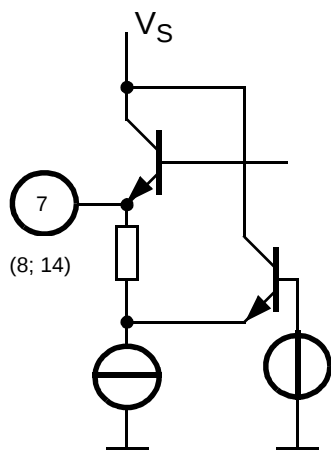
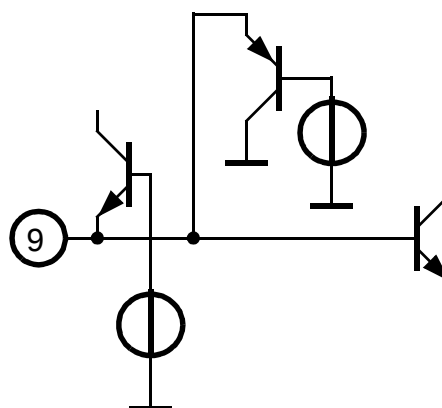
Block Diagram



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Pin Assignment

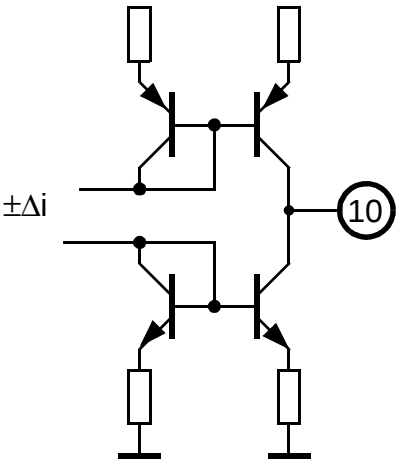
Pin No.	Function
1	Delayed tuner AGC output
2	Delayed tuner AGC threshold
3	AGC time constant
4	Aux / RF- control
5	Ground
6	+ V _{Supply}
7	Auxiliary video output
8	Video output
9	Auxiliary video input
10	AFC output
11	Demodulator tank circuit
12	Demodulator tank circuit
13	Video input at sound trap 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

SIEMENS AG**IC-SPECIFICATION****TDA 5950X****Pin Description**1. Delayed tuner AGC output:2. Delayed tuner AGC threshold:3. AGC time constant:4. ; 17. AUX./ RE ; AV-off7. / 8. / 14. Video out:9. Aux. Video in:

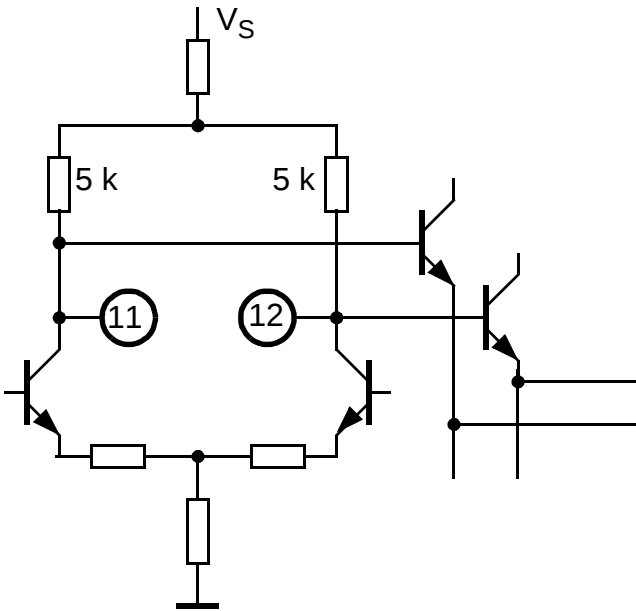
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Pin Description

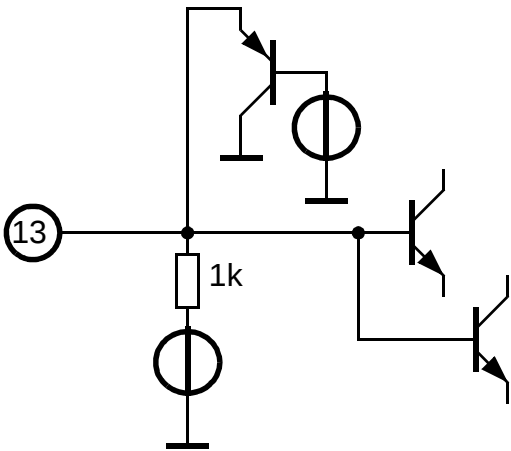
10. AFC out:



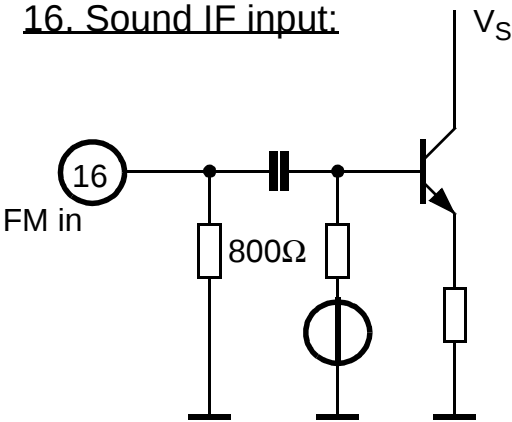
11. / 12. Demodulator tank circuit:



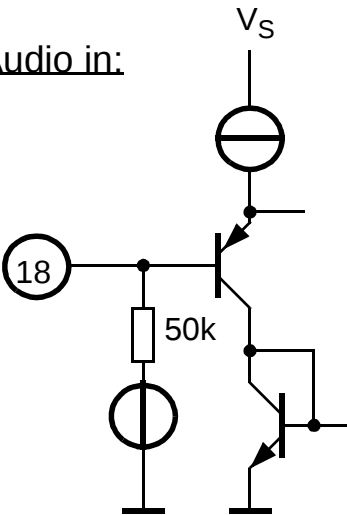
13. Sound trap video in:



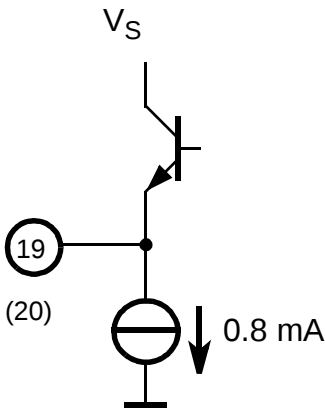
16. Sound IF input:



18. Aux. Audio in:

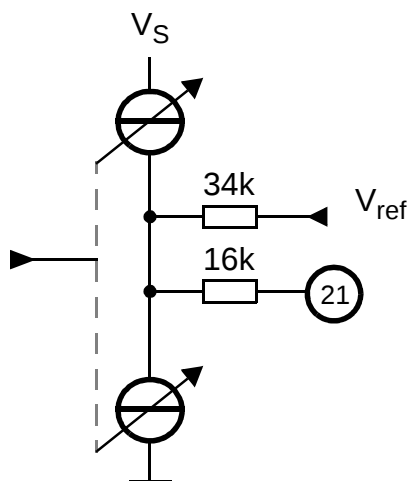
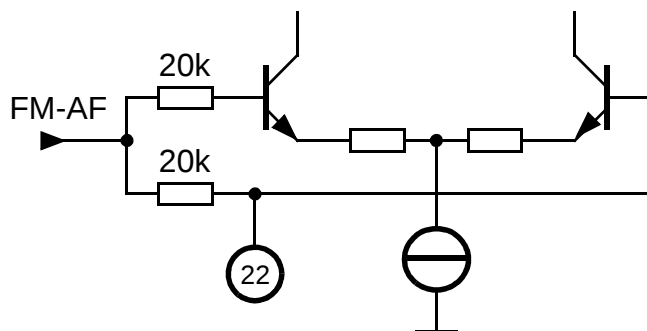
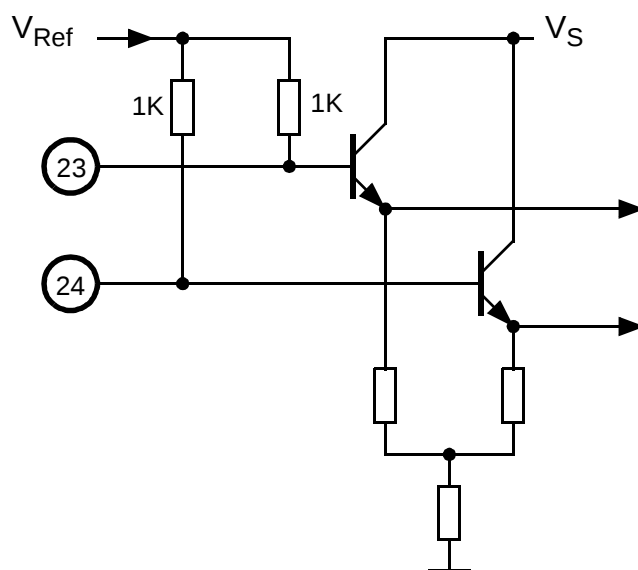


19. / 20. Aux. Audio out / AF out:



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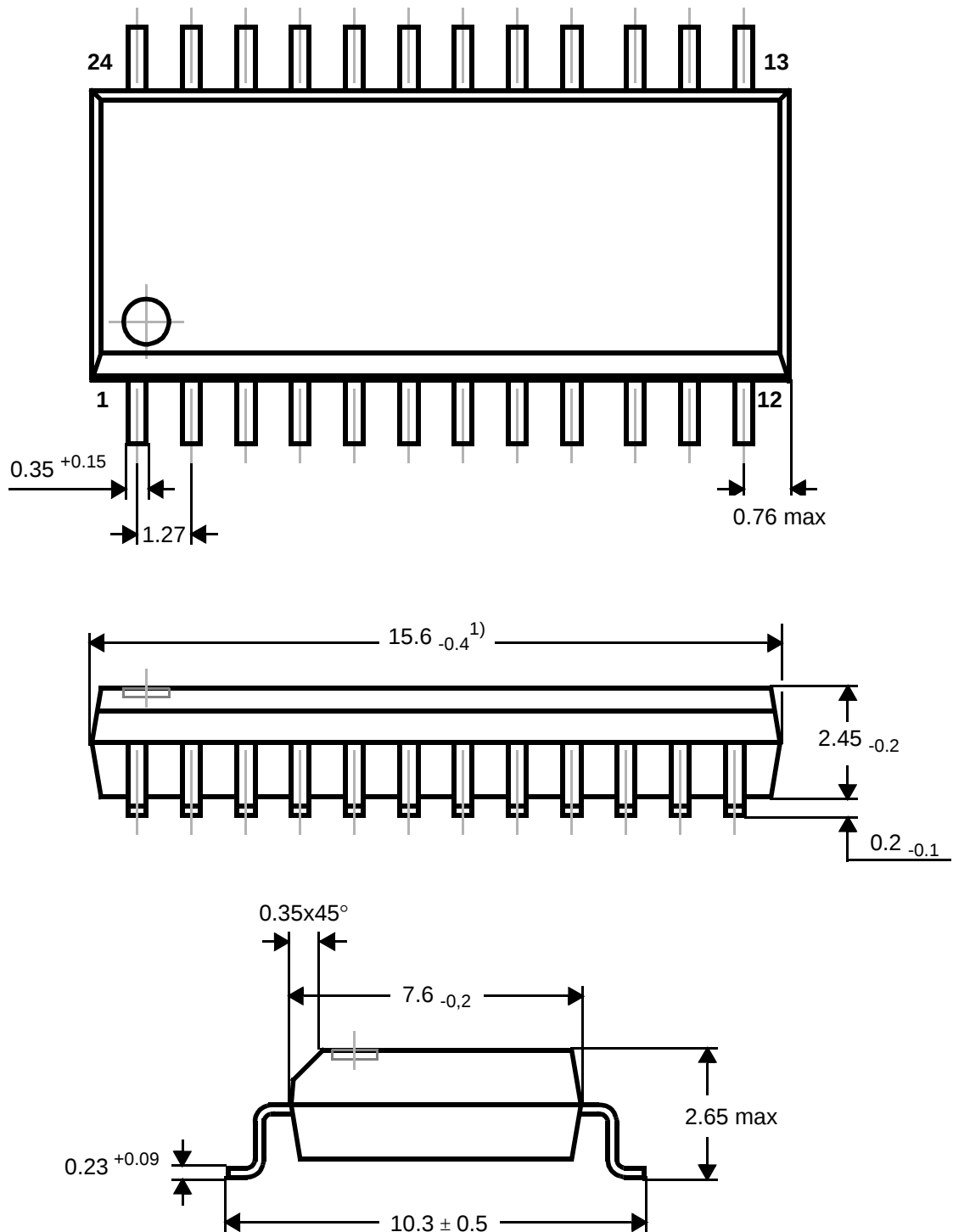
Pin Description

21. Deemphasis capacitor:22. Lowpass capacitor23. / 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

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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=1.5kΩ , 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	

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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	

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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
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Supply voltage
Ambient temperature

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

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; Pin 18	V_{18}			1.6	2	2.4	V
14	DC Voltage; Pin 19	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

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#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
AC Parameter								
Video IF Section								
20	IF input sensitivity	$V_{23/24}$	$V_{\text{Video}} - 3\text{dB}$			70	100	μV
21	max. IF input voltage	$V_{23/24}$	$V_{\text{Video}} + 3\text{dB}$		100	140		mV
22	IF control range	ΔV_{IF}			60	66	72	dB
23	Typical CVBS output signal on pin 14	V_{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	Ω
26	Output sink current	I_{14}	DC and AC				2	mA
	Output source current	I_{14}	DC and AC				-3	mA
SCART SWITCH								
30	Input impedance	Z_{13}				1 2		$\text{k}\Omega \text{pF}$
31	Gain of Video switch							
	Aux. V_{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	μA

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#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
AFC								
39	AFC-control steepness	$\Delta I_{10}/\Delta f$			0.6	0.8	1.0	$\mu\text{A}/\text{kHz}$
Tuner AGC								
40	Sink current	I_1	no tuner gain reduction		0		10	μA
			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 V_{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.

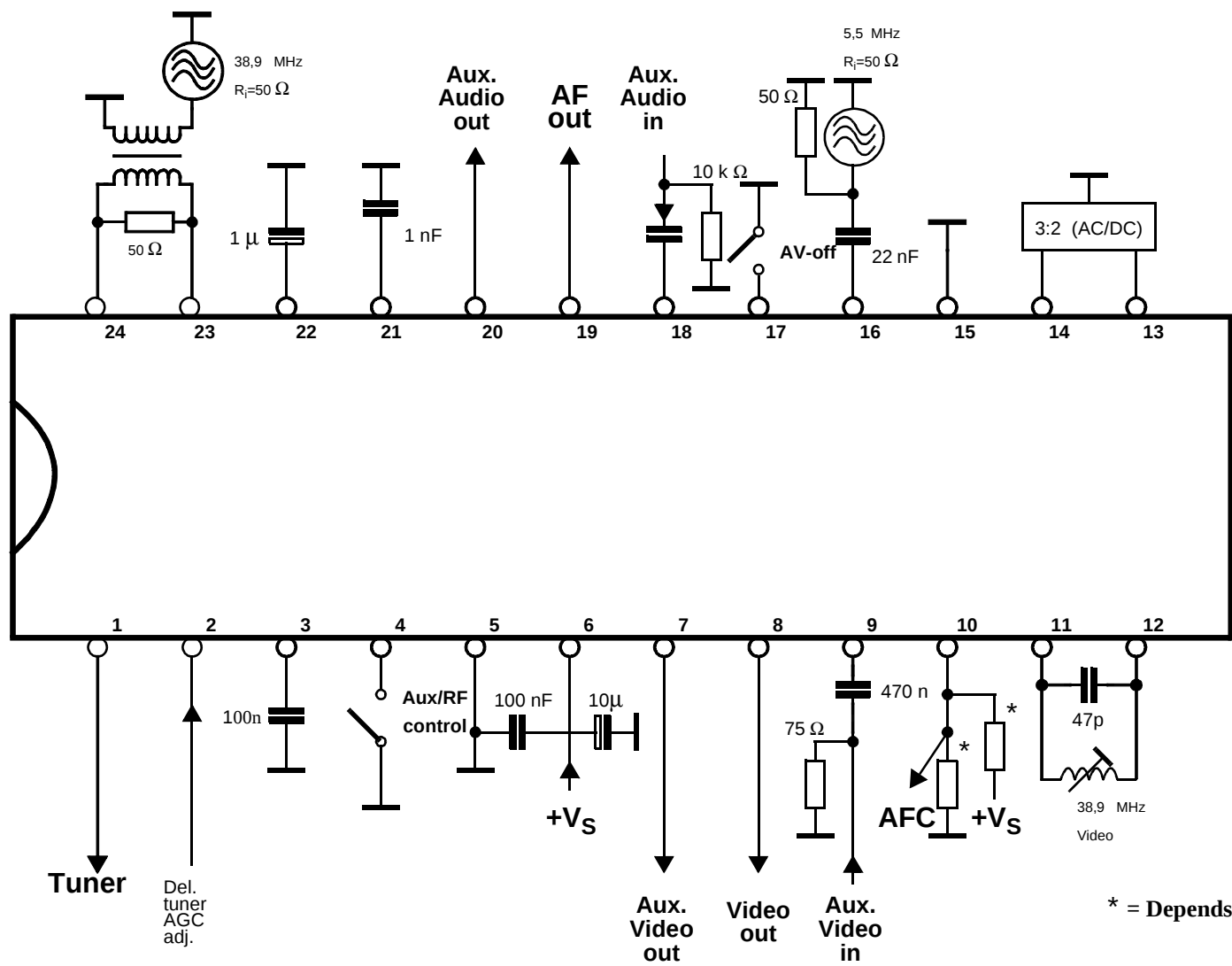
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AC / DC Characteristics

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.

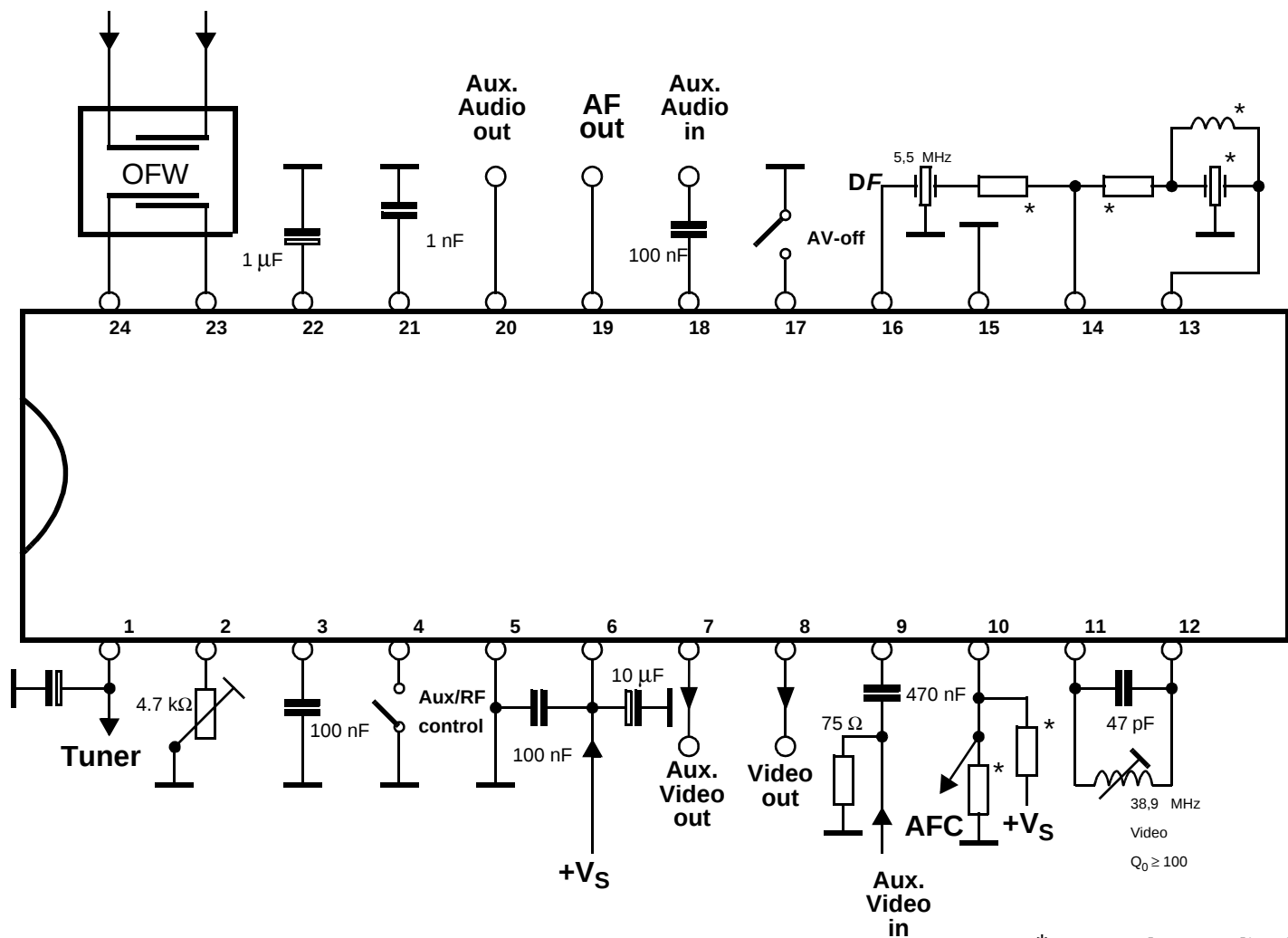
#	Parameter	Symbol	Test Conditions	Test Circuit	Min	Typ	Max	Units
Sound IF Section								
Characteristics are valid only for a stand alone operation of the Sound IF Section.								
42	min. sound IF Input voltage (min. control)	V_{16}				70	100	μV
43	AF output voltage	V_{19}	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}...6.5\text{MHz}$		175	250	350	mV
44	Aux. AF output voltage	V_{20}	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}...6.5\text{MHz}$		350	500	700	mV
45	Total harmonic distortion	THD_{AF0}	$\Delta f = 30\text{kHz}$ $f_{\text{mod}}=1\text{kHz}$ $F_{\text{SIF}}=5.5\text{MHz}...6.5\text{MHz}$			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	$\alpha_{\text{AM}19/20}$	$f_{\text{mod}}=1\text{kHz}$ $m=30\%$ $V_{16}=1\text{mV}...100\text{mV}$		50	55		dB
49	Signal to noise ratio (weighted)	$\text{S/N}_{19/20}$	$V_{16}=500\mu\text{V}...1\text{mV}$ $V_{16}=1\text{mV}...100\text{mV}$		50 60	55 65		dB 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



* = Depends on application