SGS-THOMSON MICROELECTRONICS

TDA8120

MULTISTANDARD VIDEO IF SYSTEM

- GAIN CONTROLLED IF AMPLIFIER
- VIF OPERATING FREQUENCY UP TO 50 MHz
- SYNCHRONOUS DETECTOR
- WHITE SPOT INVERTER
- VERY LOW DIFFERENTIAL ERROR
- VERY LOW PHASE ERROR
- INTERNAL AGC SWITCH (B/G - L)
- AGC TOP. SYNCH. FOR STANDARD B/G
- AGC TOP WHITE FOR STANDARD L
- QUASI SPLIT SOUND FOR STANDARD B/G
- SOUND DETECTOR FOR STANDARD L
- VIDEO MUTING FACILITY
- SEPARATED SOUND OUTPUT
- OPERATES WITHOUT EXTERNAL GATING PULSE

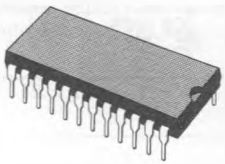
DESCRIPTION

The TDA8120 is a monolithic IC for TV video IF and Sound IF amplification and demodulation that can operate with all the TV standards.

The Video IF section can handle negative (B/G) or positive (L) modulated video signals by means of DC switching.

The Sound IF section acts as a Quasi Split Sound (QSS) subsystem in B/G transmission and allows a second Sound IF with high rejection of the video information.

The DC switch can modify the Sound IF configuration to process AM modulated Sound signals (L). The TDA8120 is assembled in a 24 pin dual in line power package.



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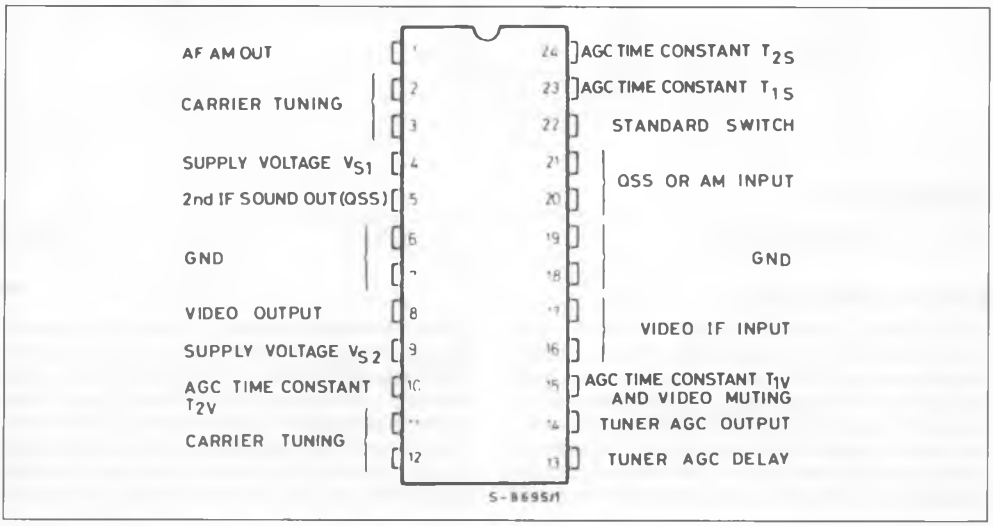
ORDER CODE : TDA8120

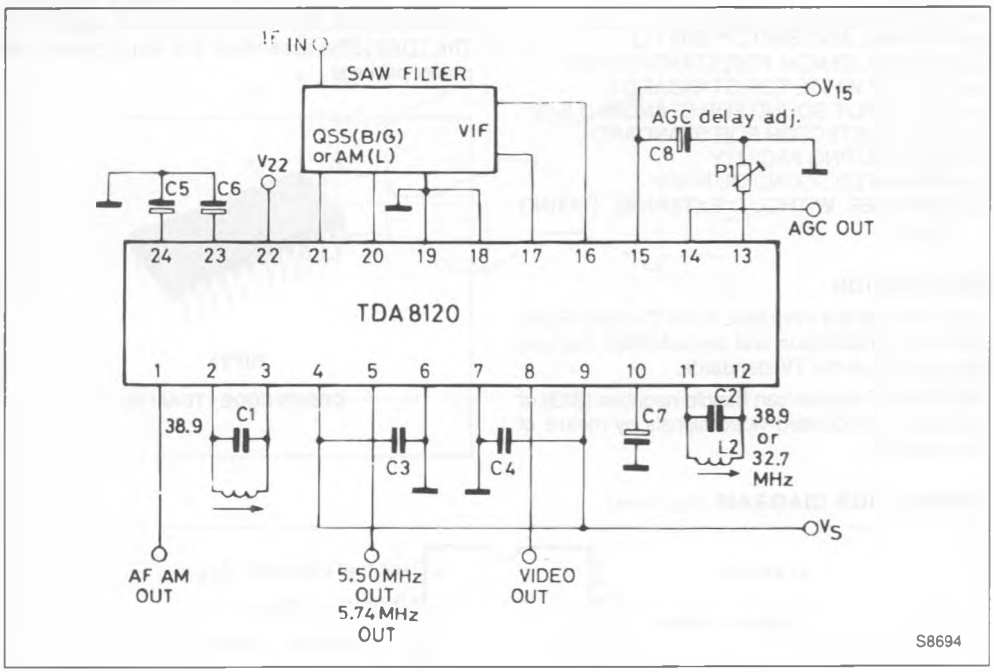
CONNECTION DIAGRAM (top view)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_4, V_9	Supply Voltage V_s	15	V
I_8, I_5, I_1	Video Out, QSS_{out}, AF AM Out, DC Output Current	10	mA
I_{22}, I_{15}	Pin 22 and Pin 15 Input Current	1	mA
P_{tot}	Total Power Dissipation (T_{amb} = 70 °C)	2	W
T_{stg}, T_j	Storage and Junction Temperature	– 40 to 150	°C
V_{14}	Voltage at Pin 14	V_s	

TEST CIRCUIT



THERMAL DATA

$R_{th\ j-amb}$	Thermal Resistance	Max	40	°C/W

CIRCUIT OPERATION

The TDA8120 (see block diagram) consists of a video section and a sound section. The integration of both sections on the same chip requires a high isolation at IF frequencies. This is achieved by physically separating the two sections, with separate power supplies and ground pins. In addition, special care has been taken in the choice of pad positions for the IF inputs and sound/video outputs.

The video section consists of three AC-coupled IF stages with more than 60 dB AGC range, flat amplitude/frequency response from 10 to 85 MHz and linearized phase slope from 30 to 50 MHz. Video carrier regeneration is performed by a tuned limiter. The carrier is then applied to the video demodulator through a special circuit which switches the carrier phase from 0 to 180° so that the video polarity can

be maintained constant when the standard switches from B/G to L. A noise inverter and a white spot inverter are included to eliminate ultra-black and white pulses.

A top sync or a top white clamping circuit and a minimum DC video component detector are implemented by two double comparators the characteristics of which may be controlled by an external control input to adapt to the modulation type for each standard. The voltage at the output of the two comparators is memorized by an external capacitor and used to drive the AGC network, which allows an input regulation of the video carrier from less than 100 µV to 100 mV. A delayed control storage with current output for the turner AGC completes the video section.

The sound section consists of three IF stages with the same characteristics as the video IF stages and an identical network to control and set the gains of the three IF amplifiers. The output of the third IF stage feeds the AM/AGC detector and the QSS section.

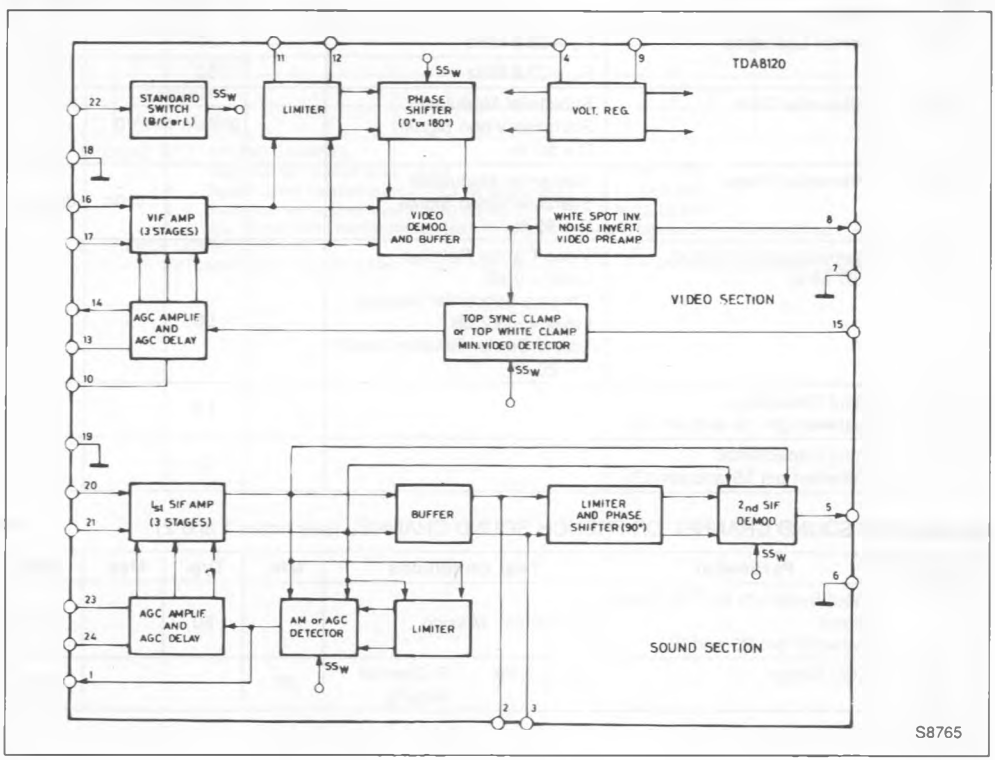
The AM/AGC detector consists of a wideband limiter for AM sound regeneration or video carrier regeneration used to feed the synchronous multiplier and consequently to obtain the AM demodulated audio signal. In addition, a DC voltage proportional to the peak-to-peak value of the video carrier is produced. Two comparators complete the sound AGC loop.

The subsequent QSS section consists of a reference amplifier tuned to the video IF which buffers a wideband limiter to reject completely the video AM information without introducing incidental phase modulation (IPM).

Following the limiter there are a 90° phase shifter and a linear-to-logarithmic converter which drives a linear multiplier as a demodulator for the intercarrier 2nd sound IF. This quadrature multiplier rejects all video components transmitted in DSB that is low frequency components of the video signal.

In addition to the sound and video sections, the TDA8120 includes a block for standard switching (B/G or L) controlled by a TTL-compatible input.

BLOCK DIAGRAM



ELECTRICAL CHARACTERISTICS (V_s = 12 V, T_{amb} = 25 °C)

VIDEO IF SECTION V_I = 10 mV_{rms} (black field), F_o = 38.9 MHz ; unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_s	Supply Voltage (pin 4 and pin 9)		10.8	12	13.2	V
I_s	Supply Current	V_I= 0		120		mA
$V_{8\,H}$	Top White Level	V_I = 0 R_L = 1.5 KΩ		6		V
$V_{8\,L}$	Top Synchronous Level			3		V
V_8	Video Output B/G	Modulation Depth D = 90 % R_L = 1.5 KΩ		3		V_{pp}
V_8	Video Output L	R_L = 1.5 KΩ M = 100 %		3		V_{pp}
ΔV_8	Video Output Variat. between Standards B/G and L	M = 100 %		± 2	10	%
$-I_8$	Output Current	R_L = 1.5 KΩ		4		mA
I_8	Input Current		2			mA
I_{14}	Turner AGC Current Capability			10		mA
S/N	Signal to Noise Ratio	B = 5 MHz D = 90 %	50			dB
ΔV_I	AGC Range	ΔV_8 = 1 dB D = 90 %	60			dB
B	Bandwidth	ΔV_8 = – 3 dB D = 90 %	7			MHz
V_{16-17}	Input Sensitivity for Full Output Signal	D = 90 %		50		µV
V_8	Carrier Leakages	F_o = 38.9 MHz		20		mV
		F_o = 77.8 MHz		50		mV
dG	Differential Gain	Subcarrier Modulated Staircase Video Signal D = 90 %			10	%
dϕ	Differential Phase	Subcarrier Modulated Staircase Video Signal D = 90 %			10	degree
d_{IM}	Intermodulation Product 1.07 MHz	Video Carrier Relative Level = 0 dB Chroma Subcarrier Relative Level = – 3.2 dB Sound Carrier Relative Level = – 20 dB		50		dB
R_i	Input Resistance (between pin 16 and pin 17)			1.5		KΩ
C_i	Input Capacitance (between pin 16 and pin 17)			2		pF

QUASI SPLIT SOUND CHANNEL OR FRENCH SOUND CHANNEL (see notes 1 and 2)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{20-21}	Input Sensitivity for Full Output Signal (between pin 20 and 21)	R Channel Missing		50		µV
ΔV_I	AGC Range	ΔV_5 = 1 dB R Channel Missing	60			dB

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_5	Output Voltage Standard B/G	R_L = 600 Ω AC Coupled F_o = 5.5 MHz		100		mVrms
V_5	Output Voltage Standard B/G	R_L = 600 Ω AC Coupled F_o = 5.74 MHz		50		mVrms
I_5	Output Current			2.5		mA
Z_5	Small Signal Output Impedance (QSS)	F_o = 5.5 MHz or F_o = 5.74 MHZ			50	KΩ
R_i	Input Resistance (between pin 21 and pin 20)			1.5		KΩ
C_i	Input Capacitance (between pin 21 and 20)			2		pF
S/N	Noise Ratio QSS (after SIF limitation and FM demodulation) F_o = 5.50 MHz F_o = 5.74 MHz	Channel R or Channel L Switched off F_m = 1 kHz Δ_f = ± 30 kHz Carrier Modulated with Syncs. Pulses Only. CCIR 468–2 Recomendant.	60 58			dB dB
V_1	Output Voltage Standard L			0.7		V_{rms}
I_1	Output Current			2.5		mA
Z_1	AF Output Impedance (L)				50	Ω
S/N	Noise Ratio AM Standard L	B_N = 20 KHz	46			dB
d	Distortion				3	%
V_{22}	B/G Operation		2		5	V
V_{22}	L Operation		0		0.8	V
V_{15}	Video Muting		8		V_s	V

Notes : 1. QUASI SPLIT SOUND CHANNEL

$\Delta f = 0$ { Video carrier relative level = 0 dB f= 38.9 MHz
Sound carrier relative level = − 13 dB (mono or L) f = 33.4 MHz
Sound carrier relative level = − 20 dB (R) f= 33.16 MHz

V_i = 10 mV Video carrier modulated with syncs ; V_{22} = 2 V, unless otherwise specified.

2. FRENCH SOUND CHANNEL

V_i = 10 mV (Carrier level) ; f_o = 39.2 MHz ; F_m = 1 KHz ; m = 80 % ; V_{22} = 0.8 V, unless otherwise specified.