

LINEAR INTEGRATED CIRCUIT

VISION IF SYSTEM WITH AFC

- HIGH GAIN-HIGH STABILITY
- VERY LOW INTERMODULATION PRODUCTS
- MINIMUM DIFFERENTIAL ERROR
- CONSTANT INPUT IMPEDANCE INDEPENDENT OF AGC
- FAST AGC GATING-ACTION, LARGELY INDEPENDENT OF PULSE SHAPE AND AMPLITUDE
- ADJUSTABLE WHITE LEVEL
- LARGE AFC OUTPUT CURRENT SWING (PUSH-PULL OUTPUT)
- SWITCHABLE AFC

The TDA4420 is a monolithic integrated circuit in 18 lead dual in-line plastic package. The functions incorporated are:

- gain controlled vision IF amplifier
- video demodulator controlled by picture carrier
- AGC detector with gating facility
- AGC amplifier for tuner drive with variable delay
- phase comparator for AFC current generation
- electronic AFC switch, controlled by a DC threshold detector
- thermally compensated push-pull AFC output stage.

ABSOLUTE MAXIMUM RATINGS

V.	Supply voltage (pin 15)	15	v
V5	Voltage at pin 5	15	v
113, 114	Video DC output current	5	mΑ
Ptot	Total power dissipation at $T_{amb} \leq 70^{\circ}C$	1	w
T_{stg}^{loc},T_{j}	Storage and junction temperature	-40 to 150	°C

ORDERING NUMBER: TDA 4420

MECHANICAL DATA

Dimensions in mm





CONNECTION DIAGRAM (top view)



BLOCK DIAGRAM





TEST CIRCUIT



Note: (*) C \cong 1.5 pF (pin and lead capacitance).

THERMAL DATA

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ELECTRICAL CHARACTERISTICS (Refer to the test circuit; $V_s = 12V$, $f_o = 38.9$ MHz; $P_1 = 2.5 \text{ K}\Omega$; pin 7 connected to GND; P_2 adjusted for V_{13} = 3.3Vpp; AFC off; T_{amb} = 25°C unless otherwise specified)

		Parameter	Test conditions	Min.	Тур.	Max.	Unit
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DC CHARACTERISTICS

V _s	Supply voltage range (pin 15)		10	12	15	v
I _s	Supply current (pin 15)			52		mA
V ₁₄	Video output DC voltage	V ₁₃ = 5.5V (1)		5.6		v
V ₁₃	Video output DC voltage	pin 12 open (1)			4.5	V
		pin 12 grounded (1)	7			v
V ₁₃	Peak black clamping level at negative video output		1.75	1.9	2.15	v
I ₁₃	Output DC current (pin 13)	V _s = 15V V ₁₃ = 8V		1.6		mA
l9, 110	DC control current for AFC off		150	300		μA



ELECTRICAL CHARACTERISTICS (continued)

	Parameter	Test conditions	Min.	Тур.	Max.	Unit		
AC CHARACTERISTICS								
I ₅	Available tuner AGC current	(2)		10		mA		
V ₇	AGC gating pulse input peak voltage	f pulse = 15625 Hz (3)	-1.5	-3	-5	V		
Vo	Peak to peak video output	V ₁₃ = 5.5V (4), (5)		3.3		v		
	signal (pin 13)	V ₁₃ = 6.4V (4), (5)		4.2	_	V		
ΔVi	AGC range	(6)	50	60		dB		
В	Frequency response (-3 dB)	(4)	8	10		MHz		
Vi	Input sensitivity	(7), (8)	100	150	200	μV		
V ₁₃ , V ₁₄	Video carrier and video carrier 2nd harmonic leakage at video output	V _i = 30 dB f_o = 38.9 MHz (4) 2 f_o = 77.8 MHz			30 50	m∨ m∨		
V ₁₄	Sound IF at positive video output (5.5 MHz)	(4), (9)	30			m∨		
d	Differential distortion of negative video output signal	V _i = 30 dB (standard staircase modulating signal)		3		%		
d _{im}	Intermodulation product at video outputs (1.07 MHz)	(4), (10)		-50		dB		
Ri	Input resistance between pins 1 and 18			1.4		КΩ		
C _i	Input capacitance between pins 1 and 18	(4)		2		pF		
V ₁₆	AFC voltage range	(11)	1		V _s -1.5	v		
I ₁₆	Maximum available AFC current	(12)			± 3	mA		
$\frac{\Delta I_{16}}{\Delta f}$	AFC slope	(13)		±0.01		mA KHz		

Notes:

(1) V_{13} and V_{14} are simultaneously adjustable by means of the resistance connected between pin 12 and ground (P₂).

(2) $\Delta V_i = +60 \text{ dB}$ (see note 7); $f_m = 100 \text{ KHz}$; m = 0.82.

(3) Input at pin 7 through C8.

- (4) The input voltage V can have any value within the AGC range.
- (5) P_2 adjusted for V_{13} = 5.5V or V_{13} = 6.4V; f_m = 100 KHz; m = 0.82.
- (6) $\Delta V_0 = 1 \text{ dB}; f_m = 100 \text{ KHz}; m = 0.82.$



- (7) The measured amplitude is assumed as 0 dB reference level of V_i that is the rms value of the unmodulated video carrier (modulation down).
- (8) P₂ is adjusted in order to have V_{13} = 3Vpp at V_i = 4 mV, then the sensitivity is obtained as the minimum input voltage that maintains this output level. f_m= 100 KHz; m = 82%.
- (9) $f_0 = 38.9$ MHz (video carrier); $f_a = 33.4$ MHz (sound carrier); the amplitude of the sound carrier is 30 dB below the amplitude of the video carrier.
- (10) V_i at $f_0 = 38.9$ MHz (video carrier); $f_a = 33.4$ MHz, 6 dB below V_i (sound carrier); $f_b = 34.47$ MHz, 24 dB below V_i (Chroma subcarrier).
- (11) V_i = 40 dB; R_5 = R_6 = 5.1 K Ω ; AFC on; f_o = 39.9 MHz; f_o = 37.9 MHz.
- (12) $V_i = 40 \text{ dB}$; $f_o = 39.2 \text{ MHz}$; AFC on; $V_{16} = 6V$.
- (13) $V_1 = 40 \text{ dB}$; $f_0 = 38.9 \text{ MHz}$; $f_2 = 39.2 \text{ MHz}$; AFC on; $V_{16} = 6V$.





Fig. 2 - Set-up for measurement of ΔV_{o}





APPLICATION INFORMATION

Fig. 3- Application circuit



* R1; R2; Ch1, depend from the SAWF characteristics

Fig. 4 - TV Signal identification circuit



TV signal identification circuit:

The suggested application circuit is shown in fig. 4. The passive components are chosen as follows:

- R_1 and R_2 : these define the AFC response slope. For $R_1 = R_2 = 5.1 \text{ K}\Omega$, the typical slope is 750/11 KHz/V (with AFC output unloaded).
- S₁ : switches between low slope (LS) and high slope (HS). The high slope is typically 88/11 KHz/V.



APPLICATION INFORMATION (continued)

 R_3 and R_4 : the ratio $(R_3 + R_4)/R_3$ defines the digital AFC width (δf) calculated from the linear AFC width ($2\Delta f$). With $V_s = 12V$, the relation is:

$$\delta f = 0.036 (2\Delta f) \frac{R_3 + R_4}{R_3}$$

R_{T1} : by means of this trimmer it is possible to align the linear tuning with the digital one, at the same frequency. The typical relation is:

$$R_{a} = 33 R_{3}$$

with $R_3 = 3.3 \text{ K}\Omega$, R_a can be a fixed resistor of 110 K Ω .

To make better sensitivity adjustment of trimmer R_{T2} , it is necessary to use only a weak signal at the antenna. The video information must be a black picture or a field of small white points on a black field. Furthermore, the action of the syncs separator must be as quick as possible.

In receivers with automatic program search, S1 should be in the HS position and then the components S1, R1 and R2 can be omitted completely.

Fig. 5 - Linear and digital AFC characteristics (TDA 4420 and TDA 4431)

