LINEAR INTEGRATED CIRCUIT

TDA 440

PRELIMINARY DATA

COMPLETE TV VISION IF SYSTEM

The TDA 440 is a silicon monolithic integrated circuit in a 16 lead dual in-line plastic package. The functions incorporated are:

- gain controlled vision IF amplifier
- synchronous detector
- AGC detector with gating facility
- AGC amplifier for PNP tuner drive with variable delay
- video preamplifier with positive and negative outputs.

It is intended for use in black and white and colour TV receivers.

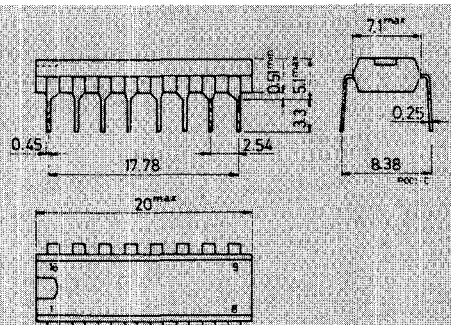
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage (pin 13)	15	V
V_5	Voltage at pin 5	20	V
V_{10}	Voltage at pin 10	{ -1 { 3	V V
V_{11}	Voltage at pin 11 (with load connected to V_s)	8	V
I_{11}, I_{12}	Output current	5	mA
I_{14}	Supply current (into pin 14)	55	mA
P_{tot}	Total power dissipation at $T_{amb} \leq 70$ °C	800	mW
→ T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

ORDERING NUMBER: TDA 440

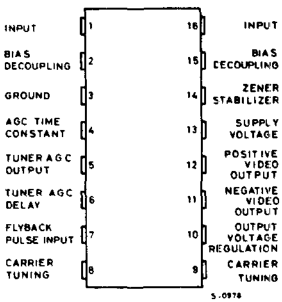
MECHANICAL DATA

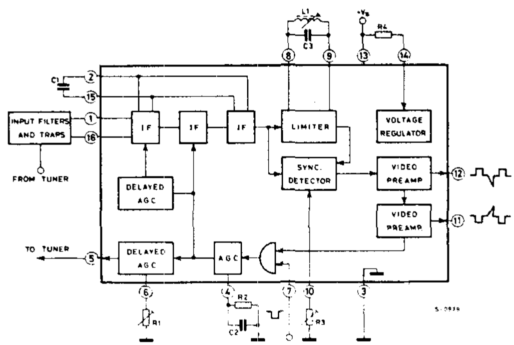
Dimensions in mm



TDA 440

CONNECTION AND BLOCK DIAGRAMS





SCHEMATIC DIAGRAM

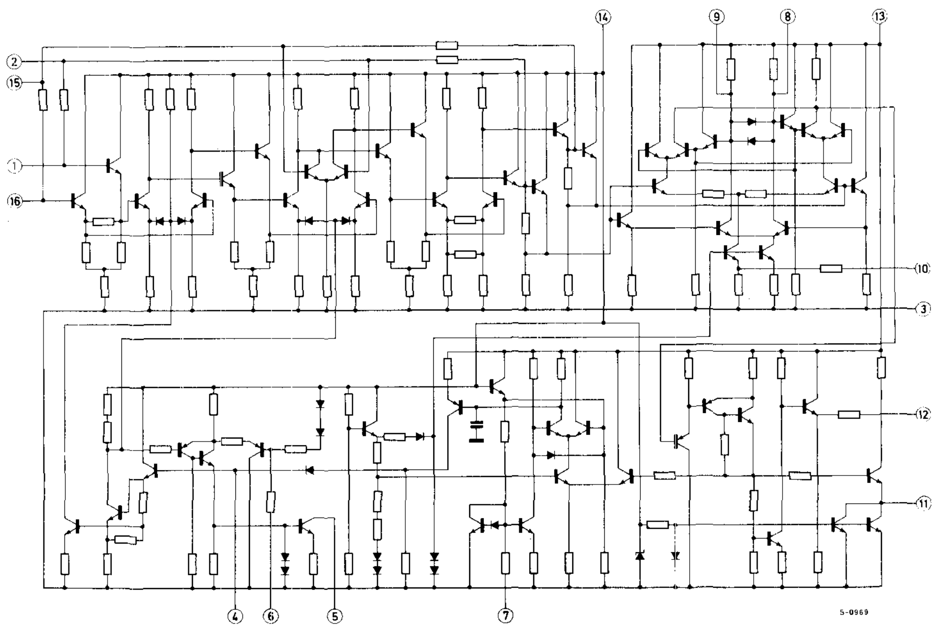


Fig. 1a – Test circuit for measurement of I_{13}, V_{11}, V_{12}, V_{14} and $\Delta V_{11}/\Delta V_{13}$

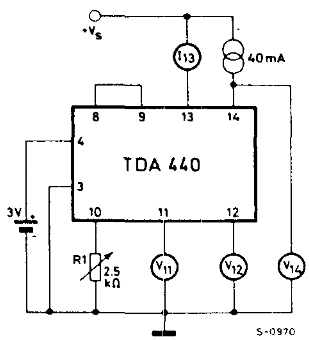


Fig. 1b – Test circuit for measurement of I_{11} and $\Delta V_{11}/\Delta V_s$

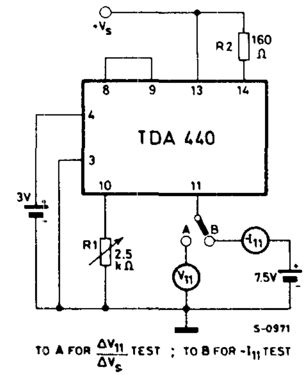


Fig. 2 - Dynamic test circuit

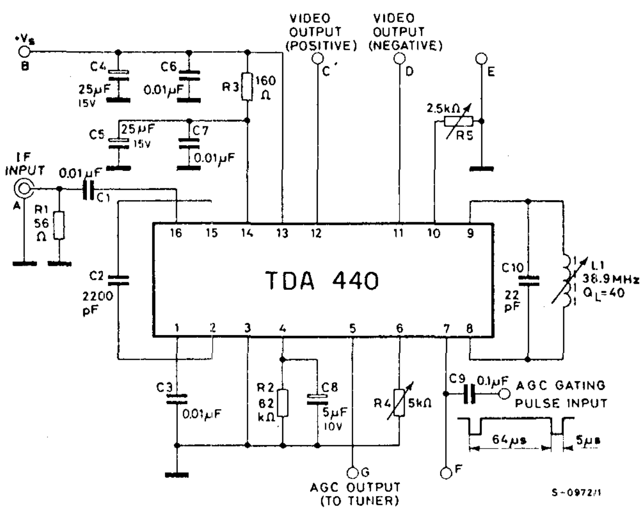


Fig. 3a - Set-up for measurement of d_{im}

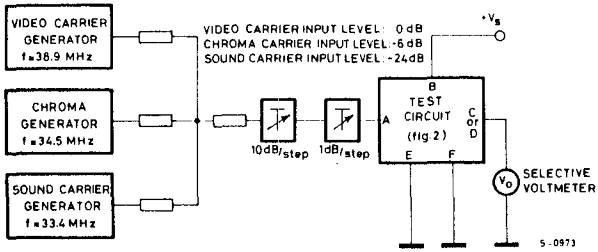


Fig. 3b - Set-up for measurement of ΔV_o

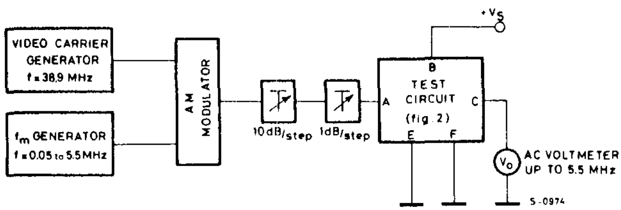


Fig. 3c - Set-up for measurement of I_5, V_i, ΔV_i, V_o, V_{11} and V_{12}

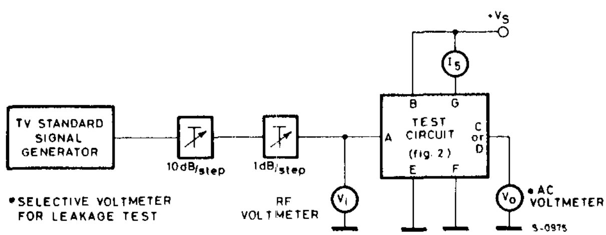
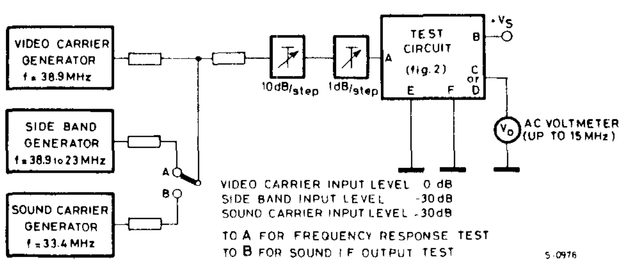


Fig. 3d - Set-up for measurement of B, V_{11} and V_{12}



THERMAL DATA

$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	100	°C/W

ELECTRICAL CHARACTERISTICS (Refer to the test circuits, T_{amb} = 25°C)

STATIC (DC) CHARACTERISTICS

Parameter		Test conditions	Min.	Typ.	Max.	Unit	Fig.
I_s	Supply current (pin 13)	V_s = 12V	14	19	25	mA	1a
$-I_{11}$ (1)	Output current	V_s = 12V	2.3	3.5	4.8	mA	1b
V_s	Supply voltage (pin 13)	I_{14} = 40 mA	10		15	V	–
V_{11} (2)	Output voltage	V_s = 12V	4.8		6.4	V	1a
V_{12} (2)	Output voltage	V_s = 12V V_{11} = 5.5V		5.6		V	1a
V_{14}	Stabilized voltage	I_{14} = 40 mA	5.5	6	6.5	V	1a
$\frac{\Delta V_{11}}{\Delta V_s}$	Output voltage drift	V_s = 11 to 14V		3,5		%	1b
$\frac{\Delta V_{11}}{\Delta V_{13}}$	Output voltage drift	V_{13} = 11 to 15V I_{14} = 40 mA		0.4		%	1a

DYNAMIC CHARACTERISTICS (refer to fig. 2 test circuit, V_s = 12V)

Parameter		Test conditions	Min.	Typ.	Max.	Unit	Fig.
I_s	Supply current		48	57	66	mA	–
I_5 (3)	Tuner AGC current	V_7 = 0 R_4 = 5 kΩ f_0 = 38.9 MHz	6	8		mA	3c
V_7	AGC gating pulse input peak voltage	f = 15.6 kHz	-1.5		-5	V	–
V_i (4)	Input sensitivity	V_7 = 0 f_0 = 38.9MHz V_{11} = 3.3V peak to peak	140	200	280	µV	3c
ΔV_i	AGC range	V_7 = 0 ΔV_o = 1 dB f_0 = 38.9 MHz V_{11} = 3.3V peak to peak	50	55		dB	3c
V_o	Peak to peak output voltage at pin 11	V_7 = 0 V_{11} = 5.5V f_0 = 38.9 MHz V_i = see note (5)	2.6	3.3	4.2	V	3c

ELECTRICAL CHARACTERISTICS (continued)

	Parameter	Test conditions	Min.	Typ.	Max.	Unit	Fig.
ΔV_o	Video output variation over the AGC range (0 to 5.5 MHz)	V_7 = 0 ΔV_i = 50 dB V_{11} = 3.3V peak to peak f_o = 38.9 MHz f_m = 0 to 5.5 MHz		1	2	dB	3b
V_{11}, V_{12}	Sound IF at video outputs (5.5 MHz)	V_7 = 0 V_i = see note (5) f_o (vision) = 38.9 MHz f_o (sound) = 33.4 MHz	30			mV	3d
	Differential error of the output voltage (B & W)	V_7 = 0 f_o = 38.9 MHz V_{11} = 3.3V peak to peak			15	%	–
V_{11}, V_{12}	Video carrier and video carrier 2[nd] harmonic leakage at video outputs	V_7 = 0 V_i = see note (5) f_o = 38.9 MHz		15	30	mV	3c
V_{11}, V_{12}	Video carrier leakage at video outputs			5	15	mV	
B	Frequency response (-3 dB)		8	10		MHz	3d
d_{im}	Intermodulation products at video outputs	V_7 = 0 V_i = see note (5) f_o (vision) = 38.9 MHz f_o (sound) = 33.4 MHz f_o (chroma) = 34.5 MHz		-50	-40	dB	3a
R_i	Input resistance (between pins 1 and 16)	V_7 = 0 V_i = see note (5) f_o = 38.9 MHz		1.4		kΩ	–
C_i	Input capacitance (between pins 1 and 16)			2		pF	–

NOTES:
(1) Current flowing into pin 11 with the load connected to V_S.
(2) V_{11} and V_{12} are adjustable simultaneously by means of the resistance, or by a variable voltage $\leqslant$0.6V, connected between pin 10 and ground.
(3) Measured with an input voltage 10 dB higher than the V_i at which the tuner AGC current starts.
(4) RMS value of the unmodulated video carrier (modulation down).
(5) The input voltage V_i can have any value within the AGC range.

Fig. 4 - AGC regulation voltage vs. input voltage variation

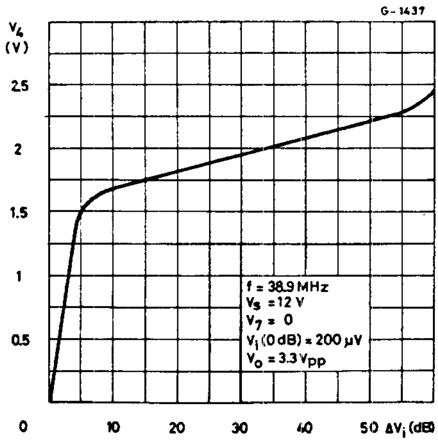


Fig. 5 - Tuner AGC output current vs. IF gain variation

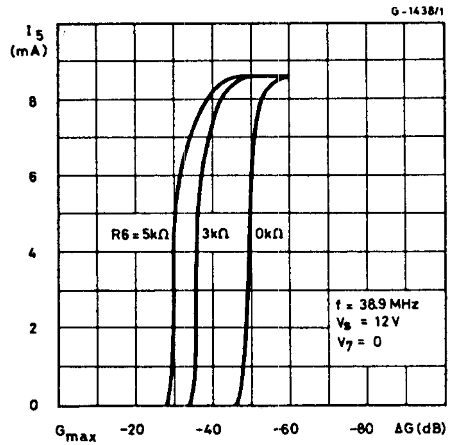


Fig. 6 - Output black level vs. supply voltage

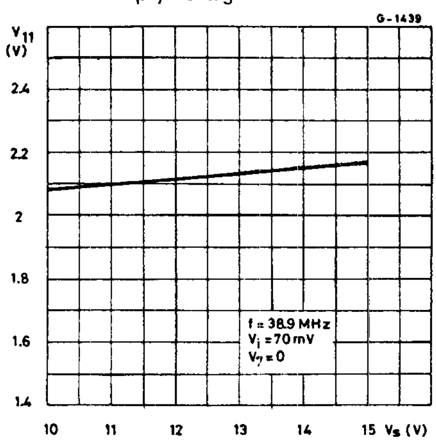
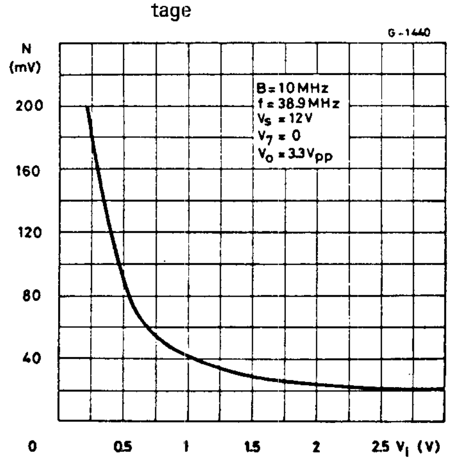


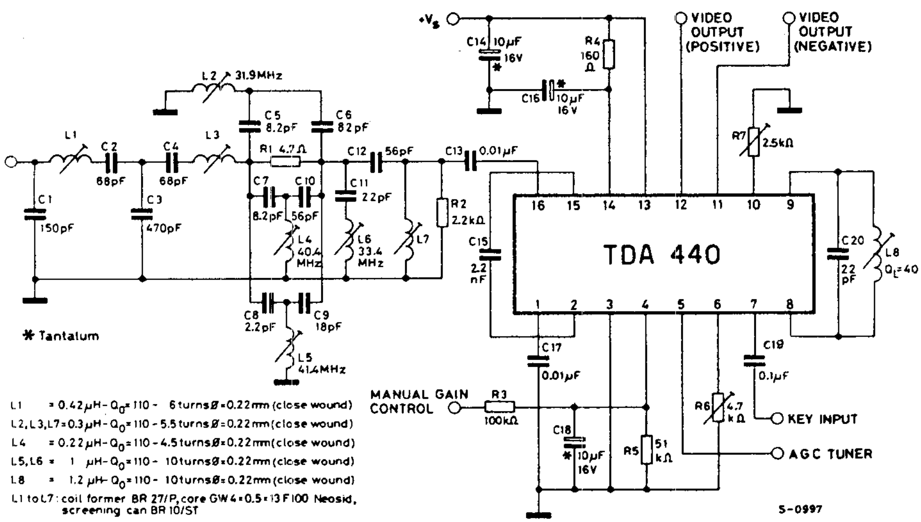
Fig. 7 - Output noise vs. input voltage



APPLICATION INFORMATION

The TDA 440 enables very compact IF amplifiers to be designed and provides the performance demanded by high quality receivers.
The input tuning-trapping circuitry and the detector network can be aligned independently with respect to each other.
The value of Q for the parallel tuned circuit between pin 8 and 9 is not critical, although the higher it is, the better is the chroma-sound beat rejection but the tuning is more critical. Values of Q from 30 to 50 give good rejection with non-critical tuning.
The LC circuit between pins 8 and 9 is tuned to the vision carrier thus appreciably attenuating the sidebands. Hence a small amount of signal can be removed whose amplitude is almost constant over the whole working range of the AGC and it can be used to drive the AFC circuit.
The black level at the output is very stable against variations of V_s and of temperature: this enables the contrast control to be kept simple. The AGC is of the gated type and can take the top of the synchronism or the black level (back porch) as its reference: when the latter is used, the output black level is particularly stable.
For a more detailed description of the TDA 440 and related performance refer to SGS-ATES Application Note n. 127.

Fig. 8 - Typical application circuit.



Typical performance of the Fig. 8 circuit

Frequency response (f_0 vision = 38.9 MHz, f_0 sound = 33.4 MHz)	standard	CCIR
Sound carrier attenuation	28	dB
31.9 MHz trap attenuation	⩾60	dB
40.4 MHz trap attenuation	⩾56	dB
41.4 MHz trap attenuation	⩾44	dB
AGC range	55	dB
Overall gain including IF filter and trap circuits (note 1)	86	dB
Intermodulation products over the whole AGC range (note 2)	- 55	dB

NOTES: (1) The gain is measured at video output 3.3V peak to peak and is defined as peak to peak output voltage to RMS input voltage (modulation down).
(2) Measured at 1.07 MHz, vision carrier level = 0 dB, chroma carrier level = -6 dB, sound carrier level = -6 dB.

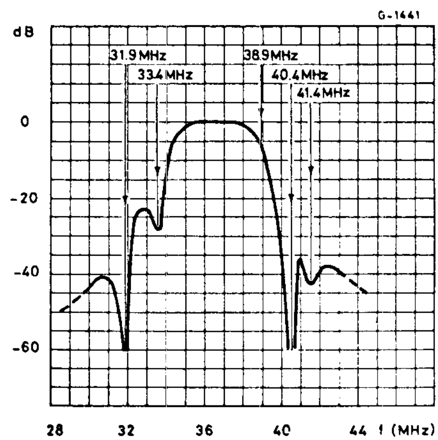


Fig. 9 - Overall frequency response of the fig. 8 circuit.

Fig. 10 - Circuit options for tuner AGC driving