SGS TDA2320

LINEAR INTEGRATED CIRCUIT

PRELIMINARY DATA

PREAMPLIFIER FOR INFRARED REMOTE CONTROL SYSTEMS

The TDA 2320 is a monolithic integrated circuit in Minidip package specially designed to amplify the IR signal in remote controlled TV or radio sets. It directly interfaces with the digital control circuitry.
The TDA 2320 incorporates a two stages amplifier with excellent sensitivity and high noise immunity. It can work with a single 5V supply voltage and "with" or "without" carrier transmission modes as provided for example by the M709/M710 C/MOS transmitter.
The TDA 2320 is particularly intended to be used in conjunction with the M103, M104 and M206 + M3870 remote control receivers.

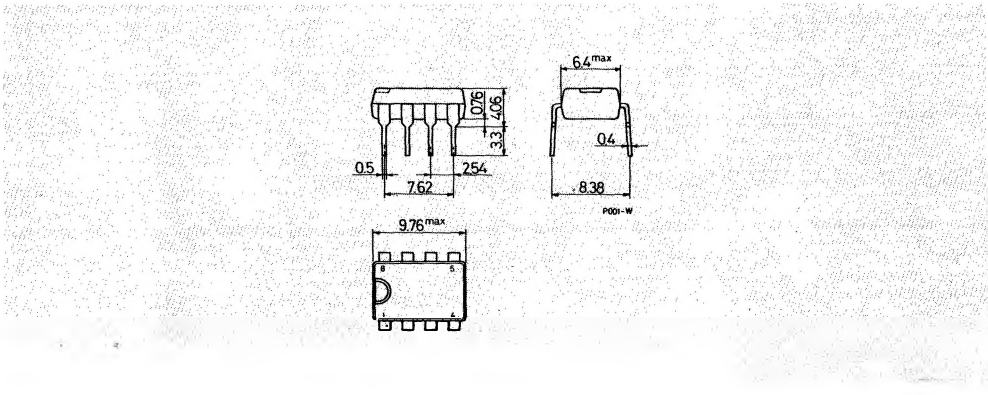
ABSOLUTE MAXIMUM RATINGS

V_s	Supply voltage	20	V
$T_{stg,\ j}$	Storage and Junction temperature	-40 to 150	°C
P_{tot}	Total power dissipation at T_{amb} = 70°C	400	mW

ORDERING NUMBER: TDA 2320

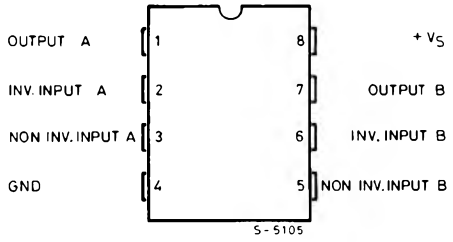
MECHANICAL DATA

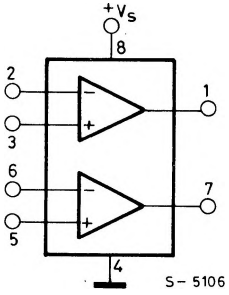
Dimensions in mm



CONNECTION AND BLOCK DIAGRAM

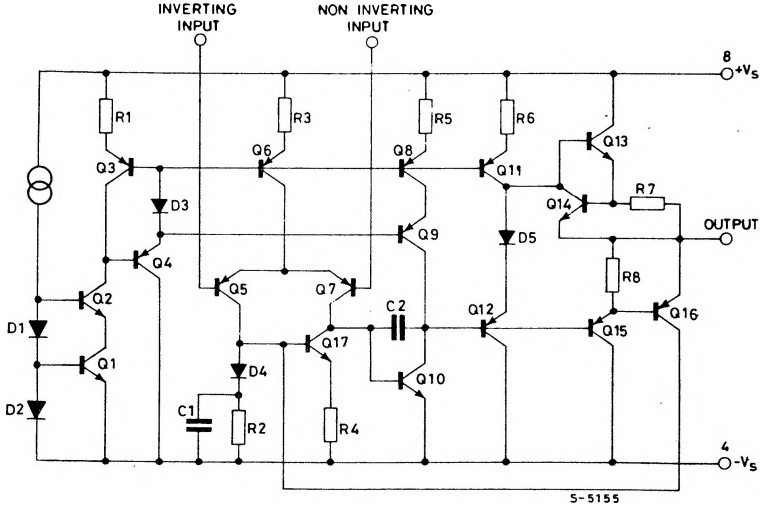
(top view)





SCHEMATIC DIAGRAM

(one section)



THERMAL DATA

$R_{th\ j\text{-}amb}$	Thermal resistance junction-ambient	max	200	°C/W

ELECTRICAL CHARACTERISTICS (V_s= 5V, T_{amb}= 25°C, single amplifier, unless otherwise specified)

Parameter		Test conditions	Min.	Typ.	Max.	Unit
V_s	Supply voltage		4		20	V
I_s	Total supply current	V_s = 20V		0.8	2	mA
I_b	Input bias current			100	500	nA
V_{os}	Input offset voltage	R_g < 10 KΩ		0.5		mV
I_{os}	Input offset current			15		nA
G_v	Open loop voltage gain	f = 1 KHz	64	70		dB
		f = 100 KHz		30		dB
B	Gain bandwidth product	f = 40 KHz	1.5	3		MHz
SR	Slew rate	R_L= 2 KΩ		1.5		V/μs
e_N	Total input noise voltage	f = 40 KHz Rg= 10KΩ		20		$nV\sqrt{Hz}$
V_o.	DC output voltage swing			2.5		Vpp
SVR	Supply voltage rejection (*)	f = 100 Hz		80		dB

(*) Circuit of fig. 1.

APPLICATION INFORMATION

Fig. 1 - Application circuit with carrier

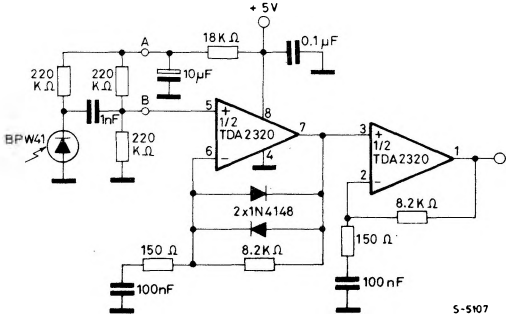
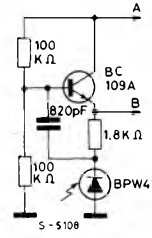


Fig. 2 - Alternative input stage



APPLICATION INFORMATION (continued)

The preamplifier shown in fig. 1 must be used with carrier mode transmission. It is particularly suitable for use with microprocessor decoding system (for instance with the M206 + M3870 or M3872 TV PLL frequency synthesizer).
The "with carrier" signal is sent as a burst (f_{carr} = 38 KHz) to reduce power consumption at the transmitter (duty cycle = 1%) and to allow the receiver to have some bandwidth limiting in the preamplifier to improve noise immunity (50/100 Hz pulses from incandescent lighting).
The fig. 2 shows an alternative configuration for the input stage: this new circuit allows the correct operation of the preamplifier even when an incandescent lamp is very close to the IR diode.
Using this configuration, the circuit has only a slight degradation in the useful range.

Fig. 3 - Tuned amplifier application (with carrier)

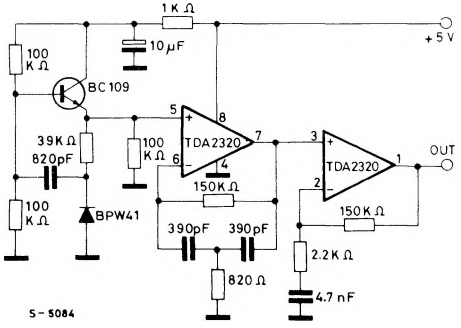
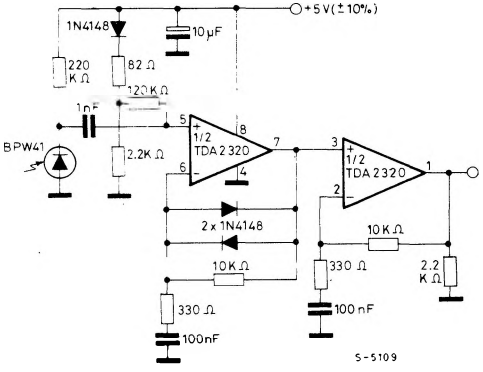


Fig. 4 - Application circuit without carrier



APPLICATION INFORMATION (continued)

The circuit shown in fig. 4 works in transmission mode without carrier. The transmitted signal is sent as a series of single pulses (rather than bursts, as with the carrier solution).
The DC bias network formed by the 82/2.2 KΩ divider and 1N4148 diode fixes the DC output voltage near the supply voltage (just under the saturation level). In this way it is possible to optimize the noise immunity of the receiver. The 2.2 KΩ output resistance avoids turn-off problems in the final stage.

Performance

Supply voltage	4.5V min; 5.5V max
Quiescent drain current	6 mA
Supply voltage rejection (f = 100 Hz)	greater than 50 dB
Useful range (using the transmitter of fig. 7)	14 mt

With a incandescent light (75W) as a noise source located at 1 mt from the receiver the useful range decreases to 10 mt.

Fig. 5 - Optimized preamplifier ("no carrier" mode)

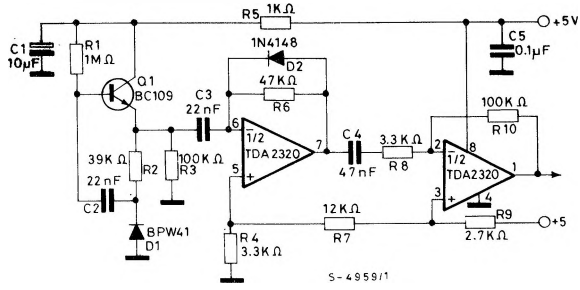
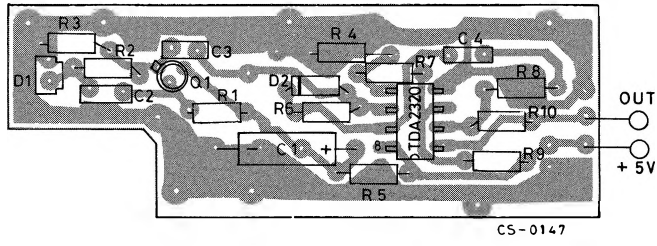


Fig. 6 - P.C. and components layout of the circuit of fig. 5 (1 : 1 scale)



APPLICATION INFORMATION (continued)

Fig. 7 - IR transmitter using M709 or M710

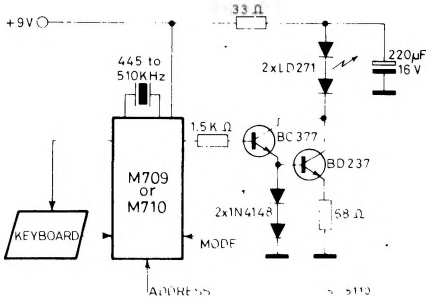


Fig. 8 - MMC II - PLL TV Frequency synthesizer

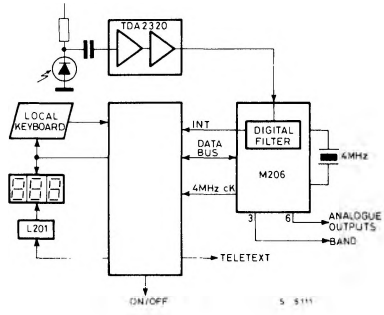


Fig. 9 - IR Preamplifier and Remote Control receiver for 32 channels voltage synthesizer (EPM - M293)