

**LOW DROP DUAL POWER OPERATIONAL AMPLIFIERS**

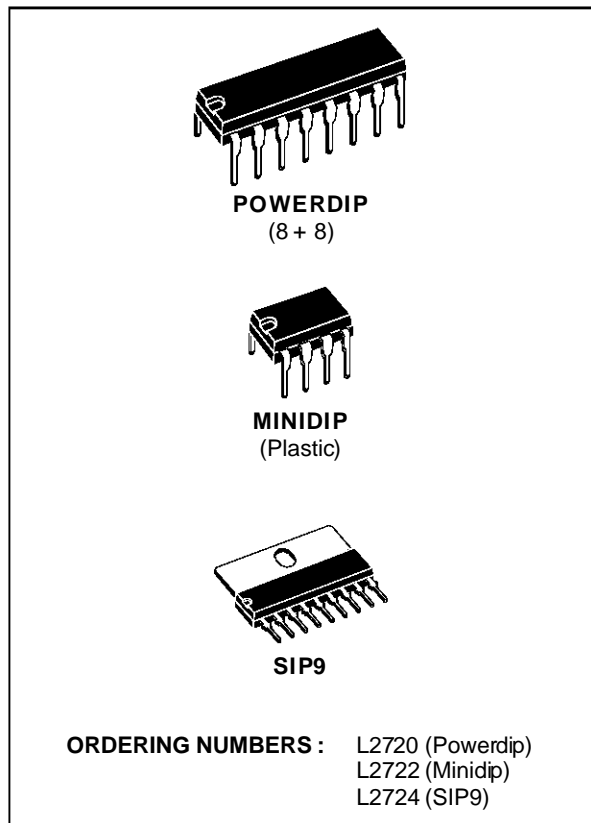
- OUTPUT CURRENT TO 1 A
- OPERATES AT LOW VOLTAGES
- SINGLE OR SPLIT SUPPLY
- LARGE COMMON-MODE AND DIFFERENTIAL MODE RANGE
- LOW INPUT OFFSET VOLTAGE
- GROUND COMPATIBLE INPUTS
- LOW SATURATION VOLTAGE
- THERMAL SHUTDOWN
- CLAMP DIODE

**DESCRIPTION**

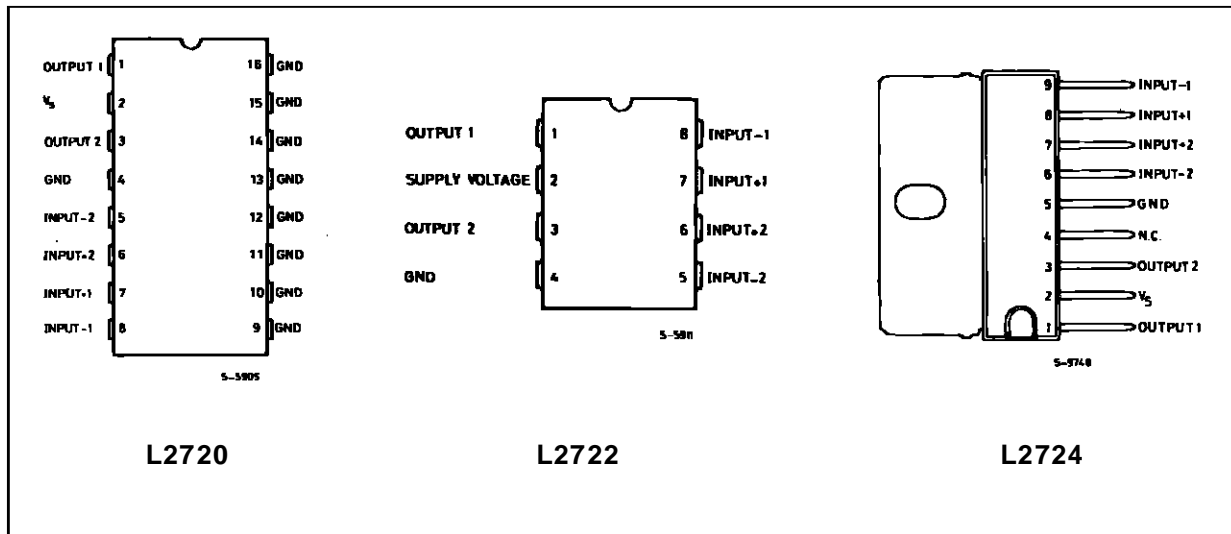
The L2720, L2722 and L2724 are monolithic integrated circuits in powerdip, minidip and SIP-9 packages, intended for use as power operational amplifiers in a wide range of applications including servo amplifiers and power supplies.

They are particularly indicated for driving, inductive loads, as motor and finds applications in compact-disc VCR automotive, etc.

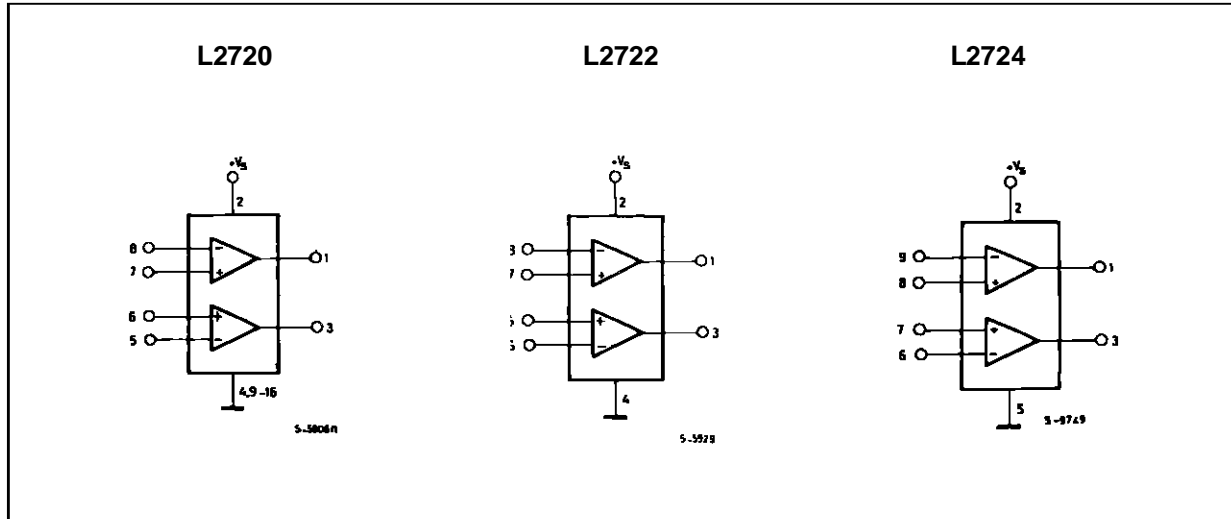
The high gain and high output power capability provide superior performance whatever an operational amplifier/power booster combination is required.



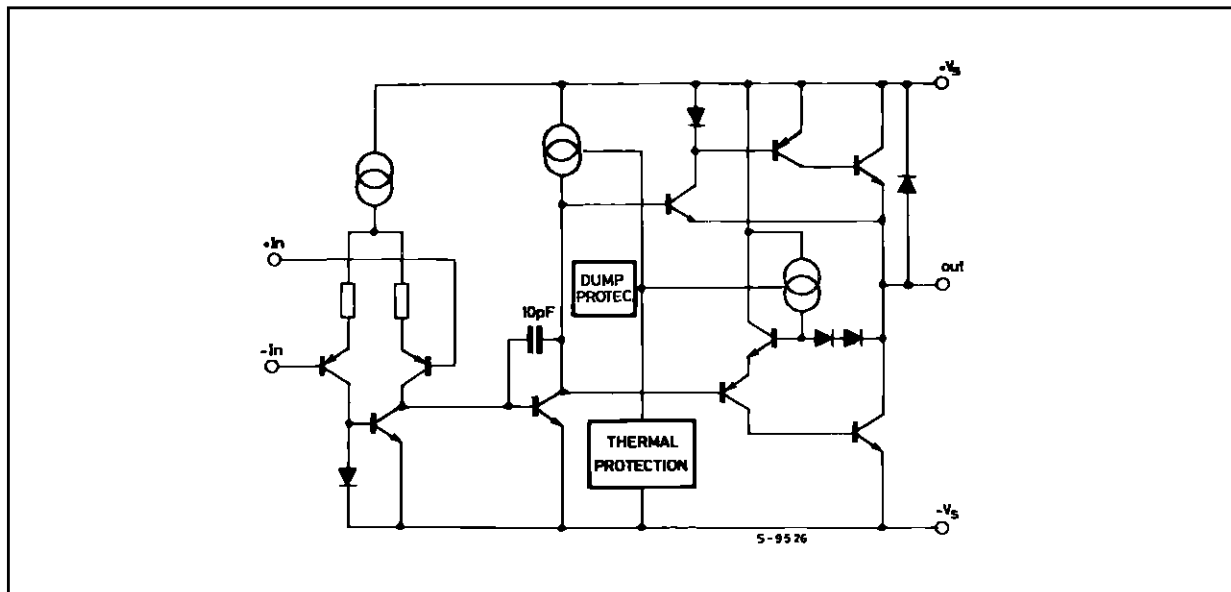
**PIN CONNECTIONS (top views)**



BLOCK DIAGRAM



SCHEMATIC DIAGRAM (one section)



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_s$	Supply Voltage	28	V
$V_s$	Peak Supply Voltage (50ms)	50	V
$V_i$	Input Voltage	$V_s$	
$V_i$	Differential Input Voltage	$\pm V_s$	
$I_o$	DC Output Current	1	A
$I_p$	Peak Output Current (non repetitive)	1.5	A
$P_{tot}$	Power Dissipation at $T_{amb} = 80^\circ\text{C}$ (L2720), $T_{amb} = 50^\circ\text{C}$ (L2722) $T_{case} = 75^\circ\text{C}$ (L2720) $T_{case} = 50^\circ\text{C}$ (L2724)	1 5 10	W
$T_{stg}, T_j$	Storage and Junction Temperature	-40 to 150	$^\circ\text{C}$

## THERMAL DATA

			SIP-9	Powerdip	Minidip
R <sub>th j-case</sub>	Thermal Resistance Junction-case	Max.	10°C/W	15°C/W	70°C/W
R <sub>th j-amb</sub>	Thermal Resistance Junction-ambient	Max.	70°C/W	70°C/W	100°C/W

## ELECTRICAL CHARACTERISTICS

V<sub>s</sub> = 24V, T<sub>amb</sub> = 25°C unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit	
V <sub>s</sub>	Single Supply Voltage		4		28	V	
V <sub>s</sub>	Split Supply Voltage		± 2		± 14	V	
I <sub>s</sub>	Quiescent Drain Current	$V_o = \frac{V_s}{2}$ V <sub>s</sub> = 24V V <sub>s</sub> = 8V		10 9	15 15	mA	
I <sub>b</sub>	Input Bias Current			0.2	1	μA	
V <sub>os</sub>	Input Offset Voltage				10	mV	
I <sub>os</sub>	Input Offset Current				100	nA	
SR	Slew Rate			2		V/μs	
B	Gain-bandwidth Product			1.2		MHz	
R <sub>i</sub>	Input Resistance		500			kΩ	
G <sub>v</sub>	O.L. Voltage Gain	f = 100Hz f = 1kHz	70	80 60		dB	
e <sub>N</sub>	Input Noise Voltage	B = 22Hz to 22kHz		10		μV	
I <sub>N</sub>	Input Noise Current			200		pA	
CMR	Common Mode Rejection	f = 1kHz	66	84		dB	
SVR	Supply Voltage Rejection	f = 100Hz R <sub>G</sub> = 10kΩ V <sub>R</sub> = 0.5V	V <sub>s</sub> = 24V V <sub>s</sub> = ±12V V <sub>s</sub> = ±6V	60	70 75 80	dB	
V <sub>DROP(HIGH)</sub>		V <sub>s</sub> = ±2.5V to ±12V	I <sub>p</sub> = 100mA I <sub>p</sub> = 500mA		0.7 1	1.5	V
V <sub>DROP(LOW)</sub>		V <sub>s</sub> = ±2.5V to ±12V	I <sub>p</sub> = 100mA I <sub>p</sub> = 500mA		0.3 0.5	1	V
C <sub>s</sub>	Channel Separation	f = 1KHz R <sub>L</sub> = 10Ω G <sub>v</sub> = 30dB	V <sub>s</sub> = 24V V <sub>s</sub> = 6V		60 60		dB
T <sub>sd</sub>	Thermal Shutdown Junction Temperature			145		°C	

Figure 1 : Quiescent Current vs. Supply Voltage

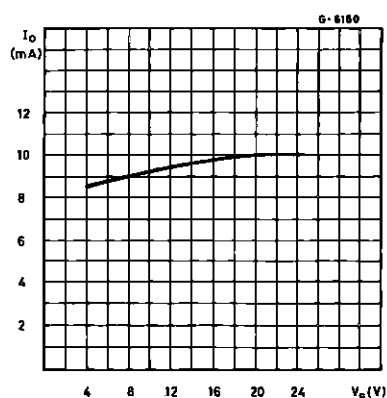
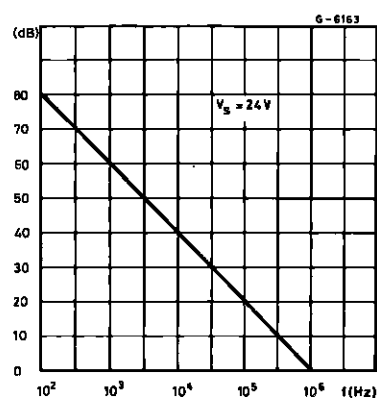
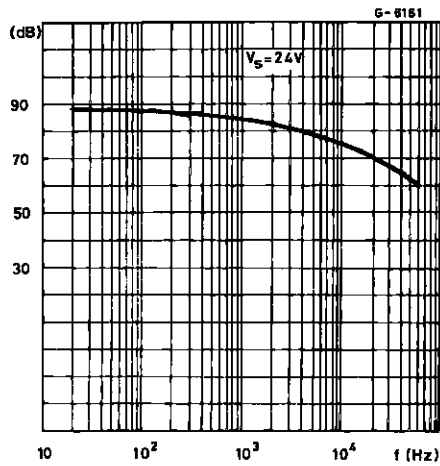


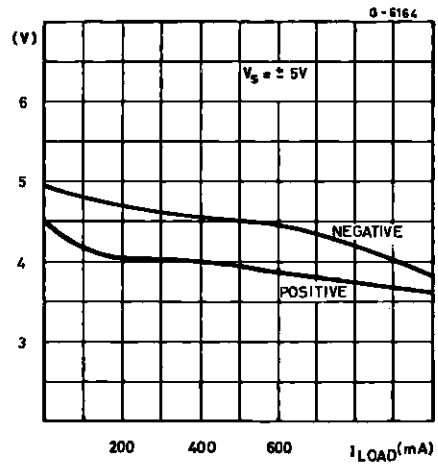
Figure 2 : Open Loop Gain vs. Frequency



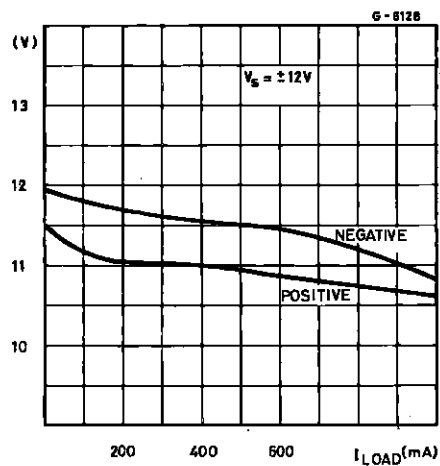
**Figure 3 :** Common Mode Rejection vs. Frequency



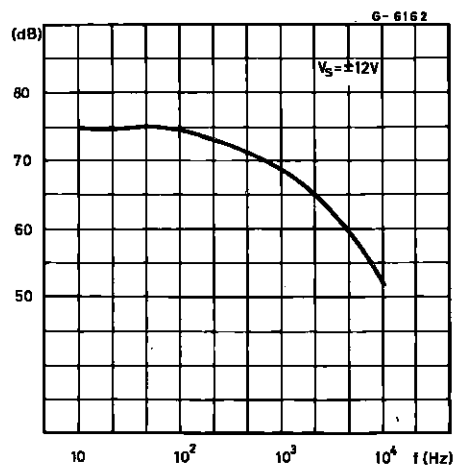
**Figure 4 :** Output Swing vs. Load Current ( $V_S = \pm 5V$ ).



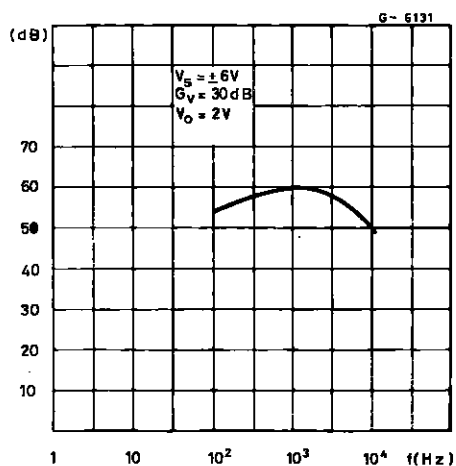
**Figure 5 :** Output Swing vs. Load Current ( $V_S = \pm 12V$ ).



**Figure 6 :** Supply Voltage rejection vs. Frequency



**Figure 7 :** Channel Separation vs. Frequency



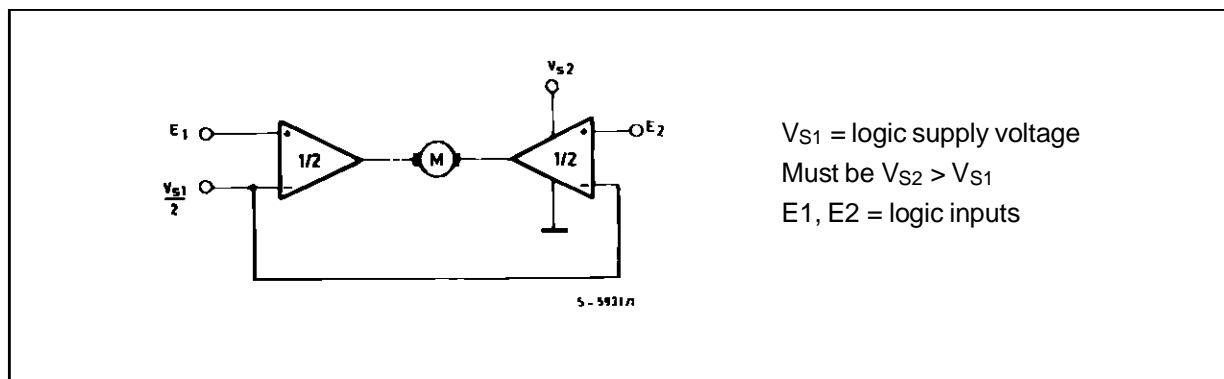
**APPLICATION SUGGESTION**

In order to avoid possible instability occurring into final stage the usual suggestions for the linear power stages are useful, as for instance :

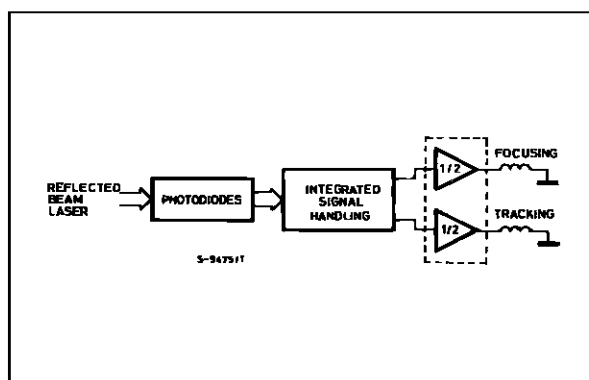
- layout accuracy ;
- A 100nF capacitor connected between supply pins and ground ;

- boucherot cell (0.1 to 0.2  $\mu$ F + 1 $\Omega$  series) between outputs and ground or across the load. With single supply operation, a resistor (1k $\Omega$ ) between the output and supply pin can be necessary for stability.

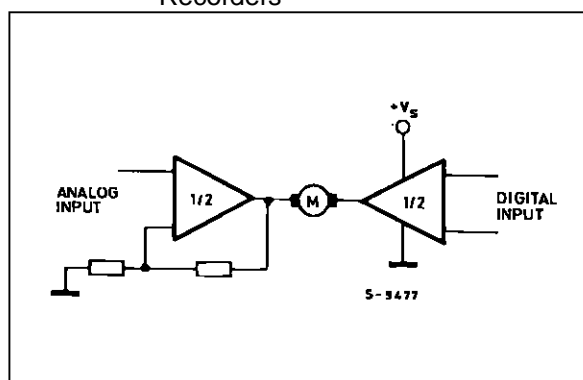
**Figure 8 :** Bidirectional DC Motor Control with  $\mu$ P Compatible Inputs



**Figure 9 :** Servocontrol for Compact-disc



**Figure 10 :** Capstan Motor Control in Video Recorders



**Figure 11 :** Motor Current Control Circuit

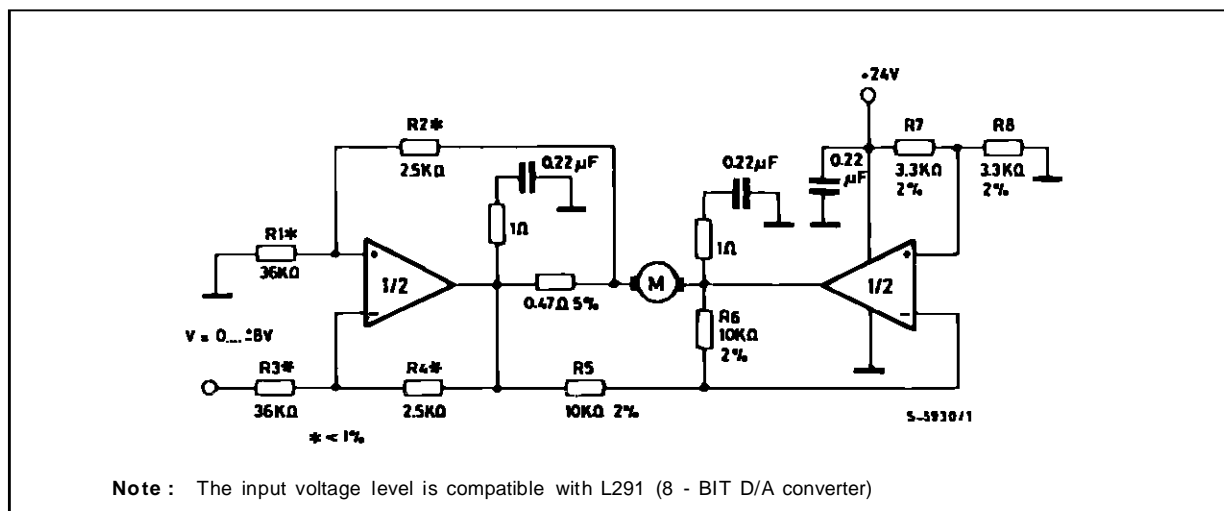


Figure 12 : Bidirectional Speed Control of DC Motors

For circuit stability ensure that  $R_x > \frac{2R_3 \cdot R_1}{R_M}$  where  $R_M$  = internal resistance of motor.

The voltage available at the terminals of the motor is  $V_M = 2 \left( V_i - \frac{V_s}{2} \right) + |R_o| \cdot I_M$  where  $|R_o| = \frac{2R_3 \cdot R_1}{R_x}$  and  $I_M$  is the motor current.

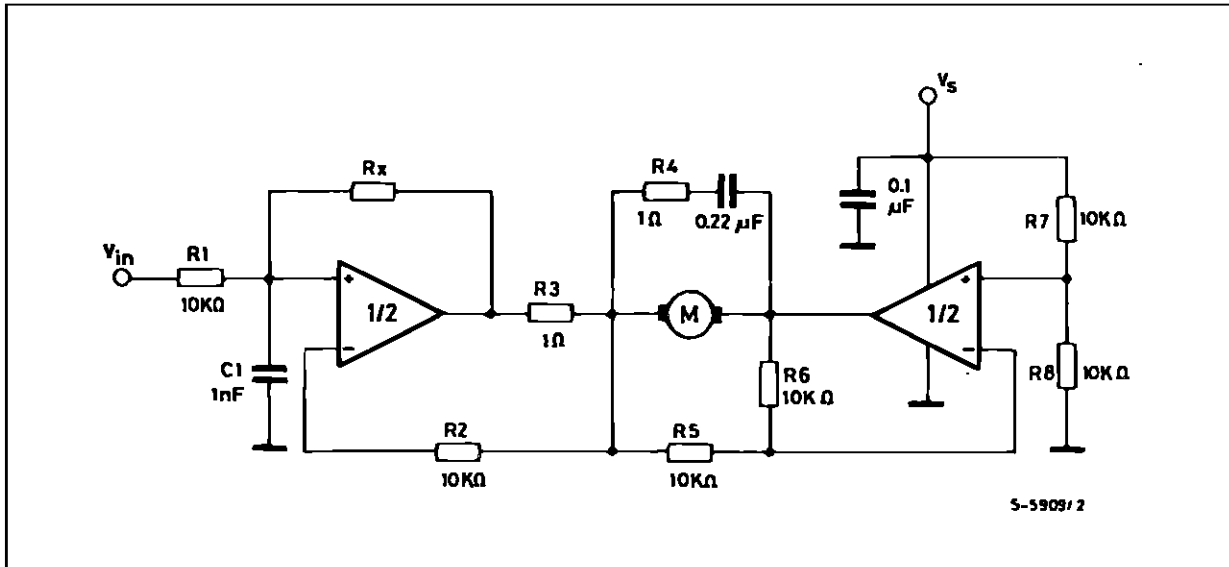
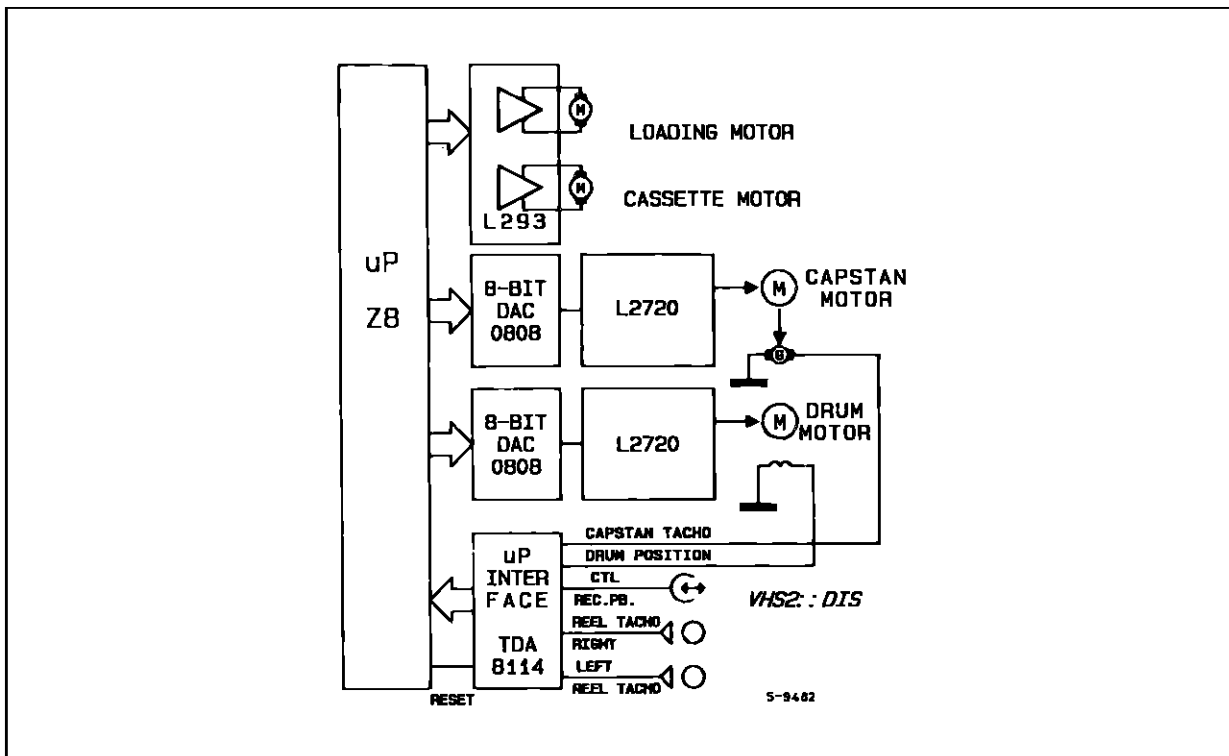
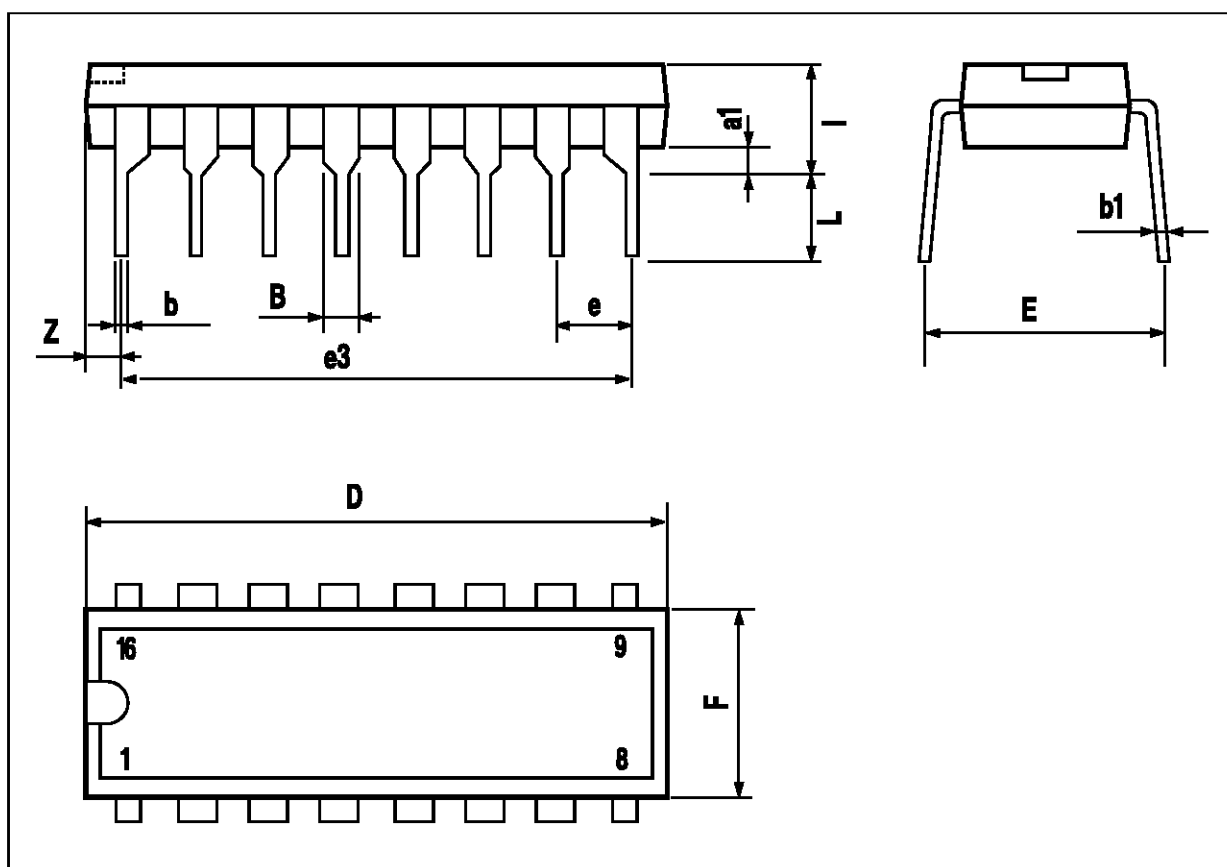


Figure 13 : VHS-VCR Motor Control Circuit



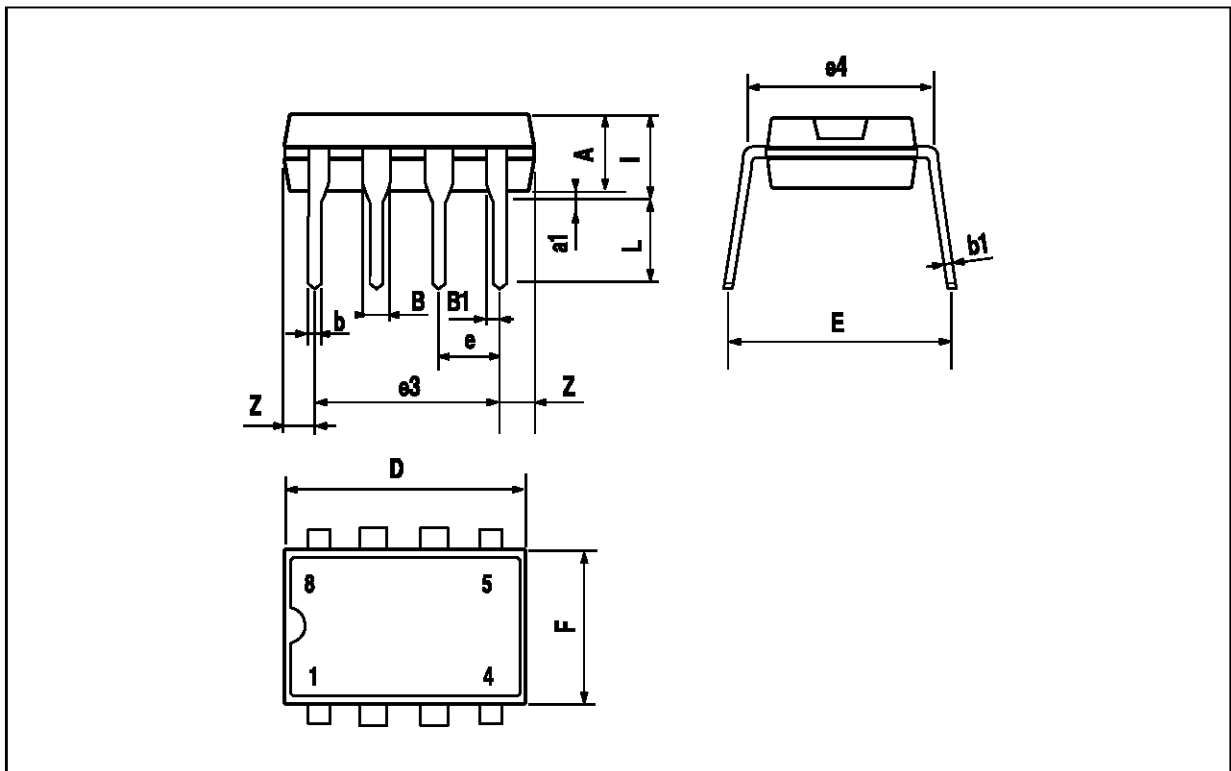
## POWERDIP 16 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
a1	0.51			0.020		
B	0.85		1.40	0.033		0.055
b		0.50			0.020	
b1	0.38		0.50	0.015		0.020
D			20.0			0.787
E		8.80			0.346	
e		2.54			0.100	
e3		17.78			0.700	
F			7.10			0.280
l			5.10			0.201
L		3.30			0.130	
Z			1.27			0.050



**MINIDIP PACKAGE MECHANICAL DATA**

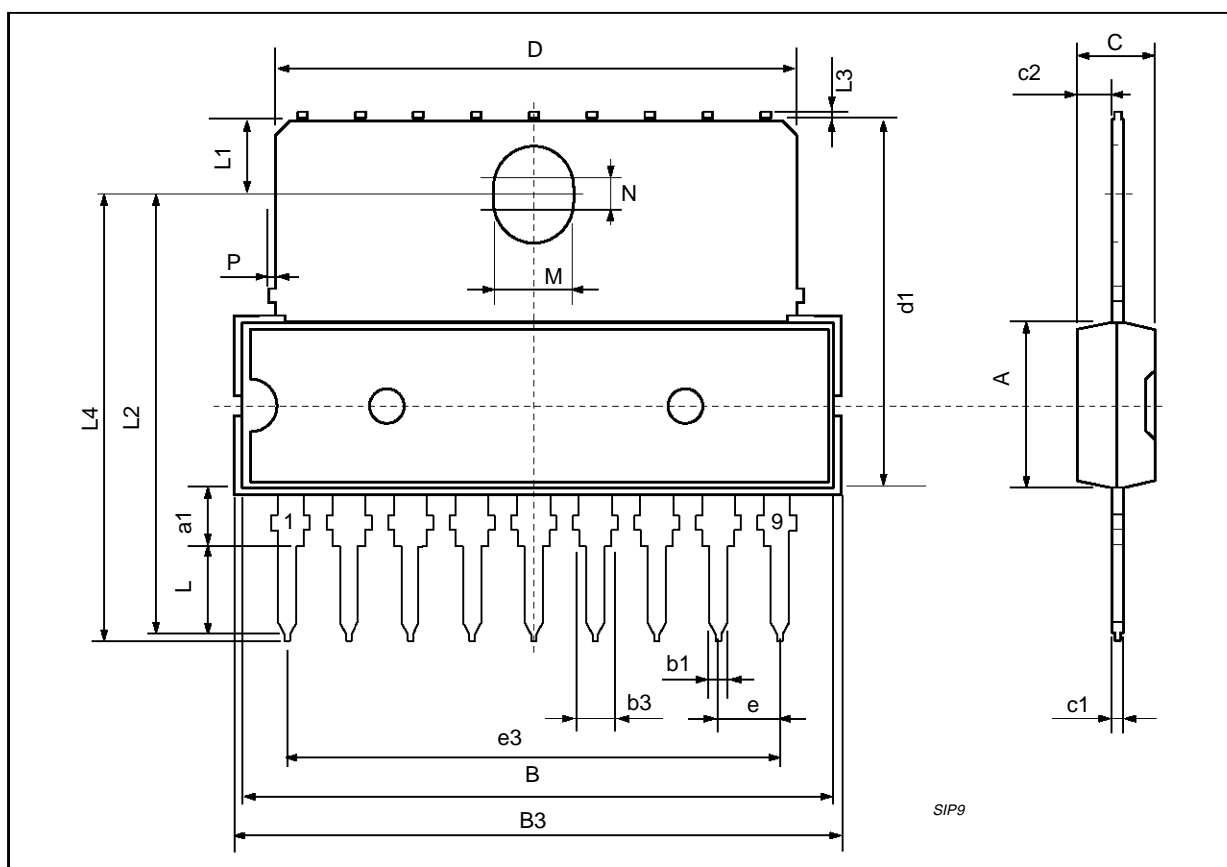
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3			0.130	
Z	0.44		1.6	0.017		0.063





## SIP9 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			7.1			0.280
a1	2.7		3	0.106		0.118
B			23			0.90
B3			24.8			0.976
b1		0.5			0.020	
b3	0.85		1.6	0.033		0.063
C		3.3			0.130	
c1		0.43			0.017	
c2		1.32			0.052	
D			21.2			0.835
d1		14.5			0.571	
e		2.54			0.100	
e3		20.32			0.800	
L	3.1			0.122		
L1		3			0.118	
L2		17.6			0.693	
L3			0.25			0.010
L4	17.4		17.85	0.685		0.702
M		3.2			0.126	
N		1			0.039	
P			0.15			0.006



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