

## LOW DROP DUAL POWER OPERATIONAL AMPLIFIERS

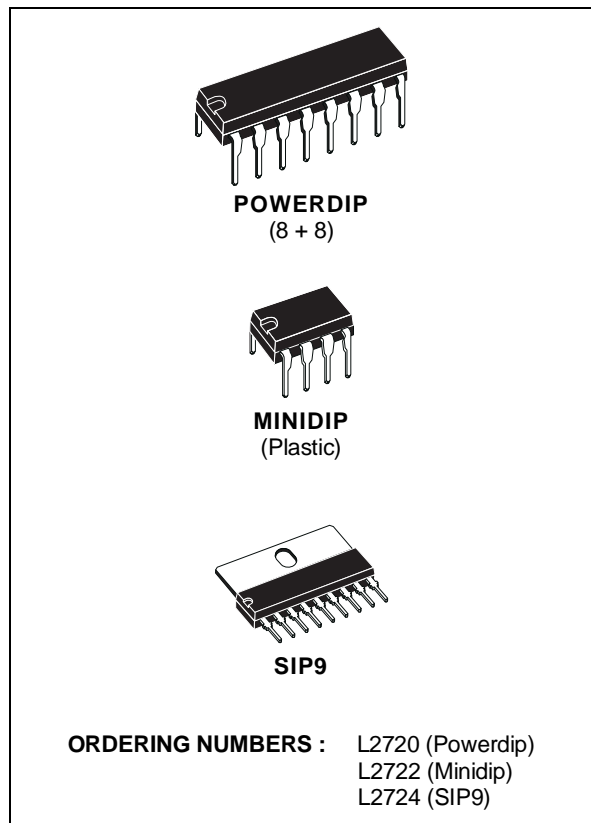
- OUTPUT CURRENT TO 1 A
- OPERATES AT LOW VOLTAGES
- SINGLE OR SPLIT SUPPLY
- LARGE COMMON-MODE AND DIFFERENTIAL MODE RANGE
- LOW INPUT OFFSET VOLTAGE
- GROUND COMPATIBLE INPUTS
- LOW SATURATION VOLTAGE
- THERMAL SHUTDOWN
- CLAMP DIODE

### DESCRIPTION

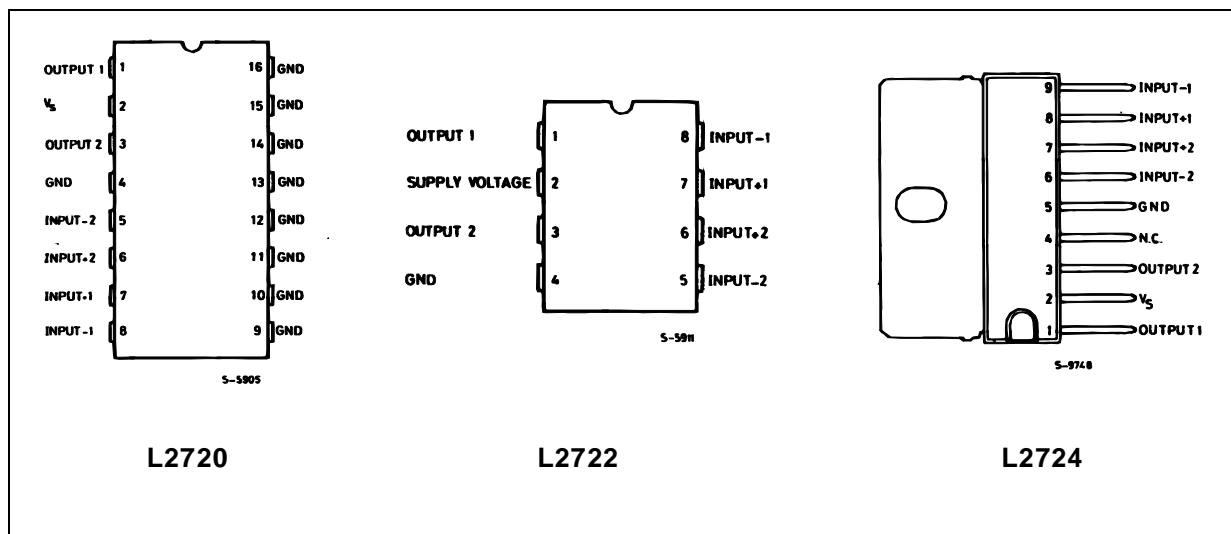
The L2720, L2722 and L2724 are monolithic integrated circuits in powerdip, minidip and SIP-9 packages, intended for use as power operational amplifiers in a wide range of applications including servo amplifiers and power supplies.

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

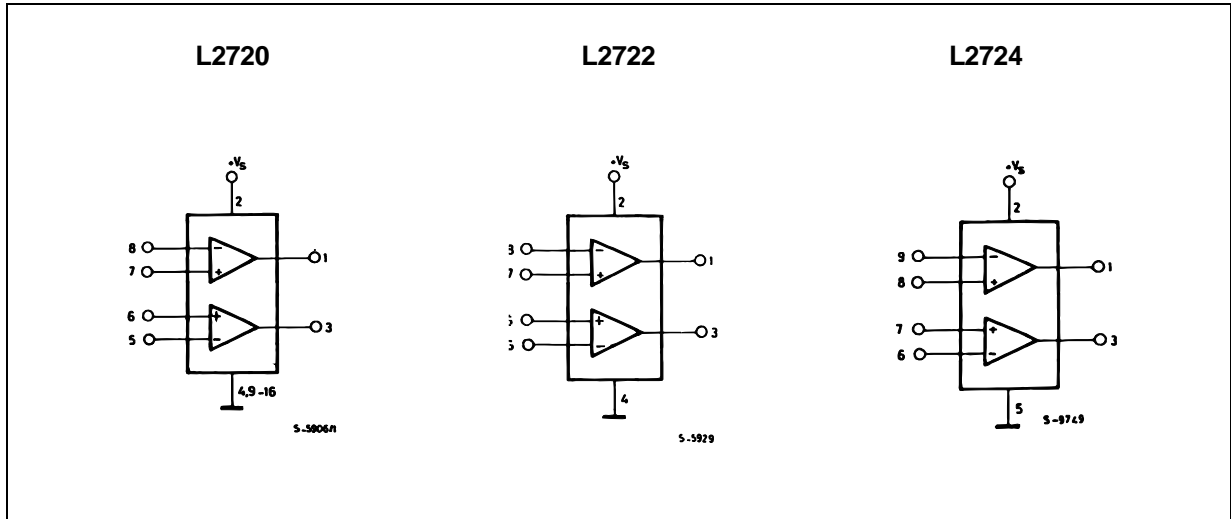
The high gain and high output power capability provide superior performance whatever an operational amplifier/power booster combination is required.



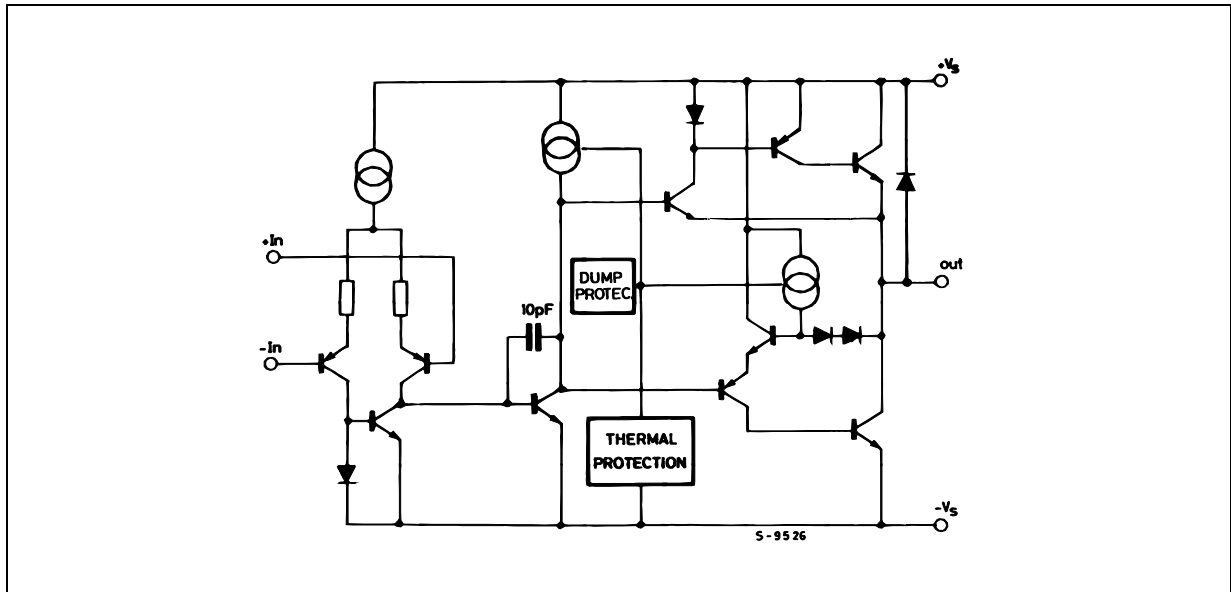
### PIN CONNECTIONS (top views)



**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
$R_{th\ j-case}$	Thermal Resistance Junction-case	Max.	10°C/W	15°C/W	70°C/W
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	Max.	70°C/W	70°C/W	100°C/W

## ELECTRICAL CHARACTERISTICS

$V_s = 24V$ ,  $T_{amb} = 25^\circ C$  unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_s$	Single Supply Voltage		4		28	V
$V_s$	Split Supply Voltage		$\pm 2$		$\pm 14$	V
$I_s$	Quiescent Drain Current	$V_o = \frac{V_s}{2}$ $V_s = 24V$ $V_s = 8V$		10 9	15 15	mA
$I_b$	Input Bias Current			0.2	1	$\mu A$
$V_{os}$	Input Offset Voltage				10	mV
$I_{os}$	Input Offset Current				100	nA
SR	Slew Rate			2		V/ $\mu s$
B	Gain-bandwidth Product			1.2		MHz
$R_i$	Input Resistance		500			k $\Omega$
$G_v$	O.L. Voltage Gain	$f = 100Hz$ $f = 1kHz$	70	80 60		dB
$e_N$	Input Noise Voltage	B = 22Hz to 22kHz		10		$\mu V$
$I_N$	Input Noise Current			200		pA
CMR	Common Mode Rejection	$f = 1kHz$	66	84		dB
SVR	Supply Voltage Rejection	$f = 100Hz$ $R_G = 10k\Omega$ $V_R = 0.5V$ $V_s = 24V$ $V_s = \pm 12V$ $V_s = \pm 6V$	60	70 75 80		dB
$V_{DROP(HIGH)}$		$V_s = \pm 2.5V$ to $\pm 12V$ $I_p = 100mA$ $I_p = 500mA$		0.7 1	1.5	V
$V_{DROP(LOW)}$		$V_s = \pm 2.5V$ to $\pm 12V$ $I_p = 100mA$ $I_p = 500mA$		0.3 0.5	1	V
$C_s$	Channel Separation	$f = 1KHz$ $R_L = 10\Omega$ $G_v = 30dB$ $V_s = 24V$ $V_s = 6V$		60 60		dB
$T_{sd}$	Thermal Shutdown Junction Temperature			145		$^\circ C$

Figure 1 : Quiescent Current vs. Supply Voltage

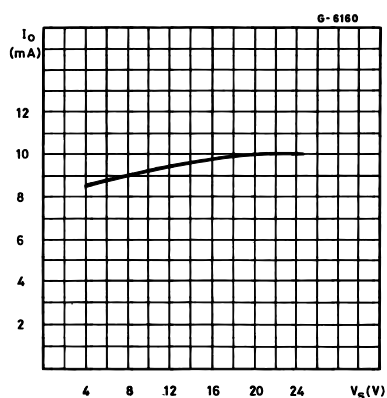
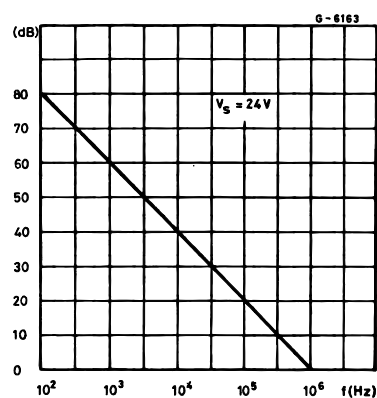
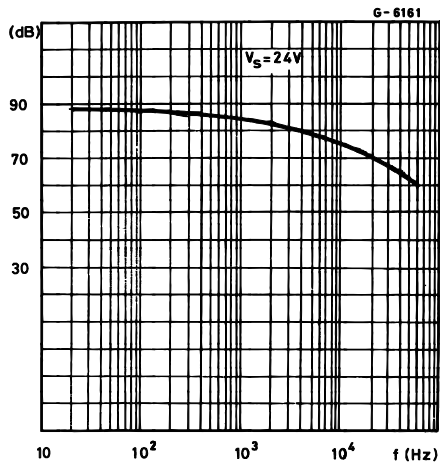


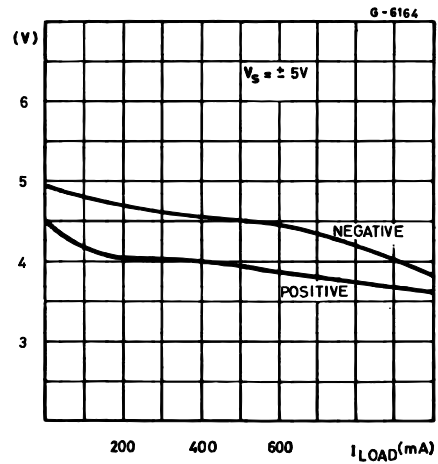
Figure 2 : Open Loop Gain vs. Frequency



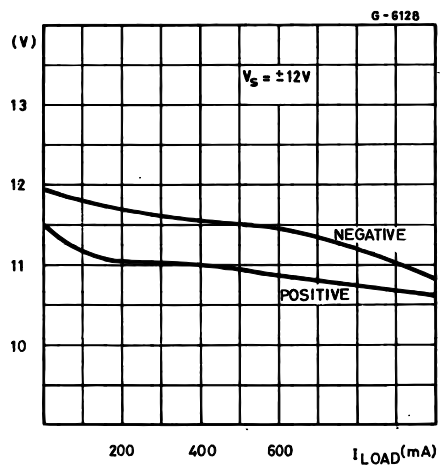
**Figure 3 :** Common Mode Rejection vs. Frequency



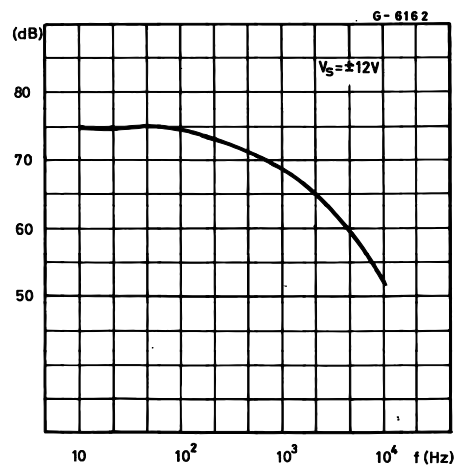
**Figure 4 :** Output Swing vs. Load Current ( $V_S = \pm 5V$ ).



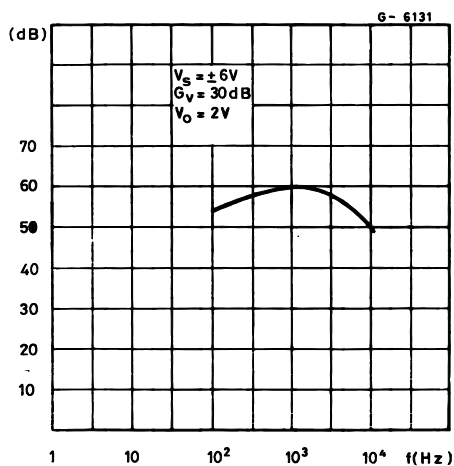
**Figure 5 :** Output Swing vs. Load Current ( $V_S = \pm 12V$ ).



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



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



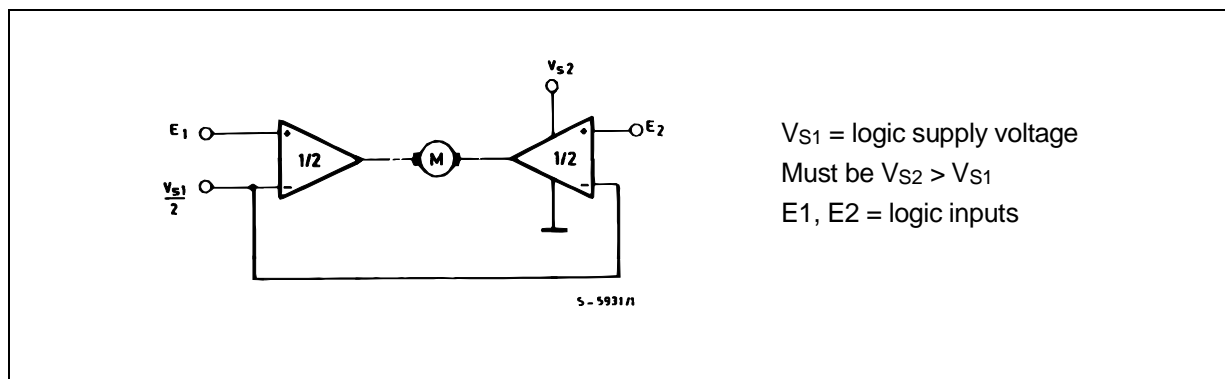
**APPLICATION SUGGESTION**

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

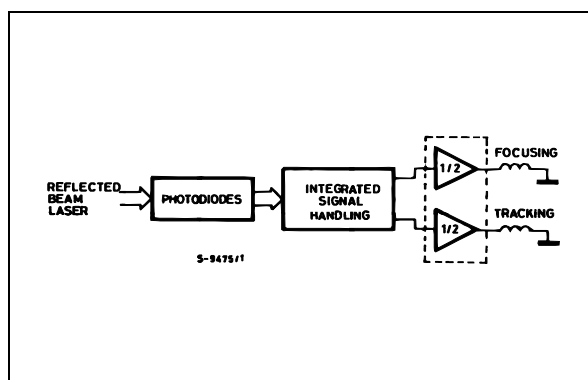
- layout accuracy ;
- A 100nF capacitor connected between supply pins and ground ;

- 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.

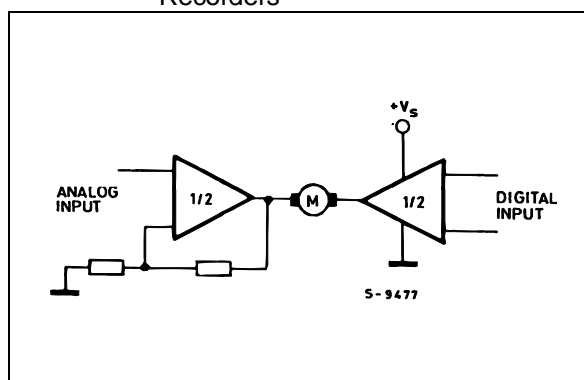
**Figure 8 :** Bidirectional DC Motor Control with  $\mu$ P Compatible Inputs



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



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



**Figure 11 :** Motor Current Control Circuit

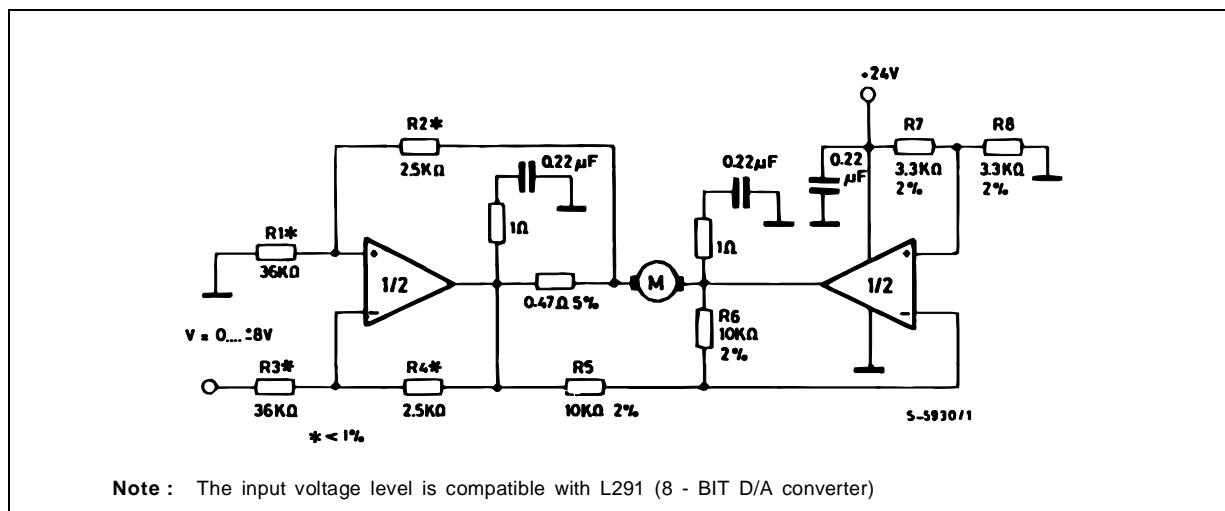


Figure 12 : Bidirectional Speed Control of DC Motors

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  $V_M = 2 \left( V_1 - \frac{V_S}{2} \right) + |R_O| \cdot I_M$  where  $|R_O| = \frac{2R_3 \cdot R_1}{R_x}$  and  $I_M$  is the motor current.

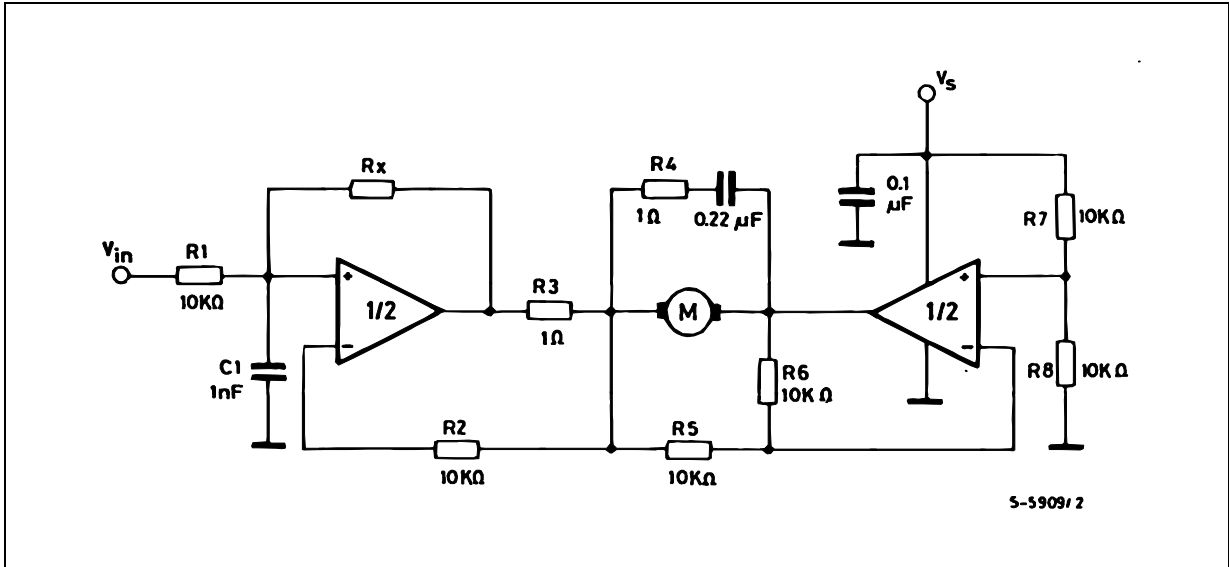
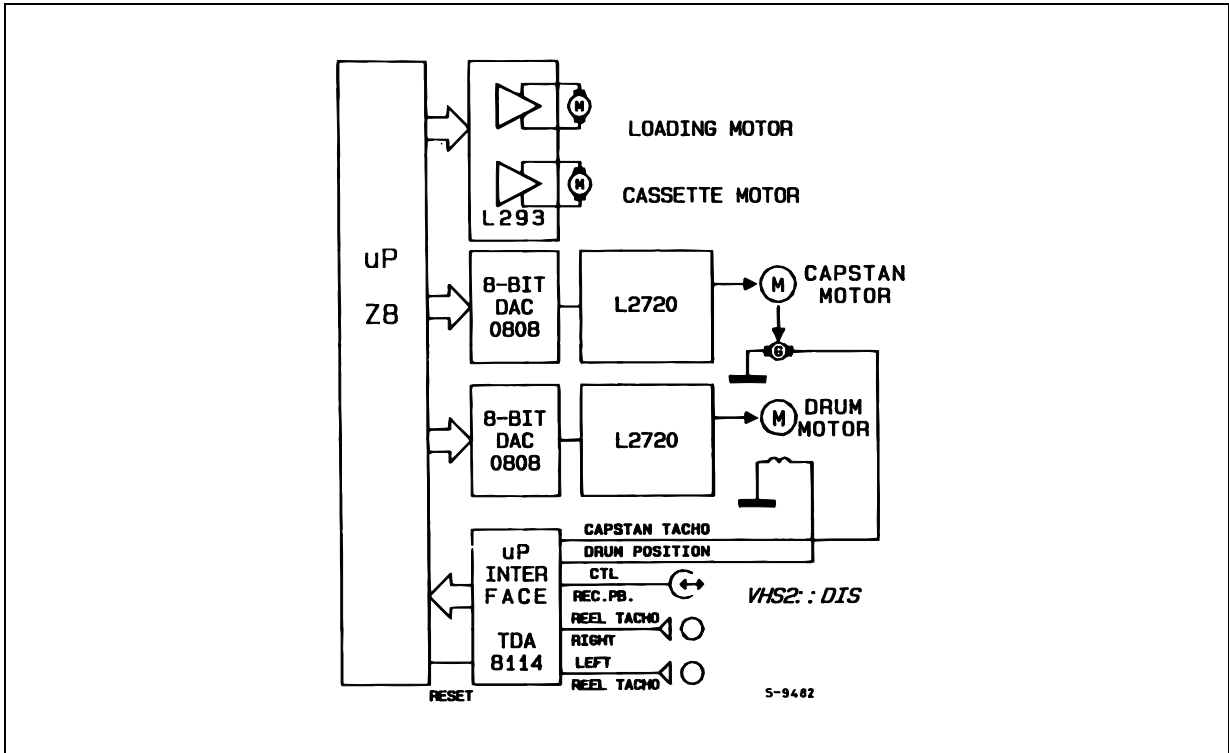
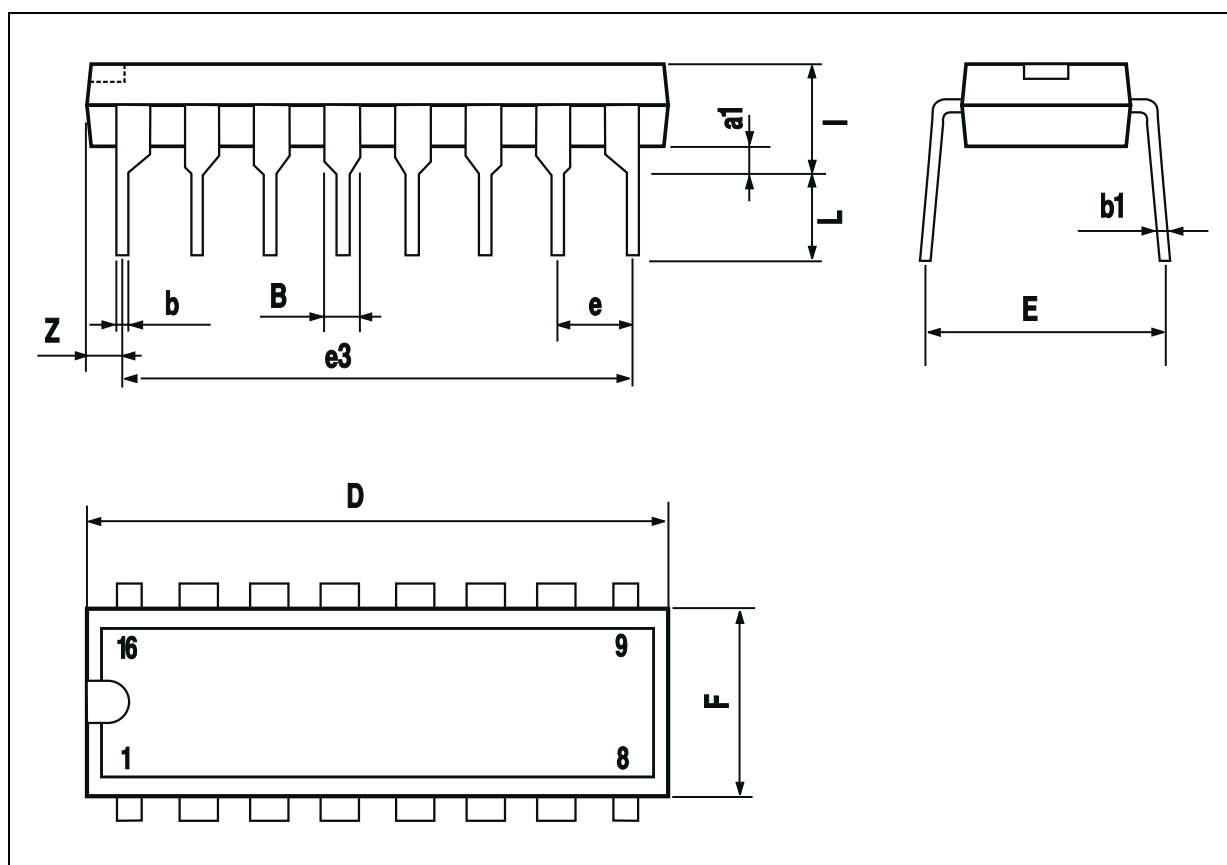


Figure 13 : VHS-VCR Motor Control Circuit



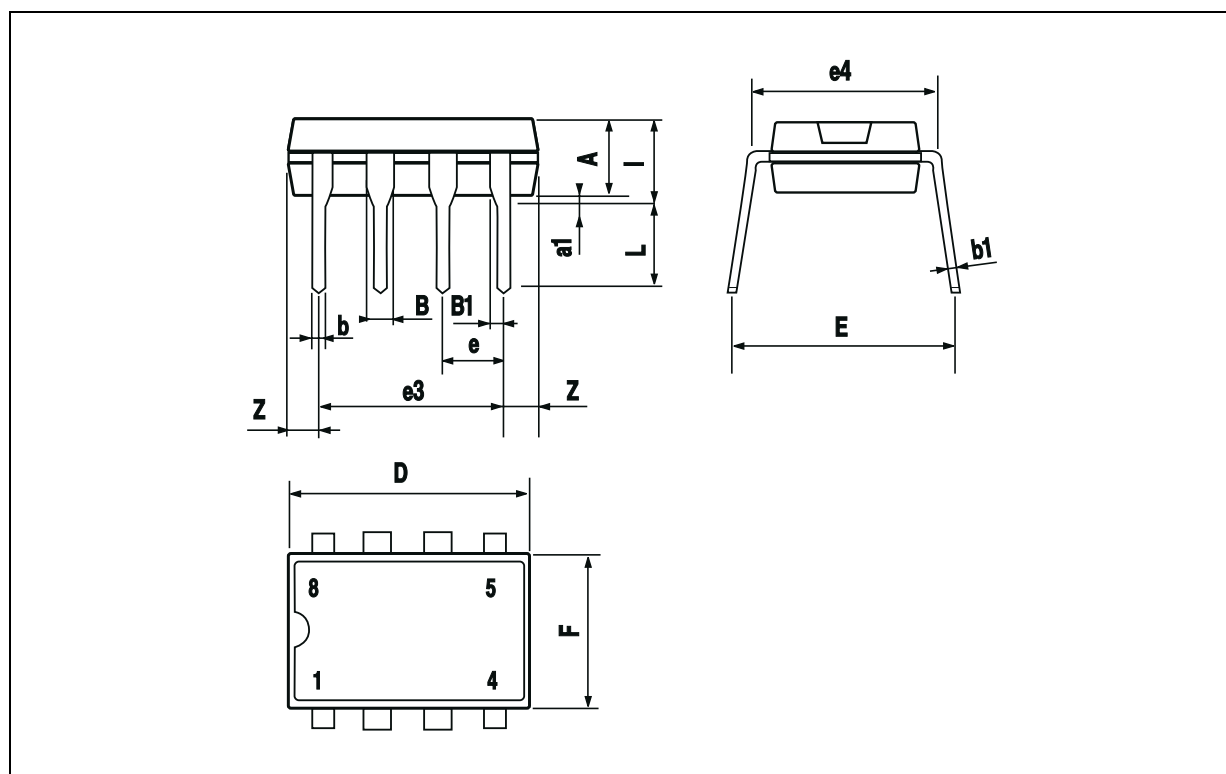
## POWERDIP 16 PACKAGE MECHANICAL DATA

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

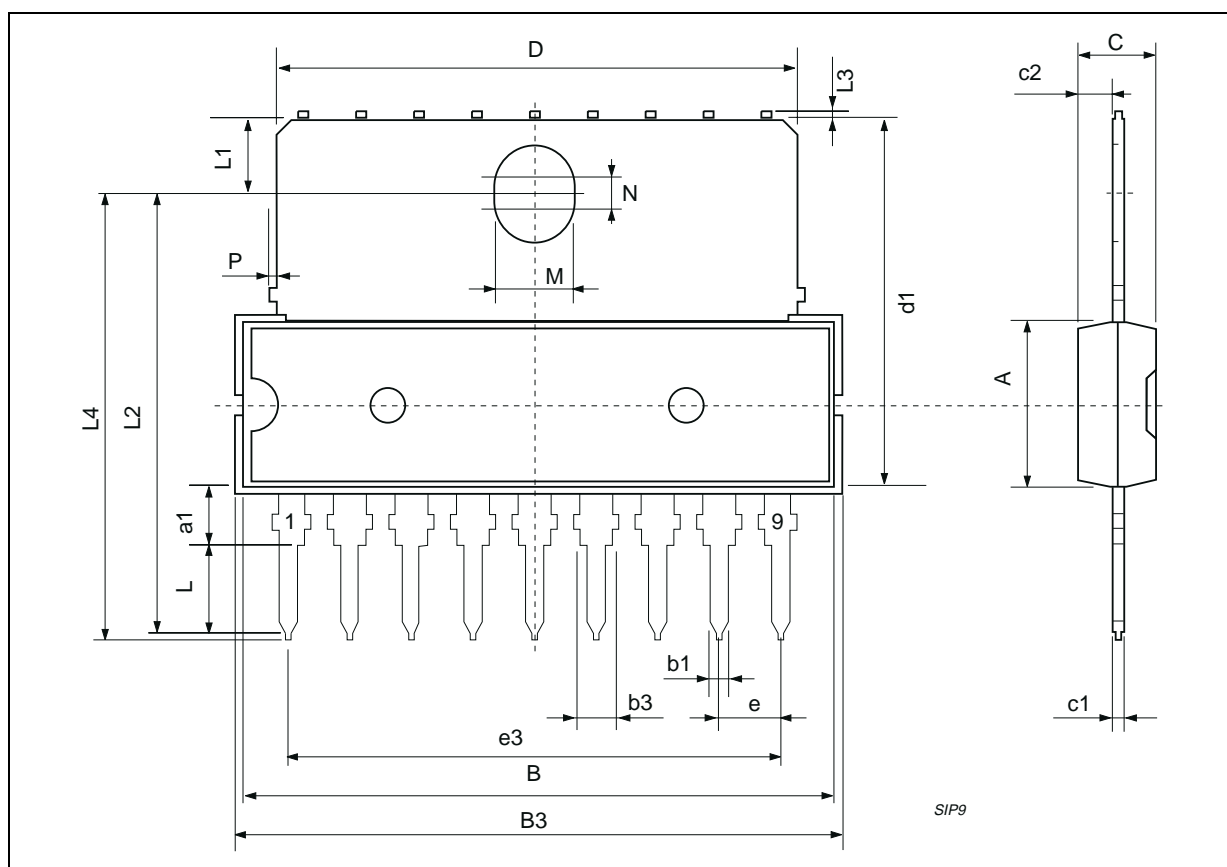
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.3			0.130	
a1	0.7			0.028		
B	1.39		1.65	0.055		0.065
B1	0.91		1.04	0.036		0.041
b		0.5			0.020	
b1	0.38		0.5	0.015		0.020
D			9.8			0.386
E		8.8			0.346	
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			7.1			0.280
I			4.8			0.189
L		3.3	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