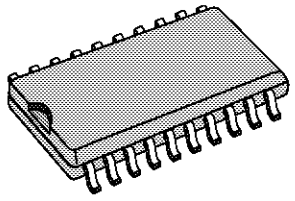
SGS-THOMSON MICROELECTRONICS

# L6242

## VOICE COIL MOTOR DRIVER

**ADVANCE DATA**

- OUTPUT CURRENT UP TO 1A
- OPERATES AT LOW VOLTAGES WITH LOW COIL RESISTANCE OF THE MOTOR
- LARGE COMMON MODE AND DIFFERENTIAL MODE RANGE
- LOW INPUT OFFSET VOLTAGE
- THERMAL SHUT-DOWN
- ENABLE FUNCTION
- INTERNAL CLAMP DIODES



**SO20**

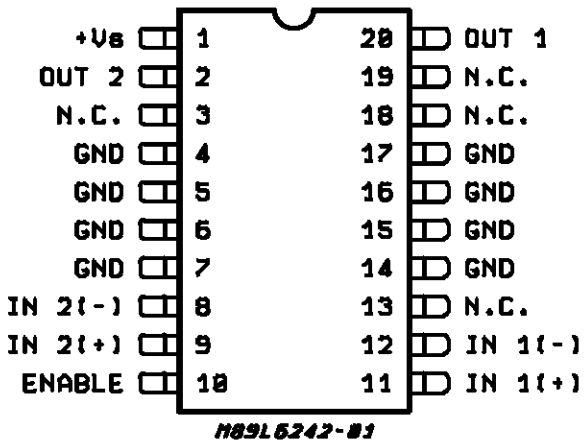
**ORDERING NUMBER:** L6242

### DESCRIPTION

The L6242 is a monolithic integrated circuit in SO-20 package intended for use as a dual power operational amplifier. It is particularly indicated for driving inductive loads as linear motor, and finds application in Hard Disc, Compact-Disc, etc.
The two power operational amplifiers are controlled by a common enable input.

The high gain and output power capability provide superior performance whatever a power booster is required.

### PIN CONNECTION AND BLOCK DIAGRAM

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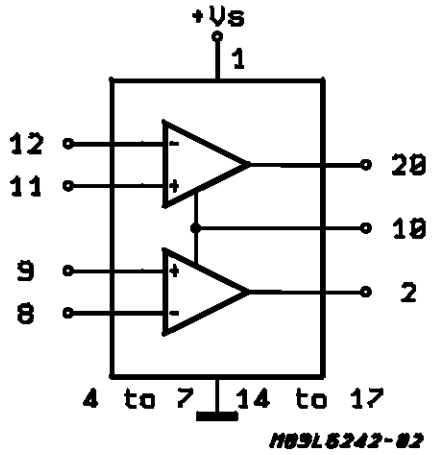


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## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_S$ | Supply Voltage | 28 | V |
| $V_i$ | Input Voltage | VS | V |
| $V_i$ | Differential Input Voltage | $\pm V_S$ | V |
| $I_O$ | DC Output Current | 1 | A |
| $I_P$ | Peak Output Current (non repetitive) | 1.5 | A |
| $P_{tot}$ | Maximum Power Dissipation at $T_{amb}$ = 85°C<br>$T_{CASE}$ = 75°C | 1<br>5 | W<br>W |
| $T_{stg}$, $T_J$ | Storage and Junction Temperature Range | -40 to 150 | °C |

## ELECTRICAL CHARACTERISTICS ($V_S$ = 12V, $T_J$ = 25°C unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_S$ | Supply Voltage | | 4 | | 28 | V |
| $I_S$ | Quiescent Drain Current | $V_O = V_S/2$ | | 10 | 15 | mA |
| $I_b$ | Input Bias Current | | | 0.2 | 1 | µA |
| $V_{OS}$ | Input Offset Voltage | | | | 15 | mV |
| $I_{OS}$ | Input Offset Current | | | 10 | 50 | nA |
| $S_r$ | Slew Rate | | | 1.5 | | V/µs |
| $R_i$ | Input Resistance | | 500 | | | KΩ |
| $G_V$ | Open Loop Voltage Gain | f = 100Hz | 70 | 80 | | dB |
| CMR | Common Mode Rejection | f = 100Hz | 66 | 84 | | dB |
| SVR | Supply Voltage Rejection | f = 100Hz $R_g$ = 10KΩ<br>$V_r$ = 0.5V | | 54 | | dB |
| $V_{drop}$ | High Drop Voltage | I = 100mA<br>I = 500mA | | 0.7<br>1 | <br>1.5 | V<br>V |
| $V_{drop}$ | Low Drop Voltage | I = 100mA<br>I = 500mA | | 0.3<br>0.6 | <br>1 | V<br>V |
| $T_{sd}$ | Thermal Shutdown Junction Temperature | | | 145 | | °C |
| $R_p$ | Internal Pull-up Resistor of the Enable Input | | | | 50 | KΩ |
| $V_e$ | Enable Low Voltage | $T_J$ = 130°C | -0.3 | | 1.2 | V |
| $I_{eq}$ | Quiescent Drain Current | En = L | | 2 | 5 | mA |
| $T_d$ | Enable Delay | | | | 50 | µs |
| $I_{ol}$ | Output Leakage Current | | | 10 | | µA |

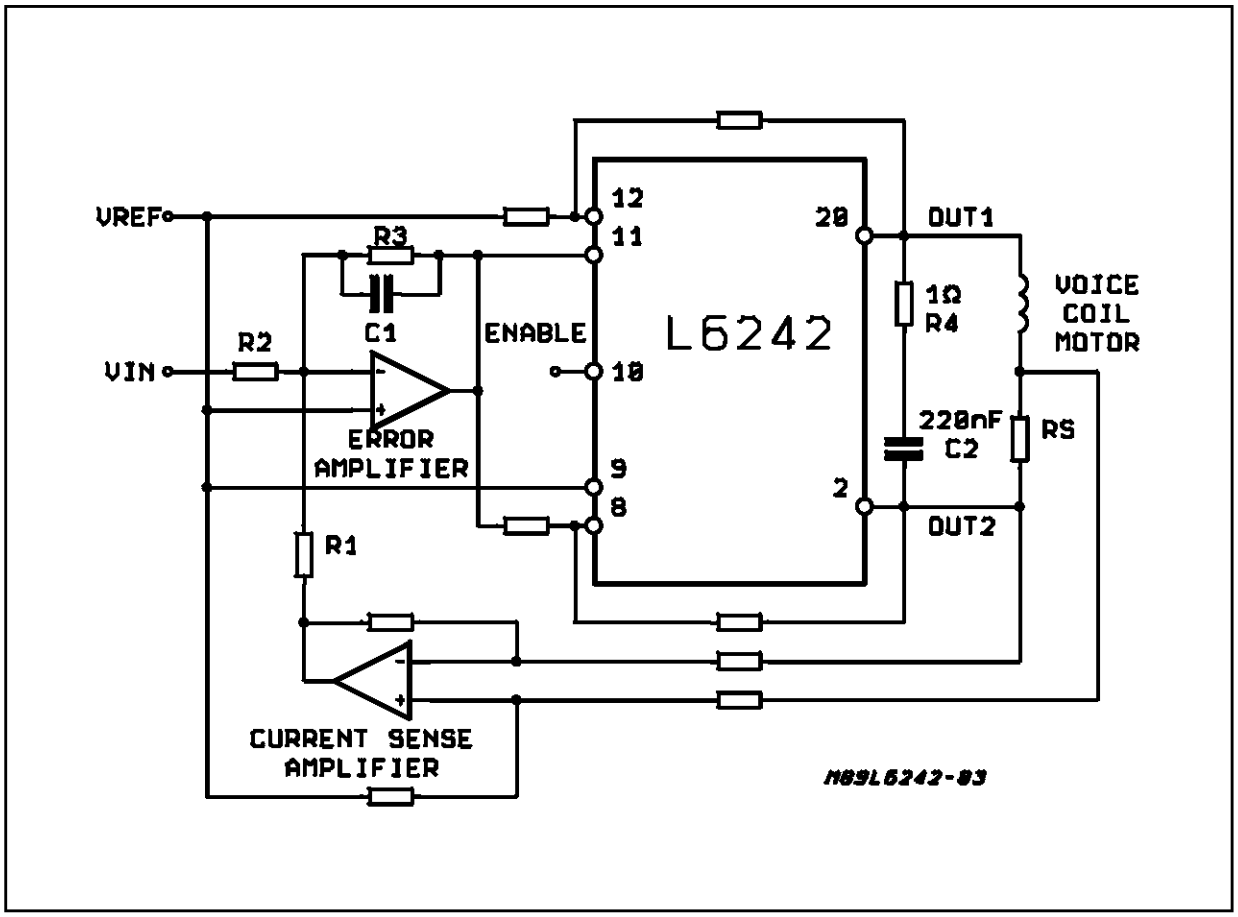
## APPLICATION INFORMATIONS

Figure 1 shows the L6242 configurated as a transconductance amplifier, in order to drive linear motors as Voice Coil (VCM). The L6242 provides the power section of the Transconductance Amplifier. The two OP AMP are configurated one as inverting and the other as noninverting amplifier, with the same gain. Working in push-pull, they can be configurated as a bridge. The motor current can be controlled by means of the sense resistor (typical 1Ω) in series with the motor. The current sense amplifier provides the feedback signal, which is summed to the driving signal at the node which is the inverting input of the Error Amplifier. R1 closes the control loop. R2 converts the input voltage signal, into a current signal.

The snubber network provides the system stability, always required by the application. The network is directly connected to the output pins of the IC, OUT1 and OUT2, and in parallel with the load. R4 and C2 could be of different values, depending on the p.c.b. configuration and on the motor characteristics.

The DC transfer function may be expressed as:
gm = Iout/Vin = k • (R1/R2)
where k = 1/(Rsense • Ad)
and Ad = gain of the current sense amplifier.

**Figure 1:** Voice Coil Motor Control Circuit




## OPTIMIZING LAYOUT

Optimizing a PC board layout involves to observe the following rules which in general can avoid application problems associated with ground loops and anomalous recirculation currents. The electrolytic capacitor for the power supply must be kept as close to the IC as possible. It is important that power grounds are close to each other on a wide enough. Copper side also, it is important to separate on the board the logic ground and the power ground in such a way that the ground traces for the logic signals and references do not cross the ground traces for the power signals. Logic ground and power ground must meet at one point on the board (startpoint grounding) far enough away from where the power ground traces terminate to ground (sense resistors and recirculation diodes). This is to avoid anomalous interface with the logic signals. It is generally a good idea to connect a non inductive capacitor (typically 100nF) between the pins VS and GND. In other cases it may be necessary to also place a by-pass capacitor between the pins Vref and GND.

## SO20 PACKAGE MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 2.65 | | | 0.104 |
| a1 | 0.1 | | 0.3 | 0.004 | | 0.012 |
| a2 | | | 2.45 | | | 0.096 |
| b | 0.35 | | 0.49 | 0.014 | | 0.019 |
| b1 | 0.23 | | 0.32 | 0.009 | | 0.013 |
| C | | 0.5 | | | 0.020 | |
| c1 | 45 (typ.) | | | | | |
| D | 12.6 | | 13.0 | 0.496 | | 0.512 |
| E | 10 | | 10.65 | 0.394 | | 0.419 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 11.43 | | | 0.450 | |
| F | 7.4 | | 7.6 | 0.291 | | 0.299 |
| L | 0.5 | | 1.27 | 0.020 | | 0.050 |
| M | | | 0.75 | | | 0.030 |
| S | 8 (max.) | | | | | |