SGS-THOMSON MICROELECTRONICS

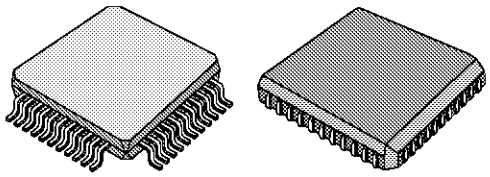
# L6450

## 28 CHANNEL INK JET DRIVER

**ADVANCE DATA**

- 40V DMOS OUTPUT BREAKDOWN
- TWO DECODER OPTIONS ARE INCLUDED
- PRECISE OUTPUT ENERGY
- ESD OUTPUT PROTECTION WITH CLAMPING DIODES
- VERY LOW QUIESCENT CURRENT
- PLCC44 OR PQFP44 (10 x 10mm)

**MULTIPOWER BCD TECHNOLOGY**



**PQFP44** **PLCC44**

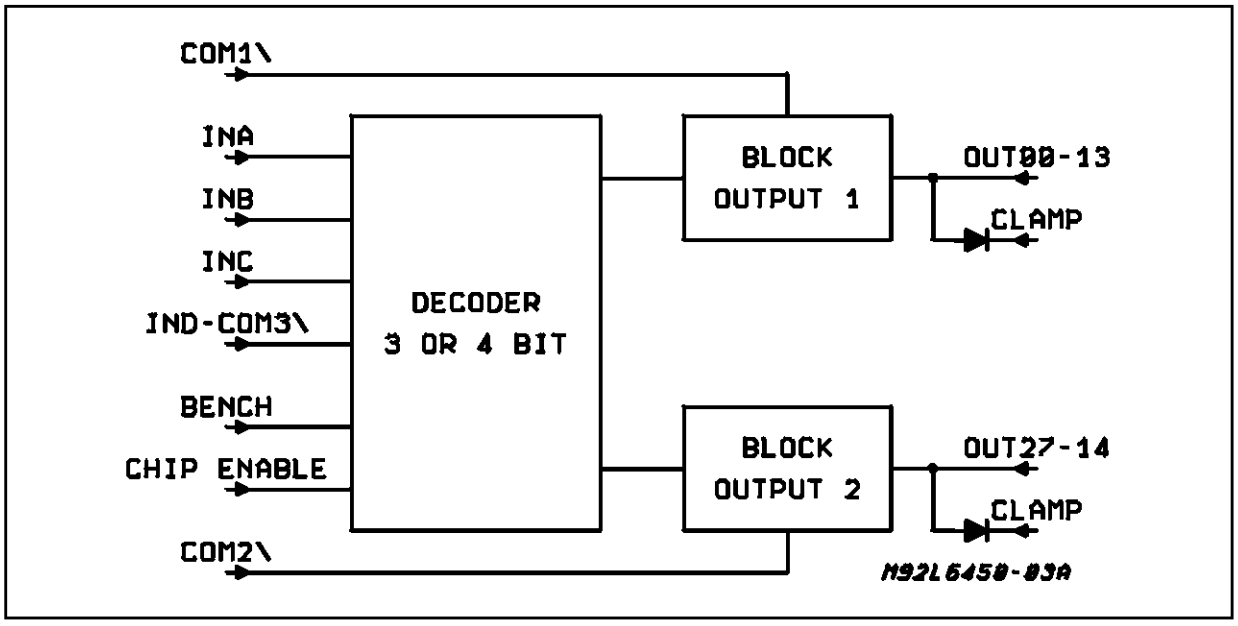
### DESCRIPTION

The L6450 is realized in Multipower BCD Technology which combines isolated DMOS power transistors with CMOS and Bipolar circuits on the same IC. By using mixed technology it has been possible to optimize the logic circuitry and the power stage to achieve the best possible performances.

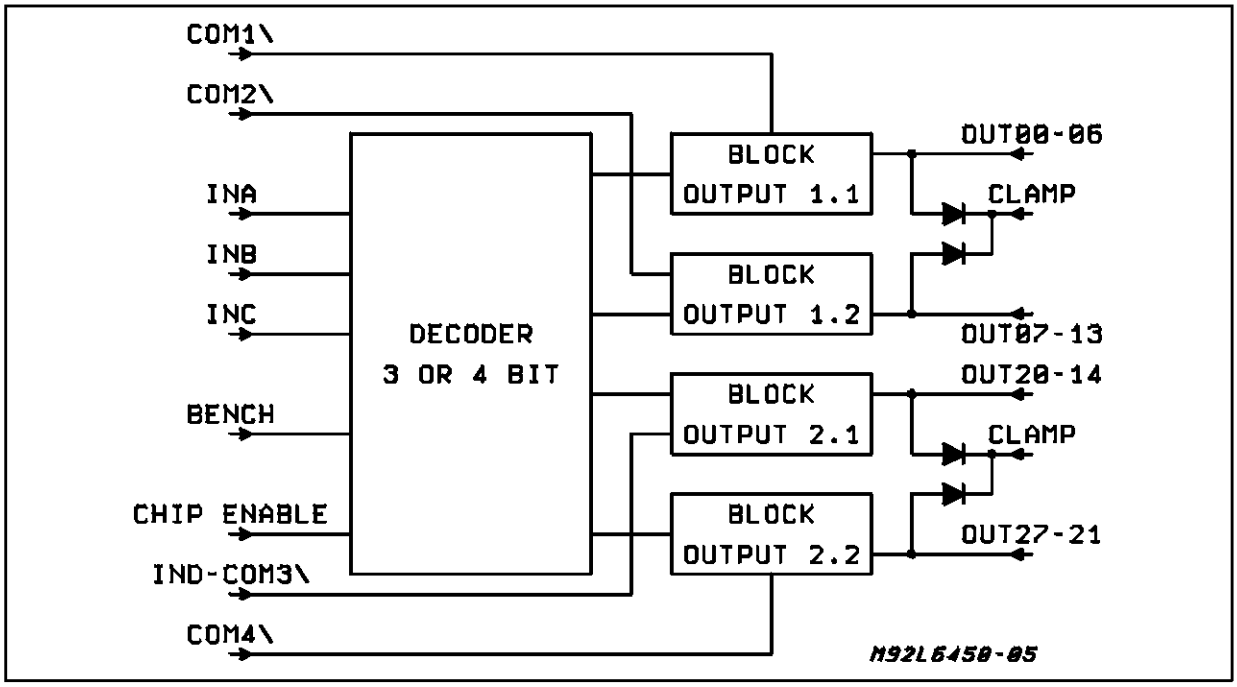
Intended to be used in ink jet Printer Applications as 4 to 28 (2 x 14) or 3 to 28 (4 x 7) lines selectable decoder/driver, the L6450 device driver has the advantages of low power CMOS inputs and logic, with 28 high current and high voltage DMOS outputs capable of sustaining a maximum of 40V.
On system power up the output drivers are locked out using the chip enable function; four enable inputs are available for the different driver banks.

An internal power-on system is implemented in order to avoid wrong output commutation during the supply voltage transients.
Using a mask option during manufacturing allows a different decoding.
Control of the energy delivered to the print head is made by means of a special circuitry.
All driver outputs are capable of withdstanding a contact discharge of ±8KV with the IC biased.

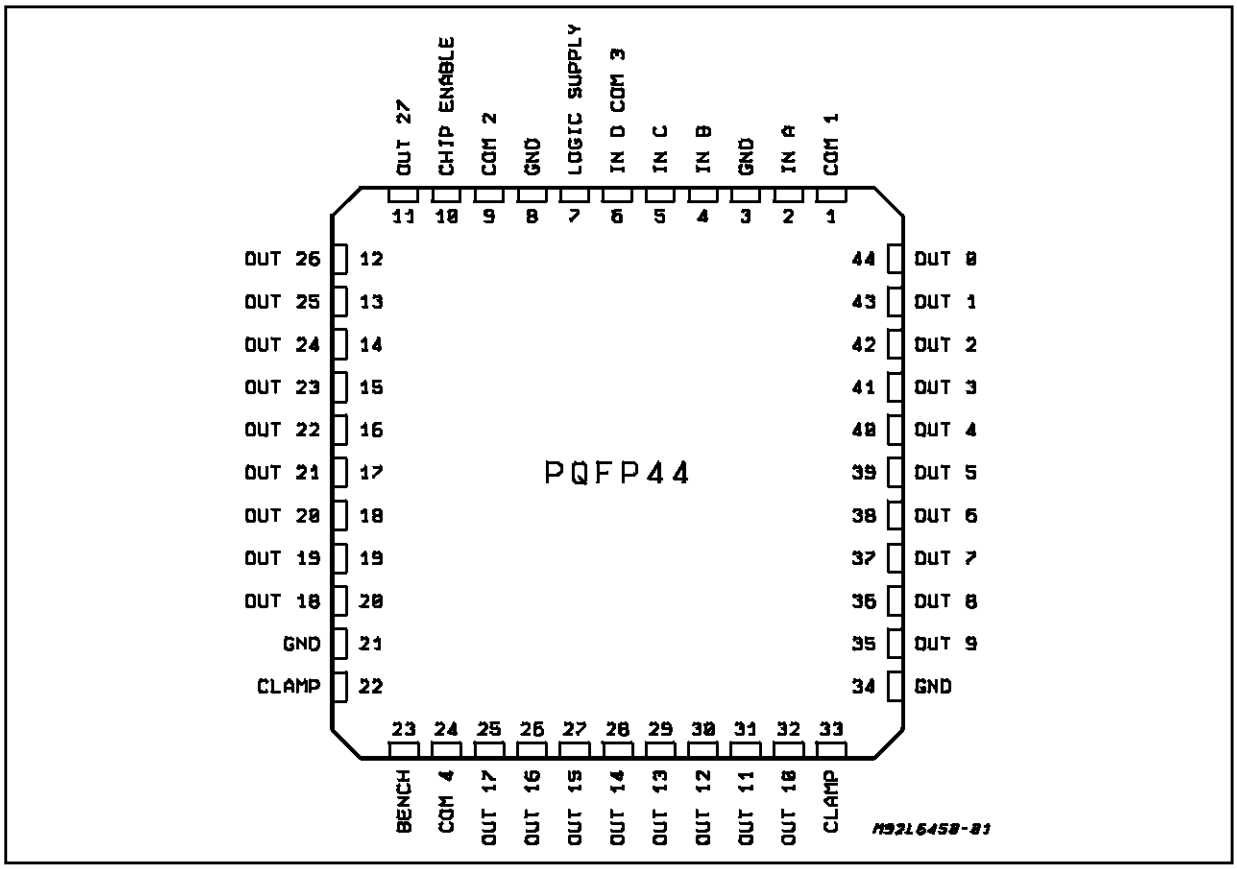
### BLOCK DIAGRAM (case of 4 bit)



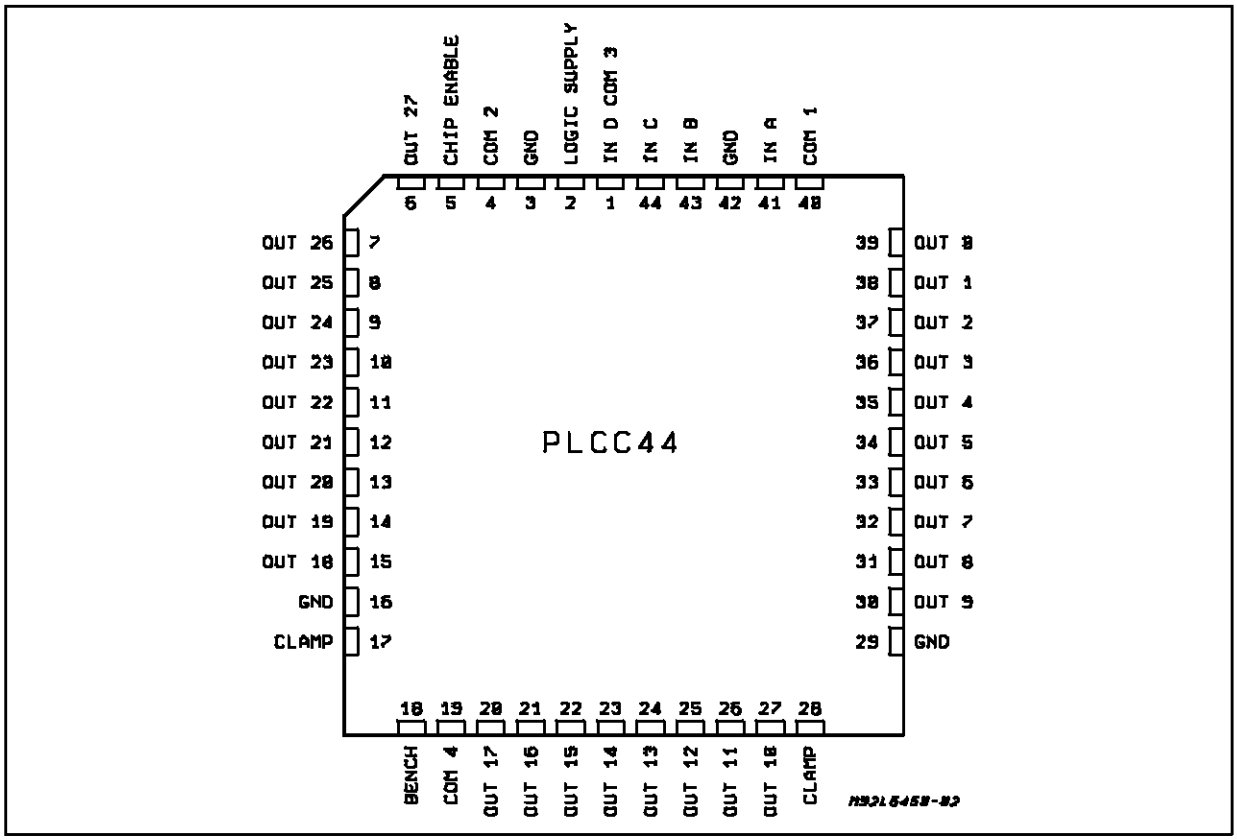
**BLOCK DIAGRAM (case of 3 bit)**




**PQFP44 PIN CONNECTION** (Top view)



**PLCC44 PIN CONNECTION** (Top view)




## PIN FUNCTIONS

| Name | Function |
|---|---|
| $V_{DD}$ | 5V Logic Supply. |
| GND | Logic and Power Ground. |
| OUT0 to OUT27 | DMOS Outputs. |
| CLAMP | This pins have to be connected to the power supply voltage of the head resistors, each of the output DMOS have their drain connected with the anode of a protection diode, all the catodes of the protection diodes are collected to the pins clamp. If the CLAMP pins are not connected to the power, the device is not supplied. |
| INA, INB, INC, IND | Decoder inputs.<br>The input IND shares the pin with the other input $\overline{COM3}$, the two different functions are selected by the pin Bench. |
| $\overline{COM1}$, $\overline{COM2}$, COM3, COM4 | A low logic input on this pins enable the outputs selected by the decoder inputs according to the logic level of the pin bench.<br>The input COM3 shares the pin with the other input IND, the two different functions are selected by the pin Bench. |
| CHIP ENABLE | A logic high enable the chip. |

## THERMAL DATA

| Symbol | Parameter | | PQFP44 | PLCC44 | Unit |
|---|---|---|---|---|---|
| $R_{th\ j\text{-}amb}$ | Thermal Resistance Junction-Ambient | Max. | 55 (*) | 65 (*) | °C/W |

(*) device mounted on PCB.

## ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{OUT}$ | Output Voltage | 40 | V |
| $V_{CLAMP}$ | Output Clamping Voltage | 40 | V |
| $I_{OUT}$ | Output Continuous Current | 0.8 | A |
| $I_{PEAK}$ | Output Peak Current (with duty cycle = 10% $T_{ON}$ = 4µs) | 2 | A |
| $T_J$ | Junction Temperature | 150 | °C |
| $V_{DD}$ | Logic Supply Voltage | 7 | V |
| $V_{IN}$ | Input Voltage Range | -0.3V to $V_S$ +0.3 | V |
| $T_{amb}$ | Operating Temperature Range | 0 to 70 | °C |
| $T_{stg}$ | Storage Temperature Range | -55 to 150 | °C |

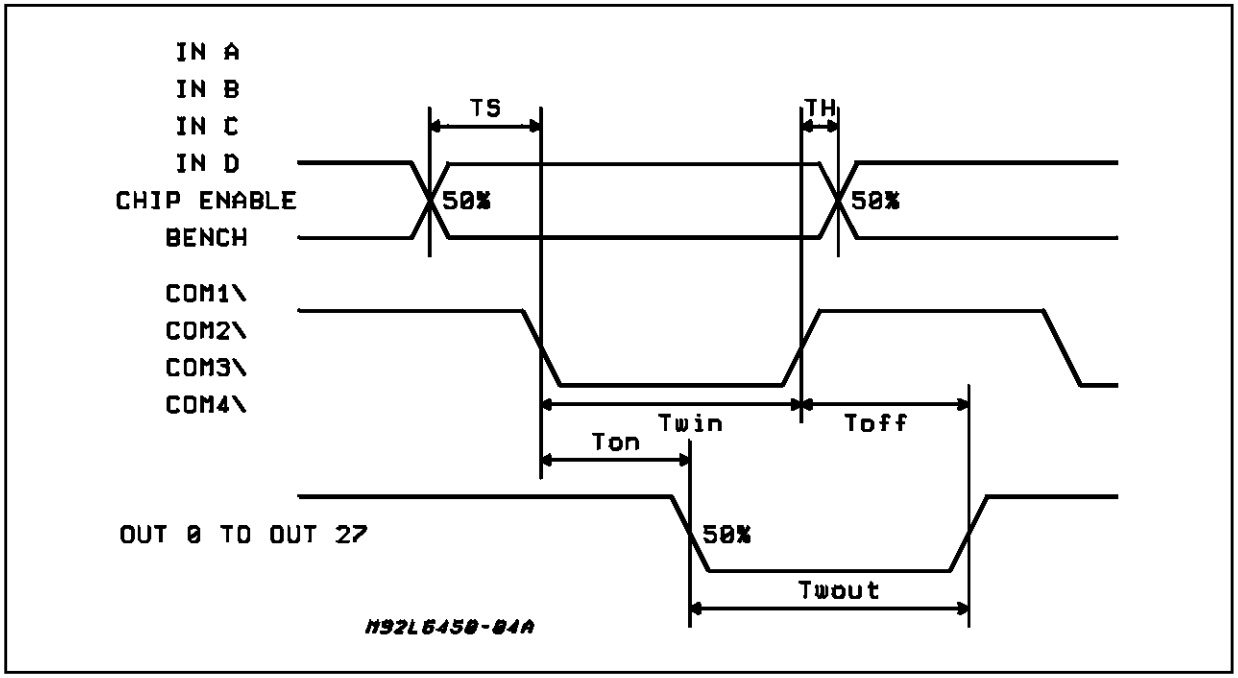
## D.C. ELECTRICAL CHARACTERISTICS at $T_{amb}$ = 25°C, $V_{DD}$ = 5V, $V_{clamp}$ = 18V (unless otherwise specified).

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| $V_{DD}$ | Logic Supply Voltage | | 4.75 | 5 | 5.25 | V |
| $V_{CLAMP}$ | Clamping Voltage | | 9 | | 38 | V |
| $V_{IL}$ | Low Level Input Voltage | | | | 1.2 | V |
| $V_{IH}$ | High Level Input Current | | $V_{DD}$ -1.2 | | | V |
| $I_{LL}$ | Low Level Input Current | $V_{IN} = V_{IL}$ | | | -200 | µA |
| $I_{LH}$ | High Level Input Current | $V_{IN} = V_{IH}$ | | | 10 | µA |
| $I_{DD}$ | Logic Supply Current | (Indipendent from the output conditions) | | | 5 | mA |
| $V_{OUT}$ | Output Saturation Voltage | Tj 25 °C D.C. 0.4A<br>Tj 25 °C D.C. 0.5A<br>Tj 90 °C D.C. 0.4A<br>Tj 90 °C D.C. 0.5A | | 0.9<br>1.1<br>1.4<br>1.7 | | V<br>V<br>V<br>V |
| $\Delta V_{CE}$ | Output saturation absolute voltage variation around the typ. values for extended temperature ranges | Tj = 25°C to 90°C D.C.: 0.4A<br>Tj = 25°C to 90°C D.C.: 0.5A | | | ±0.2<br>±0.25 | V<br>V |
| $R_{DS}$ ON | | | | 2.2 | | Ω |

## A.C. ELECTRICAL CHARACTERISTICS at $T_{amb}$ = 25°C, $V_{DD}$ = 5V.

| Symbol | Signal Name | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|---|
| $T_S$ | INA, INB, INC, IND Vs COMn | SET - UP Time | | 30 | | | ns |
| $T_H$ | INA, INB, INC, IND Vs COMn | HOLD Time | | 0 | | | ns |
| $T_{on}$ | COM1,2,3,4 $V_S$ OUT 0 to N | TURN - ON Time | $I_{OUT}$ = 0.5A, $R_L$ = 39Ω<br>$T_j$ = 25 to 90°C | | 150 | | ns |
| $T_{off}$ | COM1,2,3,4 $V_S$ OUT 0 to N | TURN - OFF Time | $I_{OUT}$ = 0.5A, $R_L$ = 39Ω<br>$T_j$ = 25 to 90°C | | 150 | | ns |
| $t_r$ | | Rise Time | | | 100 | | ns |
| $t_f$ | | Fall Time | | | 100 | | ns |
| $T_{wout}$ | | Output Pulse Width | $T_{win}$ = 3.5µs $R_L$ = 40Ω<br>$I_{OUT}$ = 0.5A | - 20 | $T_{win}$ | + 80 | ns |
| $\Delta P_D$ | | Maximum allowable variation of the output power transmitted by each driver to the resistive load | $R_L$ = 39Ω<br>$V_{CLAMP}$ = 18V | | | ±4 | % |

**Figure 1:** Timing Waveforms




**OUTPUT SELECTION**

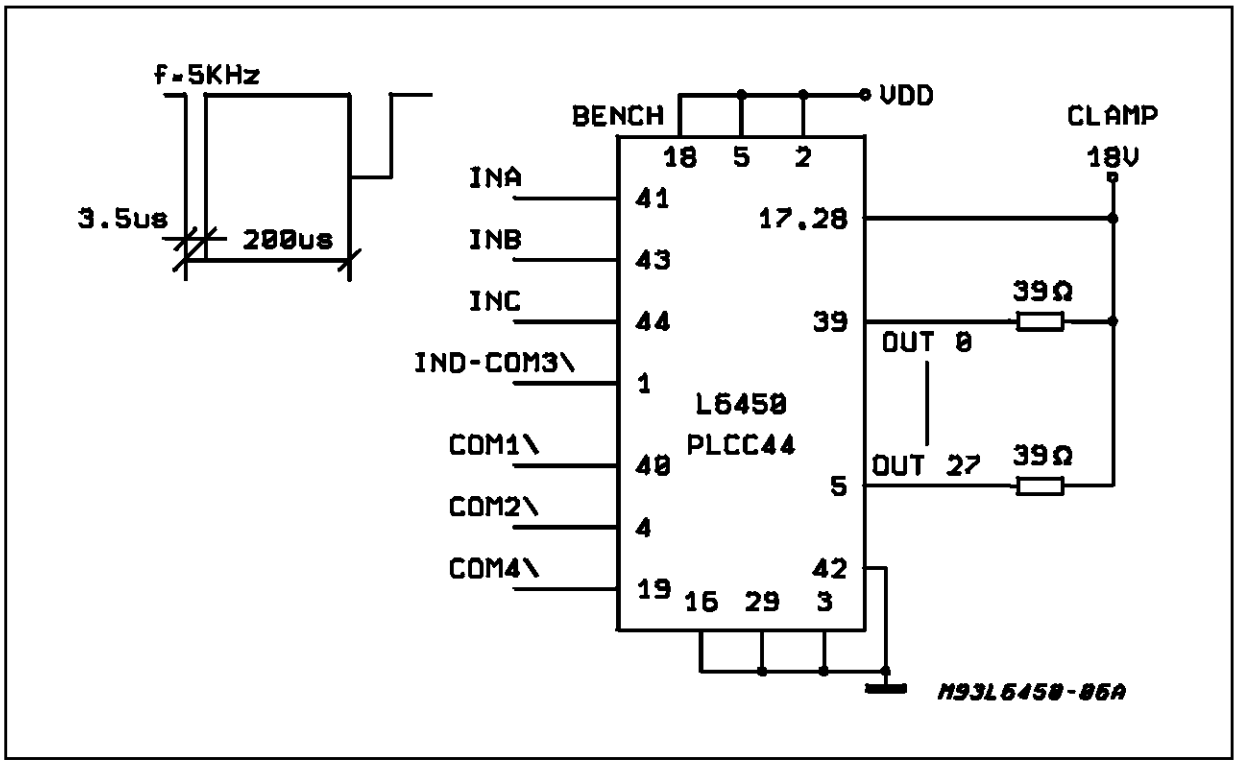
1)Decoder Truth Table when the BENCH = HIGH;
IND/$\overline{\text{COM3}}$ = is selected as input decoder ind;
COM1 = a low input enable the OUT0 to OUT13;
$\overline{\text{COM2}}$ = A Low Input Enable the OUT14 to OUT27

| IND | INC | INB | INA (LSB) | OUTPUTS |
|---|---|---|---|---|
| 0 | 0 | 0 | 0 | 0.27 |
| 0 | 0 | 0 | 1 | 1.26 |
| 0 | 0 | 1 | 0 | 2.25 |
| 0 | 0 | 1 | 1 | 3.24 |
| 0 | 1 | 0 | 0 | 4.23 |
| 0 | 1 | 0 | 1 | 5.22 |
| 0 | 1 | 1 | 0 | 6.21 |
| 0 | 1 | 1 | 1 | 7.20 |
| 1 | 0 | 0 | 0 | 8.19 |
| 1 | 0 | 0 | 1 | 9.18 |
| 1 | 0 | 1 | 0 | 10.17 |
| 1 | 0 | 1 | 1 | 11.16 |
| 1 | 1 | 0 | 0 | 12.15 |
| 1 | 1 | 0 | 1 | 13.14 |
| 1 | 1 | 1 | 0 | ALL OFF |
| 1 | 1 | 1 | 1 | ALL OFF |

2)Decoder Truth Table when the BENCH = LOW;
IND/$\overline{\text{COM3}}$ = is selected as $\overline{\text{COM3}}$
COM1: A Low Input Enable the OUT0 to OUT6
COM2: A Low Input Enable the OUT7 to OUT13
$\overline{\text{COM3}}$: A Low Input Enable the OUT14 to OUT20
COM4: A Low Input Enable the OUT21 to OUT27

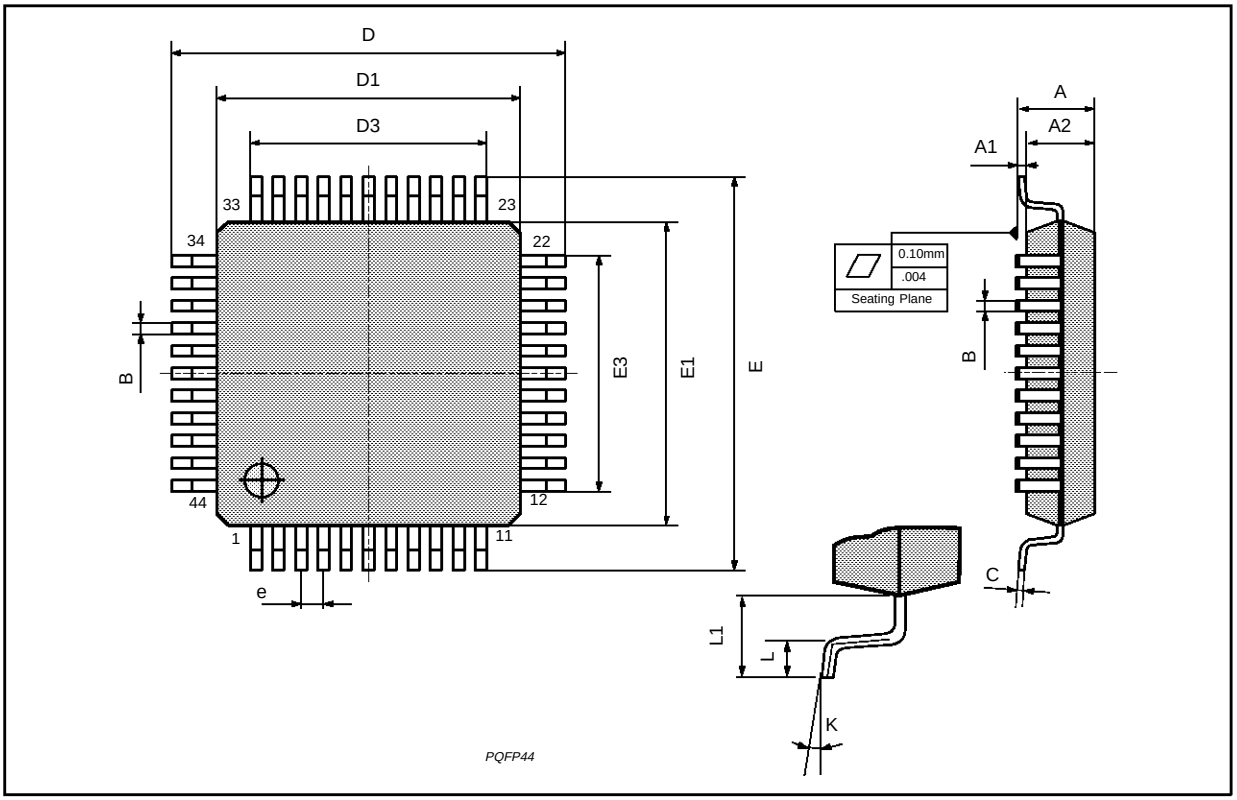
| INC | INB | INA (LSB) | OUTPUTS |
|---|---|---|---|
| 0 | 0 | 0 | 0, 7,27, 20 |
| 0 | 0 | 1 | 1, 8, 26, 19 |
| 0 | 1 | 0 | 2, 9, 25, 18 |
| 0 | 1 | 1 | 3, 10, 24, 17 |
| 1 | 0 | 0 | 4, 11, 23, 16 |
| 1 | 0 | 1 | 5, 12, 22, 15 |
| 1 | 1 | 0 | 6, 13, 21, 14 |
| 1 | 1 | 1 | ALL OFF |

**Figure 2:** Application Circuit



## PQFP44 (14 x 14) PACKAGE MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | | | 3.40 | | | 0.134 |
| A1 | 0.25 | | | 0.0098 | | |
| A2 | 2.55 | 2.80 | 3.05 | 0.100 | 0.110 | 0.120 |
| B | 0.35 | | 0.50 | 0.0138 | | 0.0197 |
| C | 0.13 | | 0.23 | 0.005 | | 0.009 |
| D | 16.95 | 17.20 | 17.45 | 0.667 | 0.677 | 0.687 |
| D1 | 13.90 | 14.00 | 14.10 | 0.547 | 0.551 | 0.555 |
| D3 | | 10.00 | | | 0.394 | |
| e | | 1.00 | | | 0.039 | |
| E | 16.95 | 17.20 | 17.45 | 0.667 | 0.677 | 0.687 |
| E1 | 13.90 | 14.00 | 14.10 | 0.547 | 0.551 | 0.555 |
| E3 | | 10.00 | | | 0.394 | |
| L | 0.65 | 0.80 | 0.95 | 0.025 | 0.0315 | 0.0374 |
| L1 | | 1.60 | | | 0.063 | |
| K | 0°(min.), 7°(max.) | | | | | |



## PLCC44 PACKAGE MECHANICAL DATA

| DIM. | mm | | | inch | | |
|---|---|---|---|---|---|---|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 17.4 | | 17.65 | 0.685 | | 0.695 |
| B | 16.51 | | 16.65 | 0.650 | | 0.656 |
| C | 3.65 | | 3.7 | 0.144 | | 0.146 |
| D | 4.2 | | 4.57 | 0.165 | | 0.180 |
| d1 | 2.59 | | 2.74 | 0.102 | | 0.108 |
| d2 | | 0.68 | | | 0.027 | |
| E | 14.99 | | 16 | 0.590 | | 0.630 |
| e | | 1.27 | | | 0.050 | |
| e3 | | 12.7 | | | 0.500 | |
| F | | 0.46 | | | 0.018 | |
| F1 | | 0.71 | | | 0.028 | |
| G | | | 0.101 | | | 0.004 |
| M | | 1.16 | | | 0.046 | |
| M1 | | 1.14 | | | 0.045 | |