

**28 CHANNEL INK JET DRIVER**

ADVANCE DATA

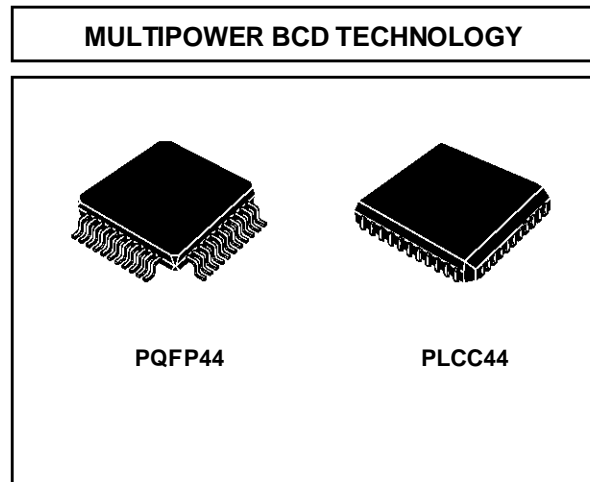
- 40V DMOS OUTPUT BREAKDOWN
- PRECISE OUTPUT ENERGY
- ESD OUTPUT PROTECTION WITH CLAMPING DIODES
- VERY LOW QUIESCENT CURRENT
- PLCC44 OR PQFP44 (10 x 10mm)

**DESCRIPTION**

The L6451 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) lines selectable decoder/driver, the L6451 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; two enable inputs are available for the different driver banks.



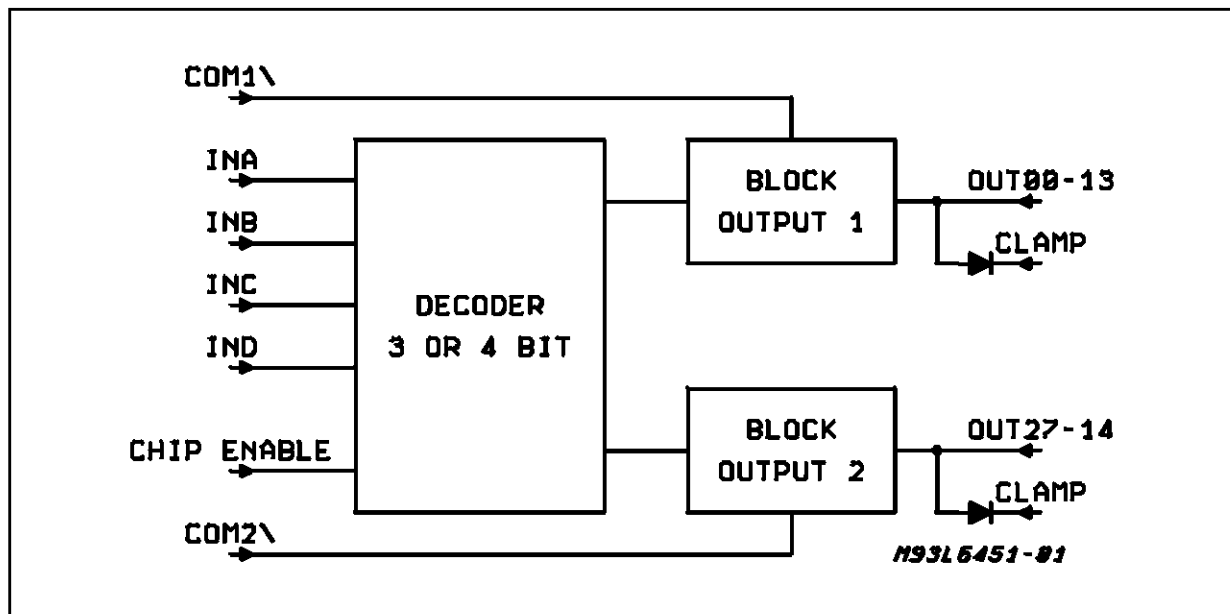
An internal power-on system is implemented in order to avoid wrong output commutation during the supply voltage transients.

Using a mask option during manufacturing allows a different decoding.

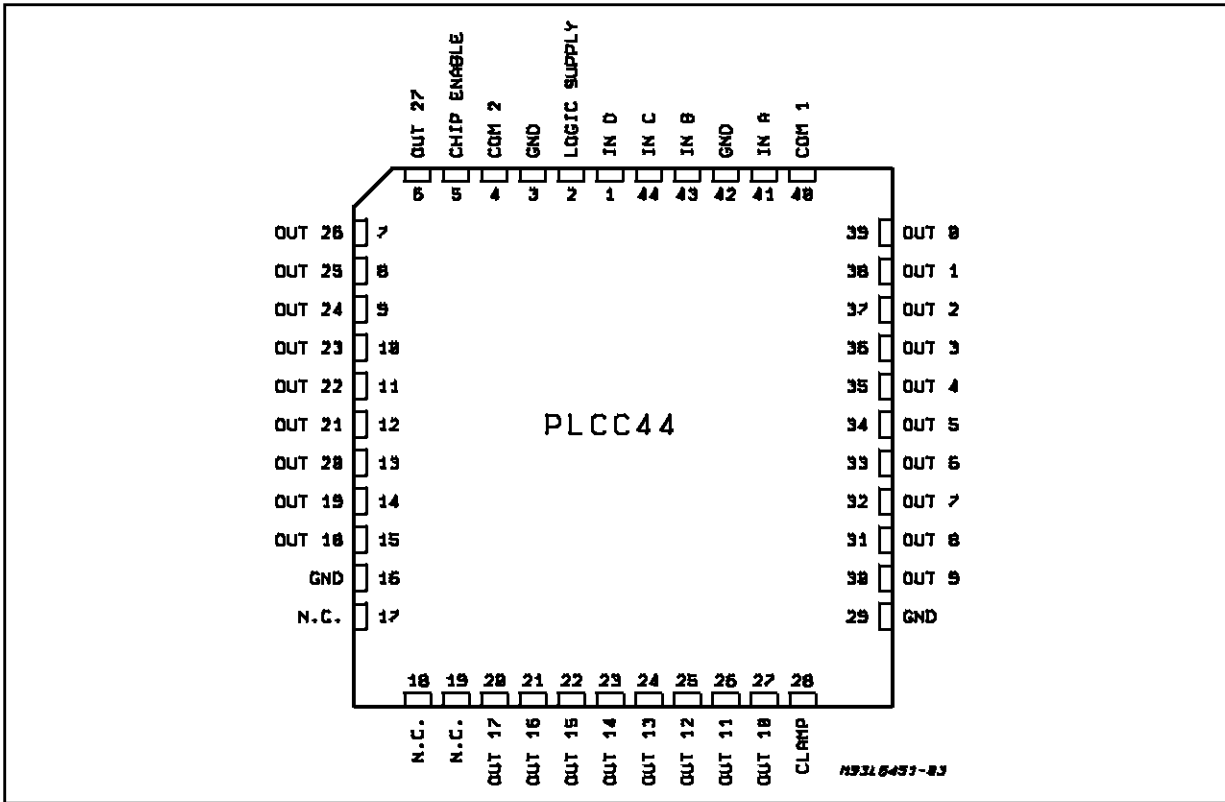
Control of the energy delivered to the print head is made by means of a special circuitry.

All driver outputs are capable of withstanding a contact discharge of  $\pm 8\text{kV}$  with the IC biased.

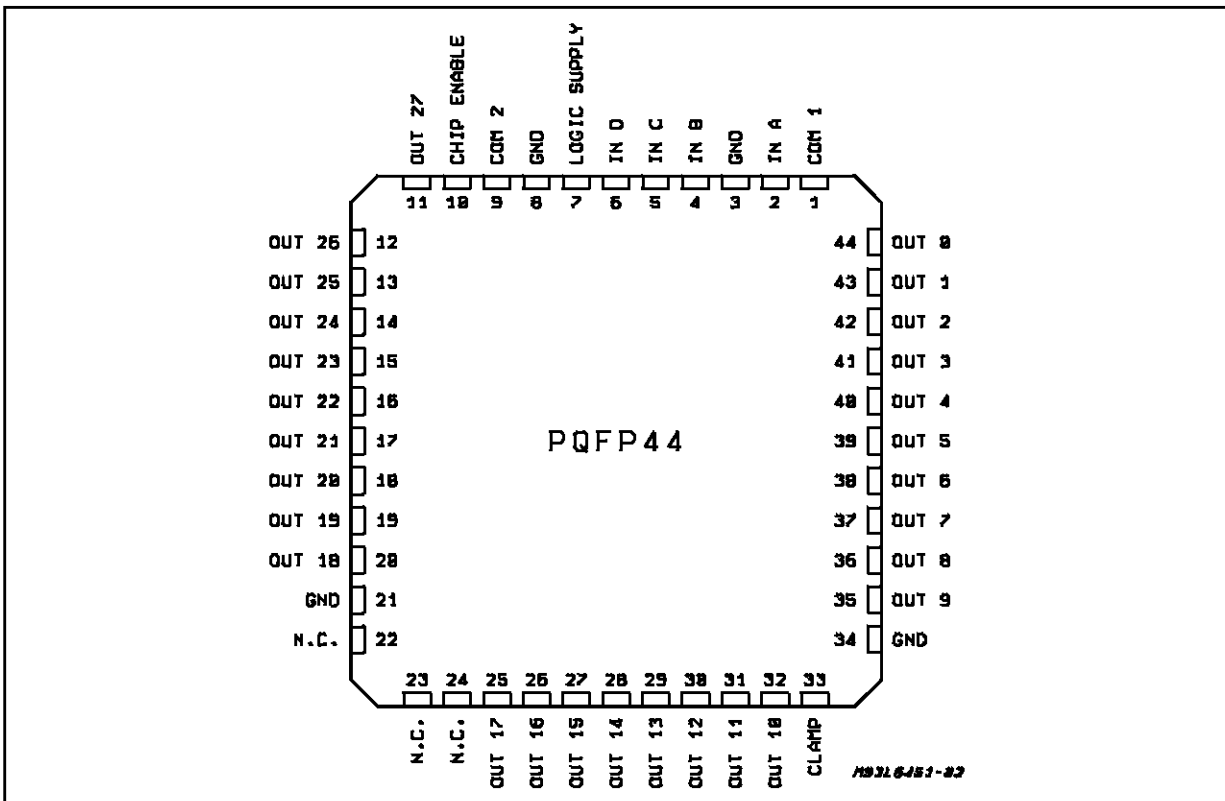
**BLOCK DIAGRAM (case of 4 bit)**



PLCC44 PIN CONNECTION (Top view)



PQFP44 PIN CONNECTION (Top view)



**ABSOLUTE MAXIMUM RATINGS**

| Symbol             | Parameter   | Value                        | Unit |
|--------------------|---|------------------------------|------|
| V <sub>OUT</sub>   | Output Voltage  | 40                           | V    |
| V <sub>CLAMP</sub> | Output Clamping Voltage   | 40                           | V    |
| I <sub>OUT</sub>   | Output Continuous Current   | 0.8                          | A    |
| I <sub>PEAK</sub>  | Output Peak Current (with duty cycle = 10% T <sub>ON</sub> = 4μs) | 2                            | A    |
| T <sub>J</sub>     | Junction Temperature  | 150                          | °C   |
| V <sub>DD</sub>    | Logic Supply Voltage  | 7                            | V    |
| V <sub>IN</sub>    | Input Voltage Range   | -0.3V to V <sub>S</sub> +0.3 | V    |
| T <sub>amb</sub>   | Operating Temperature Range                                       | 0 to 70                      | °C   |
| T <sub>stg</sub>   | Storage Temperature Range   | -55 to 150                   | °C   |

**PIN FUNCTIONS**

| Name               | Function  |
|--------------------|---|
| V <sub>DD</sub>    | 5V Logic Supply.  |
| GND                | Logic and Power Ground.   |
| OUT0 to OUT27      | DMOS Outputs.   |
| CLAMP              | This pin has 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 cathodes of the protection diodes are connected to the clamp pin. In order to have the device supplied, the CLAMP pin needs to be connected to the power.. |
| INA, INB, INC, IND | Decoder inputs.   |
| COM1, COM2         | A low logic input on these pins enables the outputs selected by the decoder inputs.   |
| CHIP ENABLE        | A logic high enable the chip.   |

**THERMAL DATA**

| Symbol                | Parameter                           | PQFP44      | PLCC44 | Unit |
|-----------------------|-------------------------------------|-------------|--------|------|
| R <sub>th j-amb</sub> | Thermal Resistance Junction-Ambient | Max. 55 (*) | 65 (*) | °C/W |

(\*) device mounted on PCB.

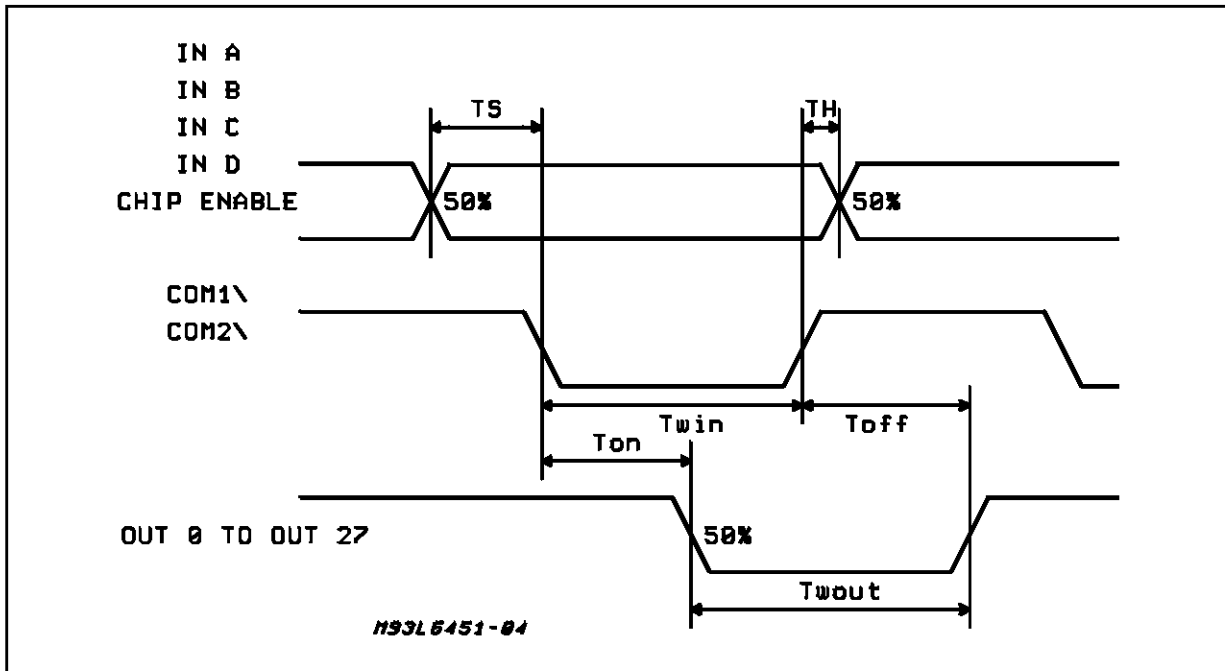
**D.C. ELECTRICAL CHARACTERISTICS** at  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_{DD} = 5\text{V}$ ,  $V_{clamp} = 18\text{V}$  (unless otherwise specified).

| 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                    | $\mu\text{A}$    |
| $I_{LH}$        | High Level Input Current  | $V_{IN} = V_{IH}$  |              |                          | 10                      | $\mu\text{A}$    |
| $I_{DD}$        | Logic Supply Current  | (Independent from the output conditions)   |              |                          | 5                       | mA               |
| $V_{OUT}$       | Output Saturation Voltage   | $T_j = 25^{\circ}\text{C}$ D.C. 0.4A<br>$T_j = 25^{\circ}\text{C}$ D.C. 0.5A<br>$T_j = 90^{\circ}\text{C}$ D.C. 0.4A<br>$T_j = 90^{\circ}\text{C}$ 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 | $T_j = 25^{\circ}\text{C}$ to $90^{\circ}\text{C}$ D.C.: 0.4A<br>$T_j = 25^{\circ}\text{C}$ to $90^{\circ}\text{C}$ D.C.: 0.5A                               |              |                          | $\pm 0.2$<br>$\pm 0.25$ | V<br>V           |
| $R_{DS\ ON}$    |   |  |              | 2.2                      |                         | $\Omega$         |

**A.C. ELECTRICAL CHARACTERISTICS** at  $T_{amb} = 25^{\circ}\text{C}$ ,  $V_{DD} = 5\text{V}$ .

| 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 Vs OUT 0 to N   | TURN - ON Time   | $I_{OUT} = 0.5\text{A}$ , $R_L = 39\Omega$<br>$T_j = 25$ to $90^{\circ}\text{C}$ |      | 150         |         | ns   |
| $T_{off}$    | COM1,2,3,4 Vs OUT 0 to N   | TURN - OFF Time  | $I_{OUT} = 0.5\text{A}$ , $R_L = 39\Omega$<br>$T_j = 25$ to $90^{\circ}\text{C}$ |      | 150         |         | ns   |
| $t_r$        |  | Rise Time  |  |      | 100         |         | ns   |
| $t_f$        |  | Fall Time  |  |      | 100         |         | ns   |
| $T_{wout}$   |  | Output Pulse Width   | $T_{win} = 3.5\mu\text{s}$ $R_L = 40\Omega$<br>$I_{OUT} = 0.5\text{A}$           | - 20 | $T_{win}$   | + 80    | ns   |
| $\Delta P_D$ |  | Maximum allowable variation of the output power transmitted by each driver to the resistive load | $R_L = 39\Omega$<br>$V_{CLAMP} = 18\text{V}$                                     |      |             | $\pm 4$ | %    |
| $\Delta P_D$ | Maximum allowable variation of the output power transmitted by each driver to the resistive load | $R_L = 40\Omega$<br>$V_{clamp} = 18\text{V}$   |  |      | $\approx 4$ | %       |      |

Figure 1: Timing Waveforms

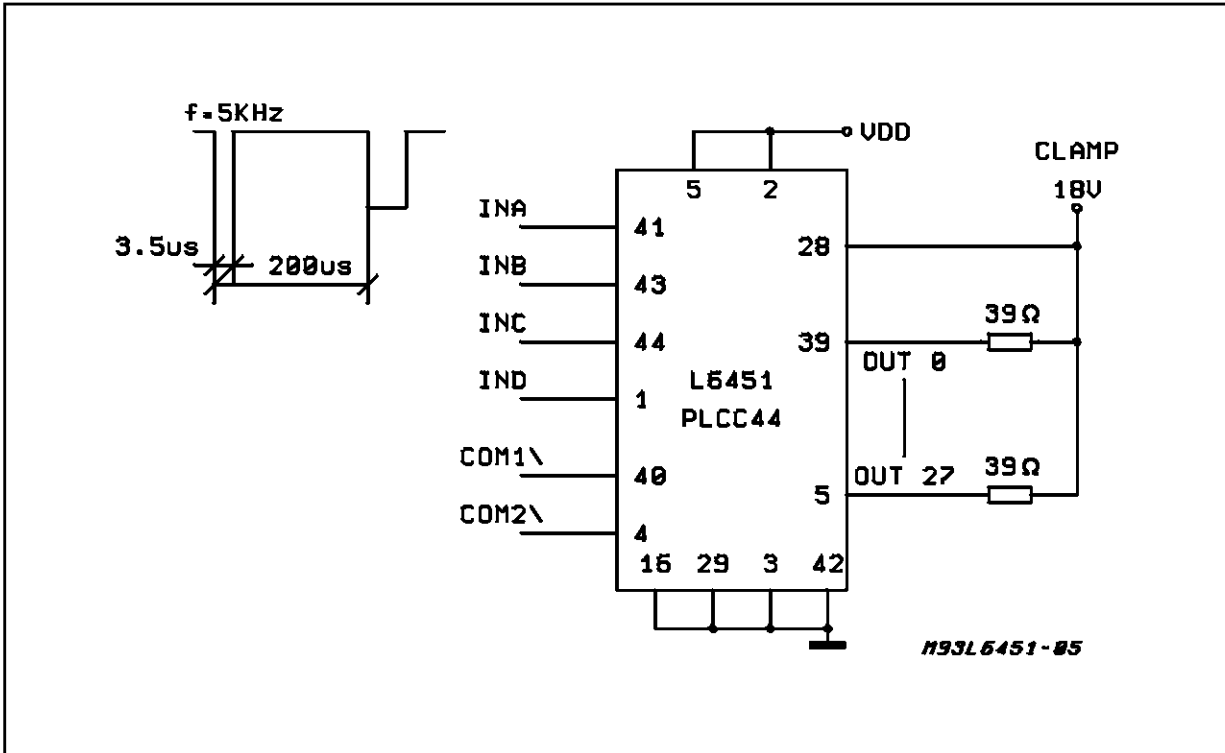


## OUTPUT SELECTION

Decoder Truth Table

| IND | INC | INB | INA<br>(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 |

Figure 2: Application Circuit



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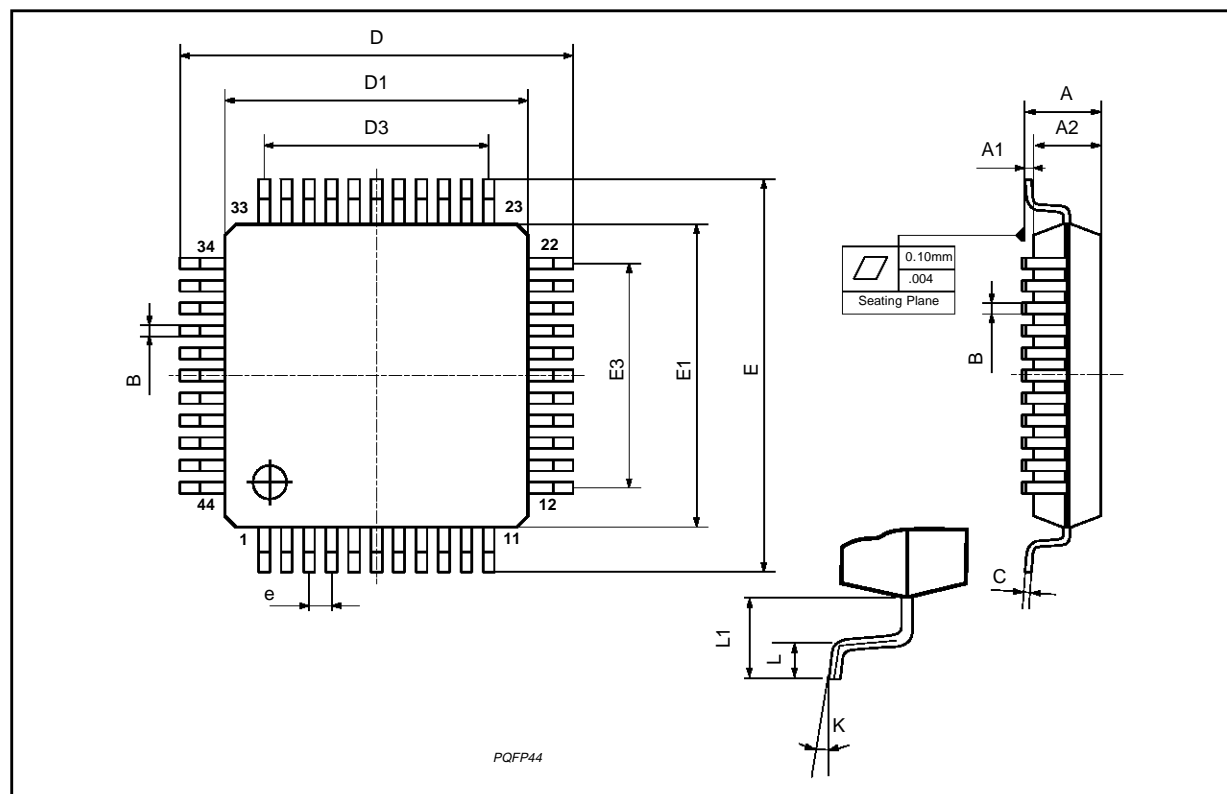
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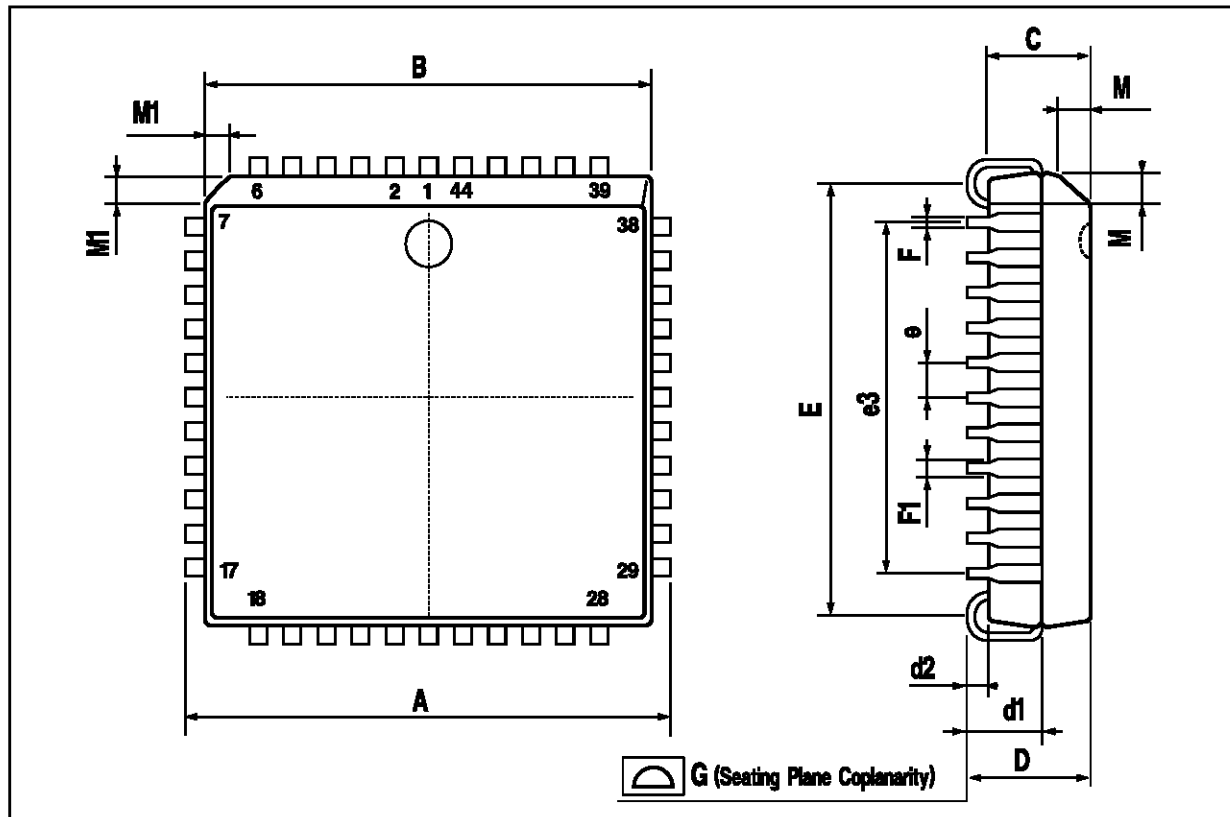
## PQFP44 (14 x 14) PACKAGE MECHANICAL DATA

| 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 |       |





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