

DESCRIPTION

The DLX413X/DLX713X are single digit 5x7 dot matrix Intelligent Display devices. The DLX413X character is 0.43" high. The DLX713X character is 0.68" high. The built-in CMOS integrated circuit contains memory, ASCII character generator, LED multiplexing and drive circuitry; thereby eliminating the need for additional circuitry. They will display the 96 ASCII characters.

These devices are TTL and microprocessor compatible and offer the possibility of cascading the displays, allowing for multi-character messages. These displays were designed for viewing distances of up to 20 feet (DLX413X) or 30 feet (DLX713X). They require a single 5-volt power supply and parallel ASCII input.

All products are 100% tested, then subjected to out-going AQLs of .25% for brightness matching, visual alignment and dimensions, .065% for electrical and functional.

Important: Refer to Appnote 18, "Using and Handling Intelligent Displays." Since this is a CMOS device, normal precautions should be taken to avoid static damage.

Timing Parameters at 25°C, V_{CC}=5.0 V ±0.5 V

| Symbol | Parameter | Units (ns) |
|------------------|--------------------|------------|
| T _{CES} | Chip Enable Set-Up | 10 |
| T _{DS} | Data Set Up | 100 |
| T _W | Write Pulse | 120 |
| T _{DH} | Data Hold | 20 |
| T _{CEH} | Chip Enable Hold | 20 |
| T _{ACC} | Access Time | 150 |

DC Characteristics

| Parameter | -40°C | | | +25°C | | | +85°C | | | Units | Conditions |
|------------------------------|-------|------|------|-------|------|------|-------|------|------|-------|----------------------------------------------------------------|
| | Min. | Typ. | Max. | Min. | Typ. | Max. | Min. | Typ. | Max. | | |
| I _{CC} (20 dots on) | | 135 | 180 | | 100 | 140 | | 85 | 115 | mA | V _{CC} =5 V, $\overline{BL0}=\overline{BL1}=5$ V |
| I _{CC} Blank | | 2.0 | 5.5 | | 1.5 | 4.0 | | 0.8 | 3.5 | mA | V _{CC} =WR=5.0 V, $\overline{BL0}=\overline{BL1}=0$ V |
| I _{IL} (all inputs) | | | | 25 | 50 | 100 | | | | μA | V _{IN} =0.8 V, V _{CC} =5 V ±0.5 V |
| V _{IH} | 2.0 | | | 2.0 | | | 2.0 | | | V | V _{CC} =5 V ±0.5 V |
| V _{IL} | | | 0.8 | | | 0.8 | | | 0.8 | V | V _{CC} =5 V ±0.5 V |
| V _{CC} | 4.5 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | 4.5 | 5.0 | 5.5 | V | |

Notes

1. "Off Axis Viewing Angle" definition: The minimum angle in any direction from the normal to the display surface at which any part of any dot in the display is not visible.
2. **This display contains a CMOS integrated circuit. Normal CMOS handling precautions should be taken to avoid damage due to high static voltages or electric fields. See Appnote 18.**
3. Unused inputs must be tied to an appropriate logic voltage level (either V + or GND).
4. V_{CC}=5.0 VDC ±10%.
5. Clean only in water, isopropyl alcohol, freon TF, TE (or equivalent).

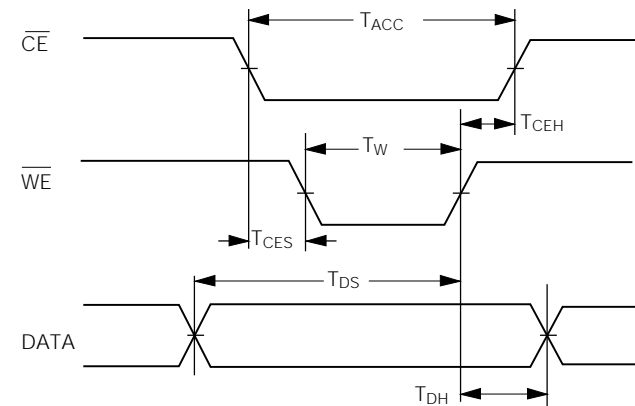
Maximum Ratings

V_{CC} Range (max.) -0.5 to +7.0 Vdc
 Voltage, Any Pin, Respect to GND. -0.5 to V_{CC} +0.5 Vdc
 Operating Temperature -40°C to +85°C
 Storage Temperature -40°C to +100°C
 Maximum Solder Temperature, .063" 260°C
 below Seating Plane, t<5 sec. 260°C
 Relative Humidity at 85°C (non condensing) 85%

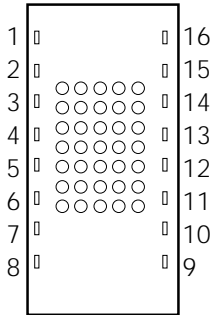
Optical Characteristics (Typical) at 25°C

Time Averaged Luminous Intensity/Dot at 5 V . . . 1500 mcd typ.
 Character Size
 DLO4135/DLG4137 0.43"
 DLO7135/DLG7137 0.68"
 Viewing Angle (Note 1) ±75°
 Spectral Peak Wavelength
 DLO4135/7135 (High Efficiency Red) 635 nm typ.
 DLG4137/7137 (Green) 565 nm typ.
 Dot to Dot Intensity Ratio 1.8:1.0 max.

Timing Characteristics — Write Cycle Waveforms



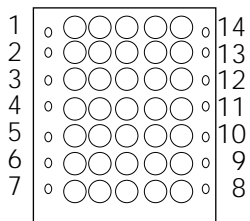
Top View — DLO4135/DLG4137



Pin Functions — DLO4135/DLG4137

| Pin | Function | Pin | Function |
|-----|-----------------------------|-----|------------------|
| 1 | \overline{LT} Lamp | 9 | D0 Data LSB |
| 2 | \overline{WR} Write | 10 | D1 Data |
| 3 | $\overline{BL1}$ Brightness | 11 | D2 Data |
| 4 | $\overline{BL0}$ Brightness | 12 | D3 Data |
| 5 | No Pin | 13 | D4 Data |
| 6 | No Pin | 14 | D5 Data |
| 7 | \overline{CE} Chip Enable | 15 | D6 Data MSB |
| 8 | GND | 16 | +V _{CC} |

Top View — DLO7135/DLG7137



Pin Functions — DLO7135/DLG7137

| Pin | Function | Pin | Function |
|-----|-----------------------------|-----|-------------------|
| 1 | V _{CC} | 8 | D0 Data Input LSB |
| 2 | \overline{LT} Lamp Test | 9 | D1 Data |
| 3 | \overline{CE} Chip Enable | 10 | D2 Data |
| 4 | \overline{WR} Write | 11 | D3 Data |
| 5 | $\overline{BL1}$ Brightness | 12 | D4 Data |
| 6 | $\overline{BL0}$ Brightness | 13 | D5 Data |
| 7 | GND | 14 | D6 Data Input MSB |

Lamp Test

When the lamp test (\overline{LT}) is activated, all dots on the display are illuminated at $1/7$ brightness. The lamp test function is independent of write (\overline{WR}) and the settings of the blanking inputs ($\overline{BL0}$, $\overline{BL1}$).

This convenient test gives a visual indication that all dots are functioning properly. Lamp test also may be used as a cursor function or pointer which does not destroy previously displayed characters.

Dimming and Blanking the Display

| Brightness Level | $\overline{BL1}$ | $\overline{BL0}$ |
|------------------|------------------|------------------|
| Blank | 0 | 0 |
| $1/7$ Brightness | 0 | 1 |
| $1/2$ Brightness | 1 | 0 |
| Full Brightness | 1 | 1 |

Loading Data

Loading data into the display is straightforward. Chip enable (\overline{CE}) should be present and stable during a write pulse (\overline{WR}). Parallel data information should be stable for the minimum time (T_{W}) and held for TDH after write has gone high. No synchronization is necessary and each character will continue to be displayed until it is replaced with another. Multiple displays may be stacked together with only an additional decoder IC for chip enable decoding.

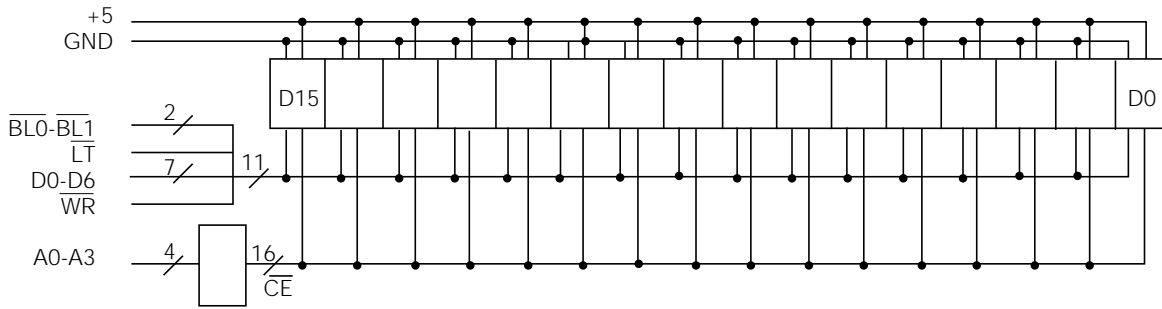
Note : Either $\overline{BL0}$ or $\overline{BL1}$ should be held high for display to light up.

Data Loading Example

| \overline{CE} | \overline{WR} | $\overline{BL0}$ | $\overline{BL1}$ | \overline{LT} | Data Input | | | | | | | | |
|-----------------|-----------------|------------------|------------------|-----------------|------------|----|----|----|----|----|----|---|-----------|
| | | | | | D6 | D5 | D4 | D3 | D2 | D1 | D0 | | |
| H | X | H | X | H | X | X | X | X | X | X | X | X | NC |
| X | X | L | L | H | X | X | X | X | X | X | X | X | Blank |
| X | X | X | X | L | X | X | X | X | X | X | X | X | Lamp Test |
| L | L | H | H | H | H | L | L | L | L | L | L | H | A |
| L | L | H | H | H | H | H | H | L | L | H | L | L | r |
| L | L | H | H | H | L | H | H | L | L | H | H | H | 3 |
| L | L | H | H | H | L | H | L | H | L | H | H | H | + |

X=don't care, NC=no change

16 Digits Interconnection



Character Set

| ASCII CODE | | D0 | D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 | D9 | D10 | D11 | D12 | D13 | D14 | D15 | | |
|------------|----|----|-----|---------------------------|----|----|----|----|----|----|----|-----|-----|-----|-----|-----|-----|---|---|
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | | |
| 0 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 | 1 | | |
| 0 | 2 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | | |
| 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | | |
| D6 | D5 | D4 | HEX | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 0 | 0 | 0 | 0 | THESE CODES DISPLAY BLANK | | | | | | | | | | | | | | | |
| 0 | 0 | 1 | 1 | | | | | | | | | | | | | | | | |
| 0 | 1 | 0 | 2 | ! | @ | # | \$ | % | & | ' | (|) | * | + | , | - | . | / | |
| 0 | 1 | 1 | 3 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 1 | 0 | 0 | 4 | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
| 1 | 0 | 1 | 5 | P | Q | R | S | T | U | V | W | X | Y | Z | [|] | ^ | _ | ` |
| 1 | 1 | 0 | 6 | ` | a | b | c | d | e | f | g | h | i | j | k | l | m | n | o |
| 1 | 1 | 1 | 7 | p | q | r | s | t | u | v | w | x | y | z | { | } | ~ | ` | ` |

- Notes: 1. High = 1 level.
 2. Low = 0 level.
 3. Upon power up, the device will initialize in a random state.



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