LED Display Modules
128 x 32 Graphics Display with Drive Electronics and + 5 V HC CMOS Level Video Interface
Orange 0603 Chip LEDs, Normal Brightness, RoHS Compliant

The LEE-128G032-1 is an LED replacement for the popular APD-128G032 plasma display module. It is designed to offer high brightness and superior viewing characteristics in a slim package. This display is ideal for low to medium level information content and is ideal for applications such as arcade games, process control, POS terminals, medical equipment, message centers and ATM machines.

The LEE-128G032-1 LED display offers high contrast, wide viewing angle, and long distance readability. It emits a brilliant orange color which catches the attention of the viewer, but is yet comfortable to the eye.

The LEE-128G032-1 LED display has a video type interface and is driven in a standard row/column refresh method. Pixel data is clocked for a row, and rows are scanned sequentially. Signals are presented for serial data, dot clock, column latch, row data, row clock and display enable. The serial data is entered with the dot clock up to frequencies as high as 8 MHz. After a row of 128 pixels is clocked in, the column latch signal is toggled and the data is latched. At the time the data is latched, the display is briefly disabled using the display enable signal, then the row pointer is advanced with the row clock signal. Once each frame the row data must be asserted to synchronize the column serial data with the beginning row. The recommended scanning frequency is approximately 70 Hz, but may be as high as 200 Hz.

**FEATURES**
- LED replacement for the popular APD-128G032 plasma display module
- + 5 V HC CMOS level video interface
- Large characters
- Highly visible for long distance viewing
- > 30:1 contrast ratio
- Brilliant neon orange color
- Slim profile
- Reduced power and brightness version
- Compliant to RoHS directive 2002/95/EC

**ELECTRICAL SPECIFICATIONS**

**Voltage(s) Required:** + 5 $V_{CC}$ ($V_{CC}$)

**Power Required (Fully Lit):**
- Typical = 5.5 W
- Maximum = 6.5 W

**OPTICAL SPECIFICATIONS**

**Viewing Area:** 12.75" [323.8 mm] W x 3.15" [80.01 mm] L

**Character Size (5 x 7):** 0.65" [16.51 mm] H x 0.45" [11.43 mm] W

**Pixel Size:** 0.063" [1.6 mm] H x 0.031" [0.8 mm] W

**Pixel Pitch:** 0.100" [2.54 mm]

**Luminance:** 100 ft-L minimum

**Color:** Neon orange

**Viewing Angle:** > 150°

**ENVIRONMENTAL SPECIFICATIONS**

**Operating Temperature:** - 40 °C to + 85 °C

**Storage Temperature:** - 40 °C to + 85 °C

**Relative Operating Humidity:** To 95 % non-condensing

**Mechanical Shock:** 30 G

**Vibration:** 3 G

**Operating Altitude:** 10 000 ft

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**STANDARD ELECTRICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>SYMBOL</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logic and LED Drive Voltage</td>
<td>$V_{CC}$</td>
<td>+ 4.5</td>
<td>+ 5.0</td>
<td>+ 5.5</td>
<td>$V_{DC}$</td>
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<tr>
<td>Logic and LED Drive Current (Fully Lit)</td>
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<td>1.1</td>
<td>1.3</td>
<td>$A_{DC}$</td>
<td></td>
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<tr>
<td>Logic 1 Input</td>
<td>$V_{IN}$</td>
<td>0.7 $V_{CC}$</td>
<td>-</td>
<td>-</td>
<td>$V_{DC}$</td>
</tr>
<tr>
<td>Logic 0 Input</td>
<td>$V_{IL}$</td>
<td>-</td>
<td>-</td>
<td>0.3 $V_{CC}$</td>
<td>$V_{DC}$</td>
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</table>

**Note**

(1) Recommended operating voltages, all maximums are absolute maximum

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**DIMENSIONS**

**in inches [millimeters]**

![Diagram of LED Display Modules](image)
**INTERFACE SIGNAL DESCRIPTION**

**Dot clock** - This signal enters the *serial data* on each low to high transition. A total of 128 *dot clock* transitions must be present for each line of column/anode data.

**Serial data** - This signal presents the pixel data in positive logic format. A logic one represents a lit pixel and a logic zero represents an extinguished pixel. Data is entered from right to left. The first pixel data entered will represent the left most pixel in the row.

**Column latch** - This signal latches the pixel data into the driver outputs. When the *column latch* signal goes to logic one the data entered previously will fall through to the driver outputs. When the signal returns to a logic zero the data is latched and the shift register is now ready to accept the next row of data. Must be held low while entering new *serial data*.

**Display enable** - This signal enables the output drivers. Using a duty cycle control, this signal may also be used for intensity control. The *display enable* must be at logic zero before the *column latch* signal transitions. To avoid display blurring, the *row clock* signal should also transition while *display enable* is a logic zero.

**Row data** - This signal is the first line marker for the scan. This input should be held high to correspond to the first row of pixel data.

**Row clock** - This signal clocks *row data* on the falling edge. The *row clock* signal is repetitive and must be present for proper scanning of the display module. The LEE-128G032-1 has an unique input protection circuit that assures the column drivers stay blanked on power up. The protection circuit unblankes the column drivers when the *row clock* signal begins (i.e. the display begins scanning).

**LOGIC AND DATA TIMING**

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>MIN.</th>
<th>TYP.</th>
<th>MAX.</th>
<th>UNITS</th>
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</thead>
<tbody>
<tr>
<td>$t_1$</td>
<td>100</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>$t_2$</td>
<td>5</td>
<td></td>
<td></td>
<td>μs</td>
</tr>
<tr>
<td>$t_3$</td>
<td>1</td>
<td></td>
<td></td>
<td>μs</td>
</tr>
<tr>
<td>$t_4$</td>
<td>-</td>
<td>70</td>
<td>200</td>
<td>Hz</td>
</tr>
<tr>
<td>$t_5$</td>
<td>25</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>$t_6$</td>
<td>75</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
<tr>
<td>$t_7$</td>
<td>75</td>
<td></td>
<td></td>
<td>ns</td>
</tr>
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**ORDERING INFORMATION**

<table>
<thead>
<tr>
<th>DESCRIPTION</th>
<th>PART NUMBER</th>
</tr>
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<tbody>
<tr>
<td>Display, Driver Electronics and + 5 V HC CMOS Interface</td>
<td>LEE-128G032-1</td>
</tr>
<tr>
<td>J2 Data Connector Kit (2 pcs. recommended)</td>
<td>280105-08</td>
</tr>
<tr>
<td>J1 Power Connector Kit</td>
<td>280108-14</td>
</tr>
<tr>
<td>J3 Power Connector Kit</td>
<td>280108-15</td>
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