LED LINEAR TAPES - THE NEW STANDARD
LED Linear offers the world’s highest quality LED tapes

HOW?
ADVANTAGE 1

LED Linear tapes are controlled by Integrated Circuit (IC) drivers

Other tapes use resistors and lose more than 25% of light at the end of the run. The light fades along the tape.

LED Linear uses IC drivers that guarantee 100% consistent light over the full specified length of the products.

https://www.ledlinearusa.com
ADVANTAGE 1

It is easy to identify the difference. Just look at the tape!

Resistor Controlled DC Circuits
- Voltage drop is not balanced along the tape
- Light output decreases over the length
- Resistors heat up and affects lifetime negatively

IC Controlled DC Circuits
- Current is regulated on each step
- Light Output is stable over the entire length
- 3V built-in buffer to compensate for voltage drops
- Reverse polarity protection for fool-proof installations

https://www.ledlinearusa.com
ADVANTAGE 2

LED Linear tapes are produced with Reel-to-Reel (R2R) Technology in Germany

State of the art custom designed R2R tape manufacturing facility
100% automation
High production capacity - up to 2500 miles of tape annually
Precise batch control through QR coding
Low production failure rate (0.1 ppm)

https://www.ledlinearusa.com
LED Linear tapes are produced with Reel-to-Reel (R2R) Technology in Germany

- Fully automated continuous process with in-line inspection
- No stairway-effect between cut-lengths
- Excellent thermal contact to heat sink
- Precision pick and place process
- Thin and homogeneous flexible material

- 18” tape sections are cut and soldered by hand
- Each solder point is a potential break point
- Poor thermal contact to heat sink
- Thicker and less flexible sheet material

https://www.ledlinearusa.com
The Tj-Away® (Thermal Junction Away) Technology is characterized by large copper areas below the LED, which ensure rapid heat dissipation and heat spread away from the LED. Due to Tj-Away® we achieve thermal power densities less than 2.7 W/in² with electrical input power of 12.5 W/ft. This is 30% cooler than other’s tapes. Thin adhesive tape with superior heat conduction guarantees rapid heat transfer into aluminum profiles.

https://www.ledlinearusa.com
LED Linear tapes have patented TjAway® thermal management technology

**OTHERS**

- Copper Layer: 70 µm
- Plastic: 120 µm
- Adhesive Tape: 50 µm

**LED LINEAR™**

- Proprietary Material
- Stacking *No plastic used

**LED-Junction Temperature**

- Tj > 95°C
  - 141.0
  - 115.0
  - 88.9
  - 62.8
  - 36.7

- Tj < 65°C
  - 72.0
  - 63.2
  - 54.3
  - 45.5
  - 36.7

https://www.ledlinearusa.com
One Bin Only stands for true color consistency within a 3 step MacAdams Ellipse located in the center ANSI bin.

During the standardized LM80 test cycle time of 10,000 hours the maximum color shift $\Delta u'v'$ is better than 0.001 ($< 1$ SDCM) which guarantees impressive color consistency over time.

The absolute CIE $(x,y)$ drift stays well within a 3 step MacAdams ellipse and cannot be recognized by the human eye.

https://www.ledlinearusa.com
ADVANTAGE 4

LED Linear tapes have One Bin Only Technology for color consistency

OTHERS 1

<table>
<thead>
<tr>
<th>CCT</th>
<th>Reported CCT Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,200 K</td>
<td>+/- 96 K</td>
</tr>
<tr>
<td>3,000 K</td>
<td>+/- 126 K</td>
</tr>
<tr>
<td>4,000 K</td>
<td>+/- 164 K</td>
</tr>
</tbody>
</table>

CIE (x,y) = +/- 0.005

OTHERS 2

<table>
<thead>
<tr>
<th>CCT</th>
<th>Reported CCT Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,200 K</td>
<td>+/- 192 K</td>
</tr>
<tr>
<td>3,000 K</td>
<td>+/- 252 K</td>
</tr>
<tr>
<td>4,000 K</td>
<td>+/- 328 K</td>
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</tbody>
</table>

CIE (x,y) = +/- 0.010

LED LINEAR™

<table>
<thead>
<tr>
<th>CCT</th>
<th>Reported CCT Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,200 K</td>
<td>+/- 39 K</td>
</tr>
<tr>
<td>3,000 K</td>
<td>+/- 56 K</td>
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<tr>
<td>4,000 K</td>
<td>+/- 78 K</td>
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</tbody>
</table>

CIE (x,y) = +/- 0.003

LED Color Initial Measuring Tolerance

https://www.ledlinearusa.com
ADVANTAGE 5

LED Linear spec sheets publish L/B Lifetime values for all tape products

L Value
Percentage of LED chips with initial lumen output at rated lifetime

B Value
Percentage of LED chips that will not deliver L value at rated lifetime

If a manufacturer does not state B Value, they accept at least 50% of the chips will fail to deliver L value at rated lifetime.

*The HYDRA series has a luminous flux of minimum 90% (L90) of the initial luminous flux within 60,000h, with 10% (B10) of the LEDs can be lower and thus consequently 90% are above at specification based conditions

https://www.ledlinearusa.com
ADVANTAGE 6

LED Linear spec sheets publish 6 Digit Photometric Code for all tape products

6 DIGIT PHOTOMETRIC CODE (IEC/PAS 62717):

Initial CRI: 77 – 86: 8
87 – 100: 9

Initial CCT: 2700 K: 27

Initial chromaticity spread within:
3 step MacAdams: 3
5 step MacAdams: 5

W 9 27 / 3 3 9

Chromaticity spread after 25% of rated lifetime, max. 6,000h

Lumen maintenance after 25% of rated lifetime, max. 6,000h

https://www.ledlinearusa.com

Member of the Signify Group

LED LINEAR lighting solutions
LED Linear tapes have minimal color shift over time

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