COLOR KINETICS

PHILIPS

DLE L-102

Color Kinetics® DLE L-102 digital light engine is a complete, networkable illumination module designed for easy integration into a wide variety of lighting applications. On-board intelligence drives the light emitting diodes (LEDs) and stores configuration data. With simple control and power input, DLE L-102 delivers a broad range of color control. Separate red, green, and blue (RGB) control channels enable smooth color mixing across a generous gamut. Innovative printed circuit board (PCB) design and construction ensures highly efficient heat dissipation and thermal performance.

DLE L-102 accepts commands using the DMX512 packet format. Three sequential channels are used: one for red, one for green, and one for blue. These three 8-bit channels provide full 24-bit control of the emitted color. Thus, DLE L-102 can be instructed to produce over 16 million different colors. Color changes are virtually instantaneous. DLE L-102 uses 12 high-brightness 5mm LEDs driven by precision current sources that are tolerant of wide variations in temperature and supply voltage, and whose intensity is controlled by an advanced pulse width modulation (PWM) algorithm. DLE L-102 uses 14-bit PWM natively. The output intensity of each channel is non-linearly mapped to incoming 8-bit DMX data, to better match the human eye's perception of brightness.

DLE L-102's on-board processor has non-volatile memory that stores configuration and performance data. Each DLE module is serialized at the time of manufacture. DLE L-102 supports up to 16 light addresses allowing for use in installations that contain other Color Kinetics products or fixtures from other OEMs that use Color Kinetics DLEs.

DLE L-102 SPECIFICATIONS

COLOR RANGE	16.7 million (24-bit) additive red, green, and blue colors; continuously variable intensity output range
SOURCE	High brightness colored light emitting diodes (LEDs)

COMMUNICATION SPECIFICATIONS

DATA INTERFACE	CKDMX
CONTROL	Color Kinetics full line of controllers or DMX 512 (RS485) compatible when using Color Kinetics power/data supply

ELECTRICAL SPECIFICATIONS

POWER REQUIREMENT	24VDC Regulated, +/- 0.5V
POWER CONSUMPTION	2.4W Max. at full intensity (full RGB), 120mA Max.
POWER CONNECTION	Solder pad

ENVIRONMENTAL SPECIFICATIONS

MAXIMUM TEMPERATURE	Housing dependent. Design should provide adequate heat transfer such that no individual component exceeds maximum levels specified in the Thermal Measurement section of this document. Over temperature protection circuit operates when component temperature exceeds acceptable limits.
MINIMUM TEMPERATURE	-20°C
ENVIRONMENT	Non-corrosive
HUMIDITY	0-95%, non-condensing

LED SOURCE LIFE

In traditional lamp sources, lifetime is defined as the point at which 50% of the lamps fail. This is also termed Mean Time Between Failure [MTBF]. LEDs are semiconductor devices and have a much longer MTBF than conventional sources. However, MTBF is not the only consideration in determining useful life. Color Kinetics uses the concept of useful light output for rating source lifetimes. Like traditional sources, LED output degrades over time (lumen depreciation) and this is the metric for SSL lifetime.

LED lumen depreciation is affected by numerous environmental conditions such as ambient temperature, humidity, and ventilation. Lumen depreciation is also affected by means of control, thermal management, current levels, and a host of other electrical design considerations. Color Kinetics systems are expertly engineered to optimize LED life when used under normal operating conditions. Lumen depreciation information is based on LED manufacturers' source life data as well as other third party testing. Low temperatures and controlled effects have a beneficial effect on lumen depreciation. Overall system lifetime could vary substantially based on usage and the environment in which the system is installed.

Temperature and effects will affect lifetime. Color Kinetics rates product lifetime using lumen depreciation to 50% of original light output. When the fixture is running at room temperature using a color wash effect, the range of lifetime is in the range of 30,000-50,000 hours. This is LED manufacturers' test data. For more detailed information on source life, please see www.colorkinetics.com/lifetime.

OPTIBIN®

There are inherent variations in the fabrication processes of all semiconductor materials. For LEDs, this variance results in differences in the color and intensity of light output as well as electrical characteristics. Due to these differences, LED manufacturers sort production into "bins," but insuring the availability of a single bin is very difficult. To minimize this issue and achieve optimal color consistency in its products, Color Kinetics has developed and uses a proprietary technology called Optibin. Optibin is an advanced production binning optimization process that minimizes the effects of LED variance for the best possible output uniformity in the final product. Color Kinetics Optibin technology gives you the most consistent control of color and intensity from product to product.

CHROMACORE® BY COLOR KINETICS

OPTIBIN® BY COLOR KINETICS

ITEM# 118-000013-00

BRO157 Rev 02

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DLE L-102

PHOTOMETRIC PERFORMANCE

Photometric data is based on test results from an independent testing lab.

SOURCE SPECIFICATIONS

Source:	12 LEDs (4 Red, 4 Green, 4 Blue)
Beam Angle:	110°
Distribution:	Symmetric direct illumination

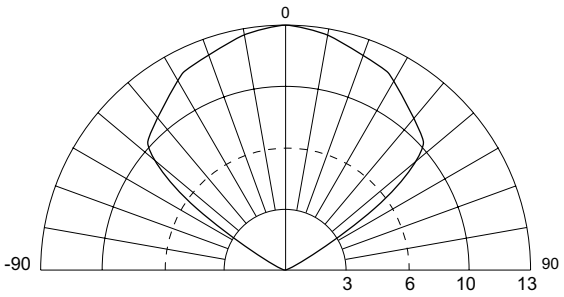
ILLUMINANCE DISTRIBUTION

0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	6.0′/2.0m
0.2 / 2.2	0.6 / 6.5	0.9 / 9.7	0.6 / 6.5	0.2 / 2.2	0.1 / 1.1	5.0′/1.5m
0.2 / 2.2	1.1 / 11.8	2.1 / 22.6	1.8 / 19.4	0.7 / 7.5	0.2 / 2.2	4.0′/1.2m
0.2 / 2.2	0.7 / 7.5	1.8 / 19.4	2.0 / 21.5	1.1 / 11.8	0.2 / 2.2	3.0′/1.0m
0.1 / 1.1	0.2 / 2.2	0.6 / 6.5	0.9 / 9.7	0.6 / 6.5	0.2 / 2.2	2.0′/0.6m
0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	0.1 / 1.1	1.0′/0.3m

3.0′/1.0m 0′/0m 3.0′/1.0m

Units:	Footcandles (top)/Lux (bottom) 10.8 lux = 1 fc
Measured on:	All, reflectance model 80/50/20%
Location:	Center of grid, 1.5′ (0.5 m) from surface, light perpendicular to surface

CANDLE POWER DISTRIBUTION



Measured on:	White
Beam center:	12.9 cd
Thin dashed line:	Indicates 50% of peak
Multipliers:	0.23 Red, 0.63 Green, 0.15 Blue

ILLUMINANCE

COLOR	0.5' / 0.15m	1' / 0.3m	2' / 0.6m	3' / 1m
WHITE	819.0 / 8815.7	32.8 / 353.1	4.8 / 51.7	1.9 / 20.5
RED	184.3 / 1983.5	7.4 / 79.4	1.1 / 11.6	0.4 / 4.6
GREEN	511.9 / 5509.8	20.5 / 220.7	3.0 / 32.3	1.2 / 12.8
BLUE	122.9 / 1322.4	4.9 / 53.0	0.7 / 7.8	0.3 / 3.1

Units:	Footcandles (top)/Lux (bottom) on axis.
Measured on:	All, reflectance 0.

LIGHT OUTPUT

COLOR	TOTAL OUTPUT (lumens)	POWER (Watts)	EFFICACY (Lm/W)
WHITE	19	2.2	8.6
RED	4.3	0.8	5.4
GREEN	11.9	0.5	23.8
BLUE	2.9	0.8	3.7

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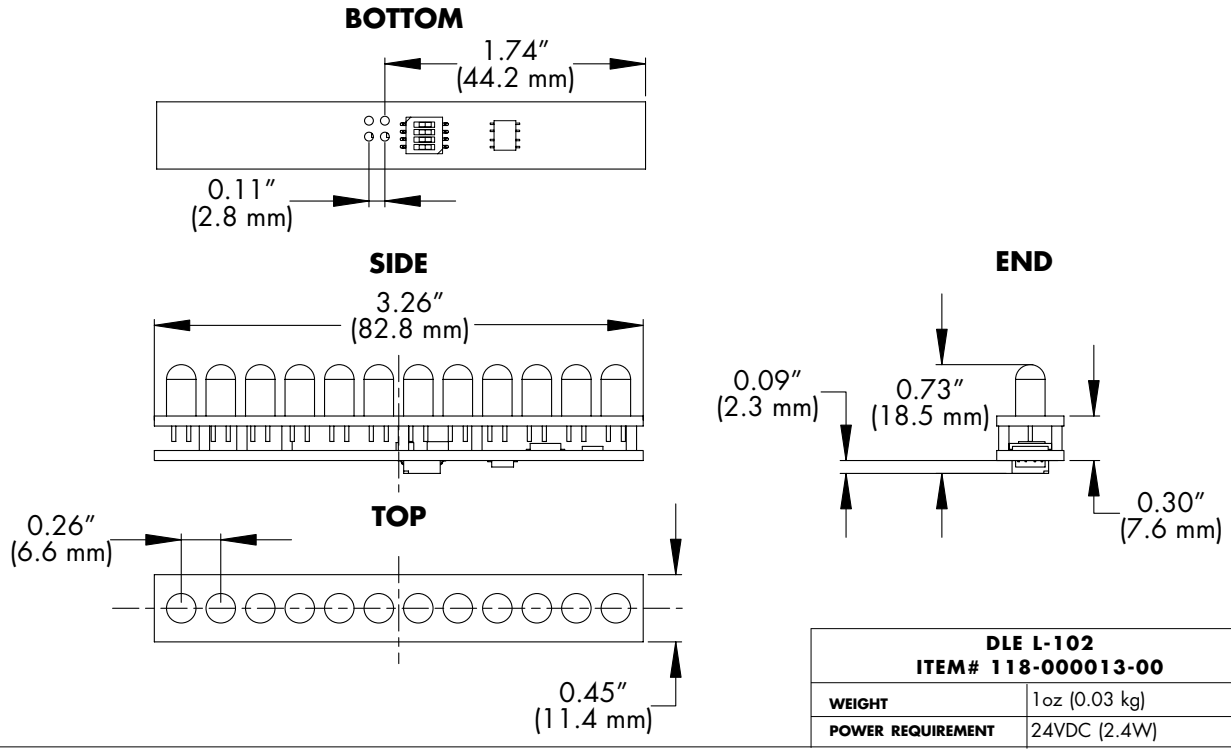
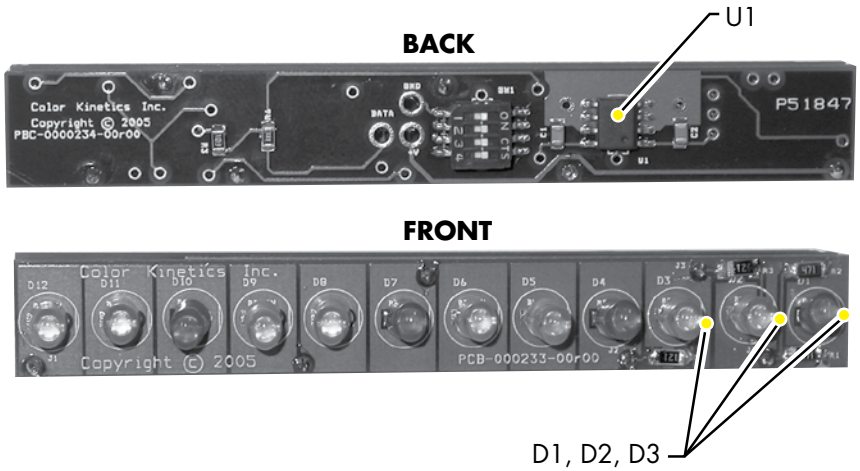
PHYSICAL DIMENSIONS



DLE L-102 ITEM# 118-000013-00	
WEIGHT	1oz (0.03 kg)
POWER REQUIREMENT	24VDC (2.4W)

THERMAL MEASUREMENT TEST POINTS



Thermal Measurement

DLE L-102 generates a maximum amount of heat when set to white (full red, green, and blue). With the DLE installed into the final OEM product configuration (e.g. housing), set the board to full white and allow everything to warm up and stabilize before testing. Thermal tests must be performed at the system's highest rated operating temperature. For elevated ambient temperatures, test the system in an environmental chamber or similar test apparatus that can maintain the desired ambient temperature for the duration of the test.

Using a thermocouple, measure the DLE L-102 at the following locations and ensure they are below the maximum temperature:

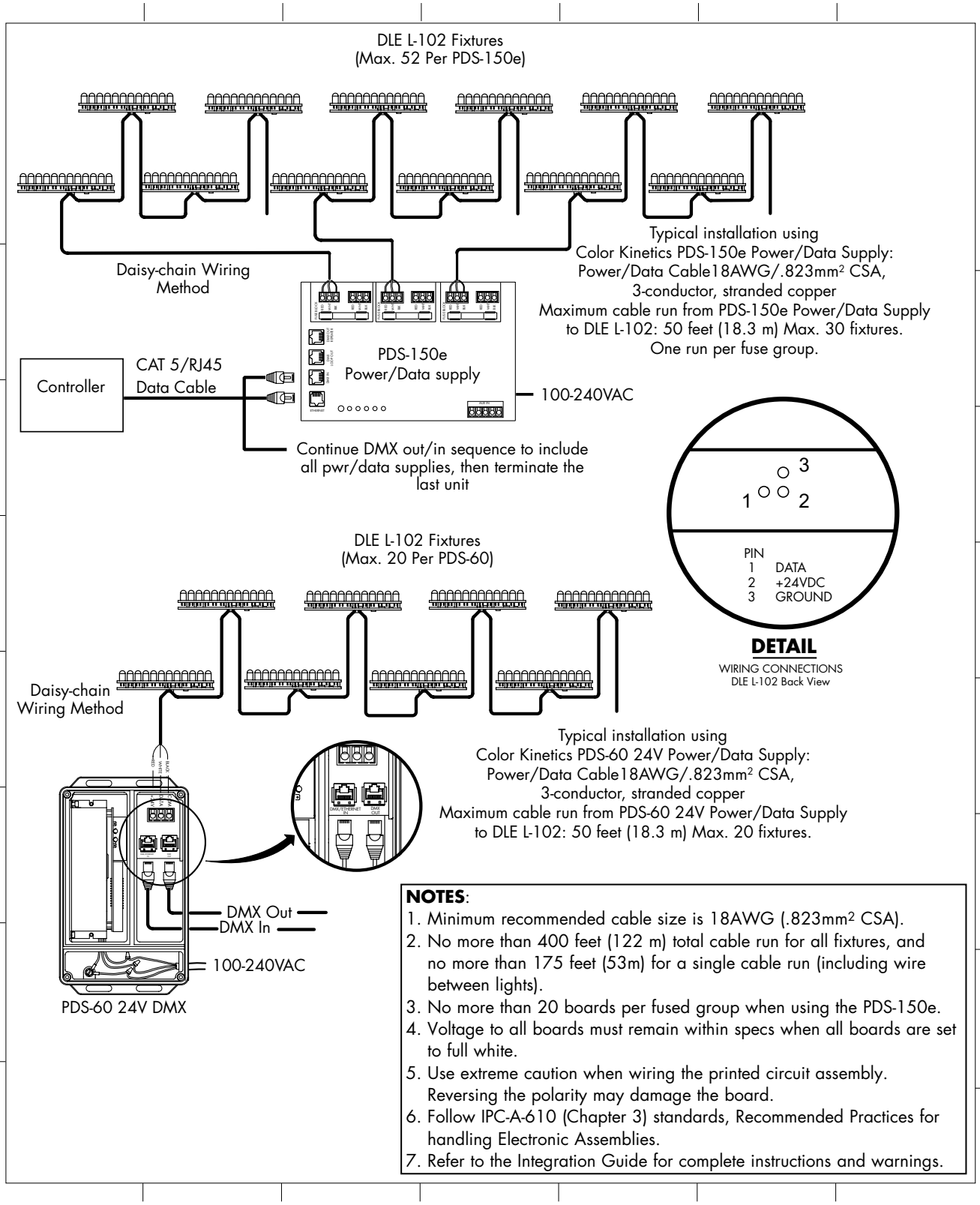
BACK: • U1 (regulator): 85° C Max.
• Q2, Q4, Q 6 (transisters): 85° C Max.

FRONT • LEDs D1, D2, D3: 85° C Max.

Note: Refer to the Integration Guide for complete instructions and warnings.

DLE L-102

FUNCTIONAL FLOW DIAGRAM



NOTES:

1. Minimum recommended cable size is 18AWG (.823mm² CSA).
2. No more than 400 feet (122 m) total cable run for all fixtures, and no more than 175 feet (53m) for a single cable run (including wire between lights).
3. No more than 20 boards per fused group when using the PDS-150e.
4. Voltage to all boards must remain within specs when all boards are set to full white.
5. Use extreme caution when wiring the printed circuit assembly. Reversing the polarity may damage the board.
6. Follow IPC-A-610 (Chapter 3) standards, Recommended Practices for handling Electronic Assemblies.
7. Refer to the Integration Guide for complete instructions and warnings.