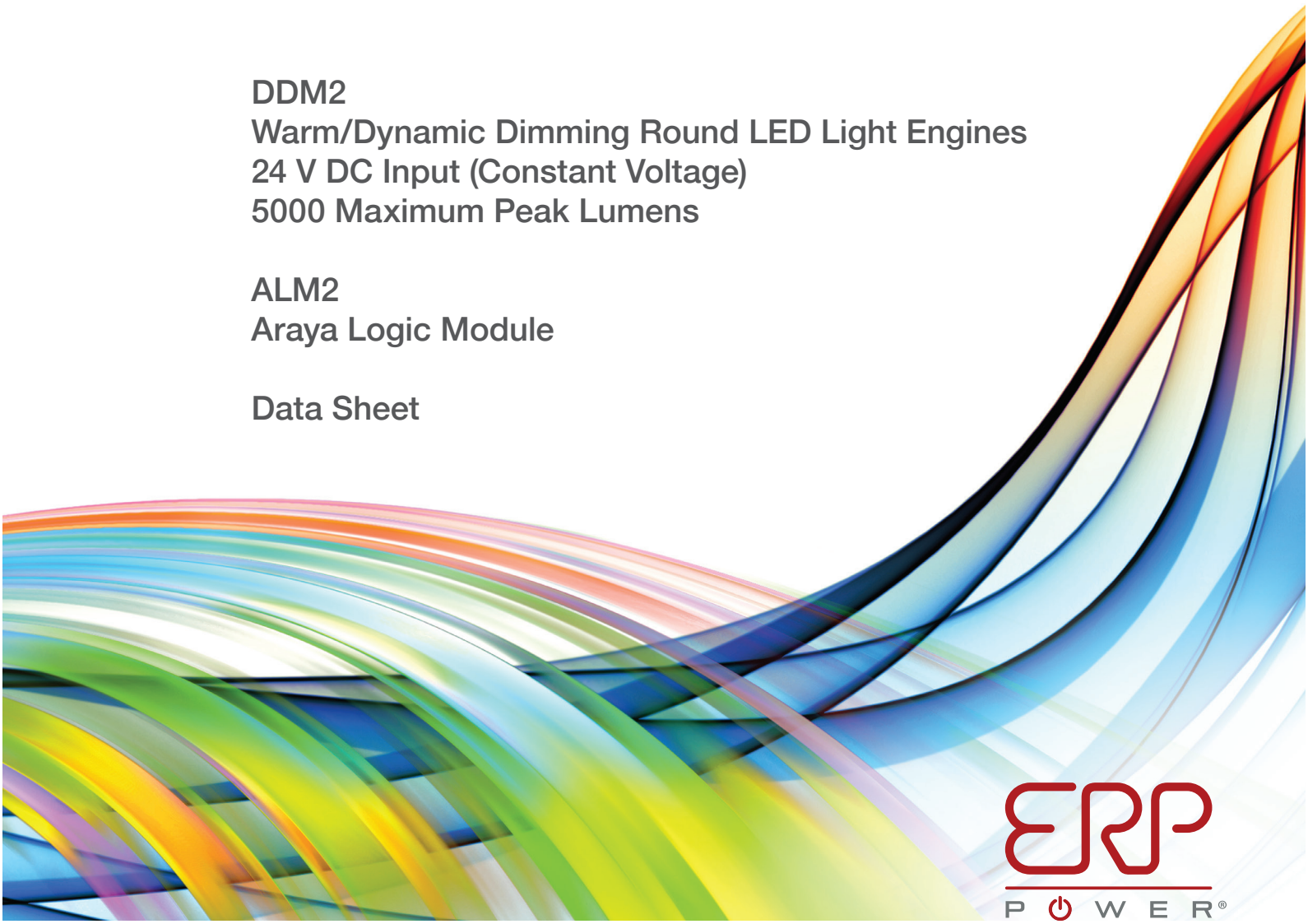
araya®

TUNABLE COLOR

DDM2
Warm/Dynamic Dimming Round LED Light Engines
24 V DC Input (Constant Voltage)
5000 Maximum Peak Lumens

ALM2
Araya Logic Module

Data Sheet



ERP POWER®

TABLE OF CONTENTS

1 Description and Key Features

2 Ordering Information

3 Electrical Specifications and Power Supplies

4 DDM2 Mechanical Specifications

5 ALM2 Mechanical Specifications

6 DMX512-A Control Card

7 Lutron® Control Card

8 Avi-on Wireless BLE Mesh Control Card

9 DALI Type 8 Control Card

10 Legrand Wattstopper DLM — LMLM Interface

11 Heat Sinking Recommendations

12 Case Temperature Measurement Points

13 Secondary Optics

14 Ribbon Cable Assemblies

15 Power / Control Cable Assemblies

16 0-10 V Wiring Diagram

17 Bluetooth Commissioning

18 DMX512 Wiring Diagram

19 Lutron EcoSystem Wiring Diagram

20 Avi-on Wireless BLE Mesh Network

21 DALI Type 8 Wiring Diagram

22 Pre-Installation Notes

ERP POWER®

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legrand® avi-on™ Simple Bluetooth® Controls LUTRON EcoSystem Enabled c UL us UL Recognized Component Dry or Damp Locations Class 2 Input FC Pb lead-free RoHS 2002/95/EC

1 DESCRIPTION AND KEY FEATURES

ALM2 – Araya Logic Module

DDM2

Light Emitting Surfaces: 9, 12, 19, 32 mm

Araya Logic Module (ALM)

Description

Araya Logic Modules (ALM) connect to tunable color high-power round LED light engines (DDM2) that mix five colors of LEDs to deliver tunable white light that warms as it dims at 90+ CRI* and color consistency of < 2 step MacAdam ellipse (SDCM). Delivered light dims from 3050 K at full intensity to 1800 K at 5% intensity, and then maintains 1800 K to 1%. An MR16 halogen dimming profile is offered.

The ALM is connected to one LED light engine via low-cost ribbon cables, and features on-board driver electronics and the Araya control logic for precise control of LED light output while tuning and dimming. On-board closed loop thermal feedback compensates each color channel for thermally induced variations in light output due to dimming or changes in ambient temperatures. On-board closed loop optical feedback measures the lumen depreciation of each channel and re-balances the color model to ensure color consistency over the 50,000 hour life of the LED light engine. A patented in-line manufacturing process captures and stores the spectral characteristics of each LED on the light engine, rapidly generating a unique color model for each light engine.

The Zhaga-compliant LED light engines are compatible with traditional 0–10 V wired controls and feature on-board Bluetooth Low Energy (BLE) for commissioning. The light engines can access DMX512-A-RDM, Legrand Wattstopper's Digital Light Management (DLM) control interface, DALI Type 8 or Lutron® EcoSystem inputs via an optional control card that connects to an electrically isolated expansion port within the ALM. For simple deployment, scene set allows up to five scenes to be pre-programmed into the LED light engine during production and recalled at the venue using a 0–10 V recommended dimmer or via Bluetooth. Commissioning of the LED light engine and the re-programming of scenes is done via the wireless Araya Tunable Color 2.0 iOS app that connects to the embedded Bluetooth radio.

The light engines can also access the patented wireless Avi-on™ Bluetooth Low Energy (BLE) Mesh platform to enable many-to-many device communication in a connected system "cloud", via an optional control card that connects to an electrically isolated expansion port within the ALM. The proprietary Avi-on mobile app (for iOS or Android) is used for setting up the network, commissioning the various system components, grouping devices, creating associated schedules and scenes, and providing manual adjustment of color temperature and/or intensity.

Key Features

- Dimming profile that warms as it dims—launching at 3050 K at full intensity, to 1800 K from 5% down to 1%
- 90+ CRI*
- Integrated driver electronics and Araya logic
- On board thermal and optical feedback for color consistency of < 2 step MacAdam ellipse over 50,000 hour life
- In-line spectral capture and storage creates an unique color model for each Zhaga-compliant LED light engine, resulting in consistent CRI and CCT across all light engines
- On-board thermal turndown
- Compatible with 0–10 V wired controls
- On-board Bluetooth Low Energy (BLE) for commissioning
- DMX512-A-RDM, Wattstopper DLM, DALI Type 8 or Lutron EcoSystem control accessibility via an optional control card that connects to an electrically isolated compartment within the ALM
- DMX slots set by RDM or via wireless Araya Tunable Color 2.0 iOS app
- Scene set enables up to five scenes to be preprogrammed and recalled using a 0–10 V recommended dimmer or via Bluetooth
- Avi-on BLE Mesh control accessibility via an optional control card that connects to an electrically isolated compartment within the ALM, with system setup, commissioning and control of networked devices using the proprietary Avi-on app

Tunable Color 2.0
iOS App

Avi-on App
iOS or Android

2 ORDERING INFORMATION

ALM2 – Araya Logic Module

2.1 Photometrics and Ordering Codes (DDM2 Kits)[1]

	Dimming Range/Profile	LES[3]	Peak Source Lumens	Peak Delivered Lumens[4]	Nominal Wattage (±10%)	Ordering Code
Specifications[2]	3050–1800 K (MR16 Profile)	31.6 mm	5000	4350	60 W	80.002.019.01
		19.7 mm	3000	2600	50 W	80.002.018.01
		12.6 mm	2000	1700	30 W	80.002.017.01
		9.6 mm	1500	990	20 W	80.002.016.01
CRI (Ra) Across Tuning Range	> 90*					
Dimming	100% to 1%, in increments of 1% at variable CCT					
Nominal Color Consistency	< 2 step MacAdam ellipse (±0.002 Duv from C78.377-2008 ANSI curve)*					
Color Consistency Over Life	Calibration maintains original color points over life*					
Lumen Maintenance	L70 (70% of initial lumens) at 50,000 hours					

1. Kits include round LED light engine and ALM2 with on-board 0–10 V and Bluetooth LE, as a factory pre-matched set which MUST be kept that way during installation for proper operation and control and CANNOT be separated. The kits do not include ribbon cables, power cables, control cables, or control cards (see below for accessory ordering specifications).
2. Specifications are within +/- 10% of the nominal value. Peak efficacy is not necessarily at typical peak lumens.
3. LES = Light Emitting Surface.
4. Peak delivered lumen values are listed for modules tested with the included dome diffuser.

*From 2000–3050 K, down to 5% dim level.

2.2 Accessories (Ordered Separately)

Qty.	Description	Ordering Code
1	18” long flexible tape-wrapped 16-pin ribbon cable (16-pin Tyco Connector at one end, 20-pin JST connector at other end) (for connecting ALM to round light engine)	28.700.004.02
1	18” long jacketed/round 16-pin ribbon cable (16-pin Tyco Connector at one end, 20-pin JST connector at other end) (for connecting ALM to round light engine)	28.700.003.03
1	18” long flat 16-pin ribbon cable (16-pin Tyco Connector at one end, 20-pin JST connector at other end) (for connecting ALM to round light engine)	28.700.001.05
1	24” long 2-wire ALM power cable assembly	28.030.001.01
1	24” long 4-wire ALM control cable assembly	28.002.002.02
1	DMX512-A-RDM Control Card***	80.003.002.01
1	Lutron® Control Card***	80.003.002.02
1	DALI Control Card***	80.003.004.01
1	Avi-on Wireless BLE Mesh Networking Control Card***	80.003.005.01
1	Legrand Wattstopper DLM - LMLM Interface***	80.003.003.03

***Control cards are shipped pre-attached to the ALM, & cannot be shipped individually.
Control cards for different controls should NOT be interchanged in the field. This will void the ERP Power warranty.

3 ELECTRICAL SPECIFICATIONS

3.1 Electrical Specifications (ARAYA LOGIC MODULE)

Input Voltage	24 V DC (Constant Voltage)
Nominal Power Input*	20 W, 30 W, 50 W, and 60 W
Nominal Current Input	0.83 A (20 W); 1.25 A (30 W); 2.08 A (50 W); 2.5 A (60 W)
Power Supply Classification	Class 2 (UP TO 100 W RATED POWER)
Power and Control Connector	Power Connector: Molex 5023520200; Control Connector: Molex 874380743
Ribbon Cable Connector (supplied by third parties)	TE Micro-Match 215460-4 (requires TE mating connector 2-215083-0)
Control Options**	0–10 V, DMX512-A-RDM, Wattstopper DLM, Lutron® EcoSystem, DALI Type 8, Avi-on BLE Mesh
CCT and Dimming Control Connections	Plug-in connector for 24 gauge leads

*Araya Logic Module (ALM) power dissipation is up to 10% of total power dissipation. Therefore ALM must be provided with adequate heat sink capability when applicable.
**DMX512-A-RDM, Lutron EcoSystem, DALI Type 8, Avi-on wireless BLE Mesh, or Wattstopper Digital Light Management control compatibility requires optional control card.

3.2 Control Specifications

CONTROL SYSTEM / PROTOCOL	1 DIMMING	NOTES
DMX512-A-RDM [1, 2]	1% (3050–1800 K) [3]	1. Requires control card connected to ALM. 2. Refer to the separate DMX Lookup Tables for specific programming values and information. 3. Factory setting or RDM command.
0–10 V	~1% (3050–1800 K) [4]	4. Factory setting.
LUTRON ECOSYSTEM [5, 6]	1% (3050–1800 K) [7]	5. Requires control card connected to ALM. 6. Refer to the separate Lutron EcoSystem Lookup Tables for specific programming values and information. 7. Factory setting.
AVI-ON (WIRELESS BLE MESH CONNECTIVITY) [8]	1% (3050–1800 K) [9]	8. Requires control card connected to ALM. 9. Factory setting.
DALI TYPE 8 [10]	1% (3050–1800 K) [11]	10. Requires control card connected to ALM. 11. Factory setting.
WATTSTOPPER DLM [12]	1% (3050–1800 K) [13]	12. Requires control card connected to ALM. 13. Factory setting.

3.3 Recommended Power Supplies (Constant Voltage)

Manufacturer	Part Number	Rated Power	9 mm DDM2 (20 W)	12 mm DDM2 (30 W)	19 mm DDM2 (50 W)	32 mm DDM2 (60 W)
Mean Well	APV-25-24	25 W	✓			
Efore / Roal	Strato RSLP035-24	35 W	✓			
Mean Well	APV-35-24	35 W	✓	✓		
ERP	VLM40W-24	40 W	✓	✓		
Amperor	ANP-101-24P1-277-2500L-1-P	60 W	✓	✓	✓	
ERP	VLM60W-24	60 W	✓	✓	✓	
Mean Well	IRM-60-24ST	60 W	✓	✓		
Mean Well	LPV-60-24	60 W	✓	✓	✓	
Efore / Roal	Strato RSLP070-24	70 W	✓	✓	✓	✓
Mean Well	LPF-90-24	90 W	✓	✓	✓	✓
ERP	VLM100W-24	96 W	✓	✓	✓	✓
Mean Well	GST120A24-R7B	120 W	✓*	✓*	✓*	✓*

IMPORTANT

The Araya Logic Module (ALM) has on-board drive electronics, including dimming. A dimming driver should NOT be used.

CAUTION:

- Using a constant current power supply will damage the module, and will void the ERP Power warranty.
- Using a triac or dimming driver will damage the module, and will void the ERP Power warranty.
- The power supply MUST be evaluated with the module(s) that it will be operated with.
- If a recommended power supply from the above list is not used, it will void the ERP Power warranty.
- If unqualified power supplies are used in a fixture, it will void the ERP Power warranty.
- It is the responsibility of the fixture manufacturer to ensure that the power supply performance does not change over time. The ERP Power warranty is void if problems occur as a result of such changes.

*U.L. CLASS 1 — NON-NORTH AMERICA ONLY.

NOTES:

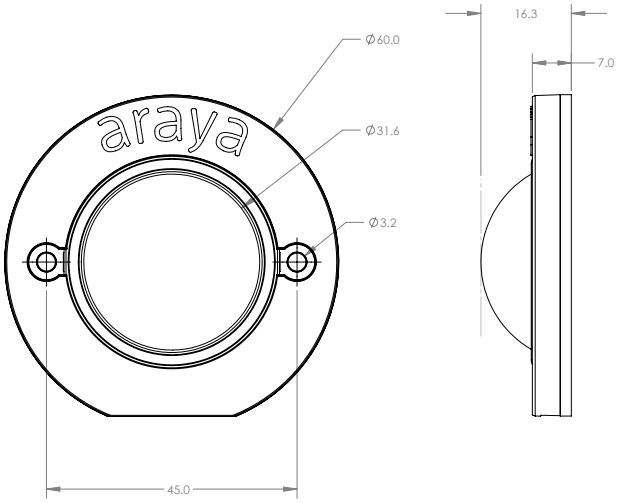
- Recommendations are subject to change. Consult your ERP Power representative for the most updated list.
- Please contact the power supply manufacturer to verify that the current version of the listed power supply still meets the latest ERP Power testing approvals / qualifications.
- Power supply qualification process:: if a power supply that is not part of the above list is submitted for testing to ERP Power (during the design-in phase), it will be qualified or disqualified within two weeks of submission.

4 DDM2 MECHANICAL SPECIFICATIONS

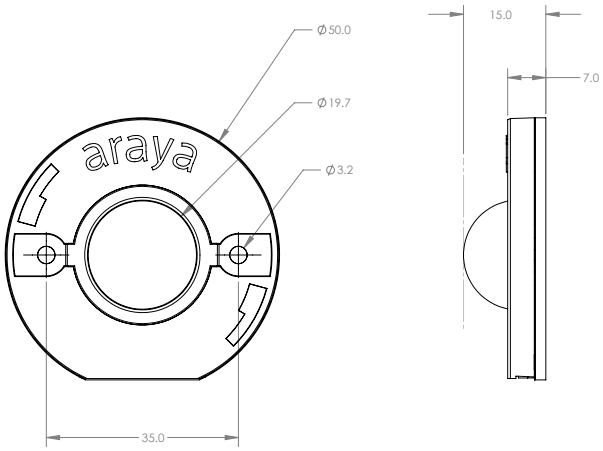
Round LED Light Engine Kits

Light Engine Dimensions (LES; Diameter 'D'; Height 'H')	LES = 31.6 mm (nominal 1.24 in.)	D = 60 mm (nominal 2.36 in.); H = 16.3 mm (nominal 0.64 in.)
	LES = 19.7 mm (nominal 0.78 in.)	D = 50 mm (nominal 1.97 in.); H = 15 mm (nominal 0.59 in.)
	LES = 12.6 mm (nominal 0.50 in.)	D = 50 mm (nominal 1.97 in.); H = 12.9 mm (nominal 0.51 in.)
	LES = 9.6 mm (nominal 0.38 in.)	D = 40 mm (nominal 1.57 in.); H = 10.1 mm (nominal 0.40 in.)

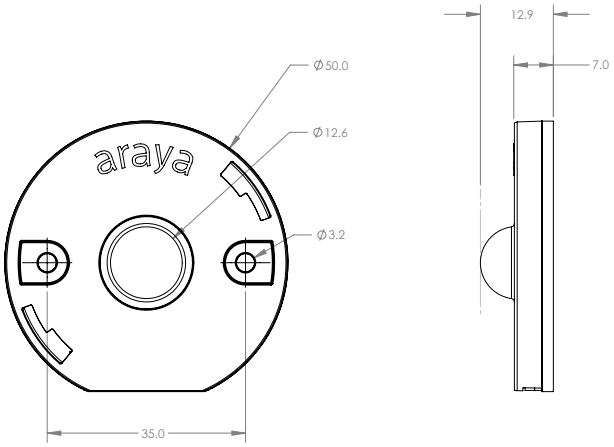
LES = Light Emitting Surface.



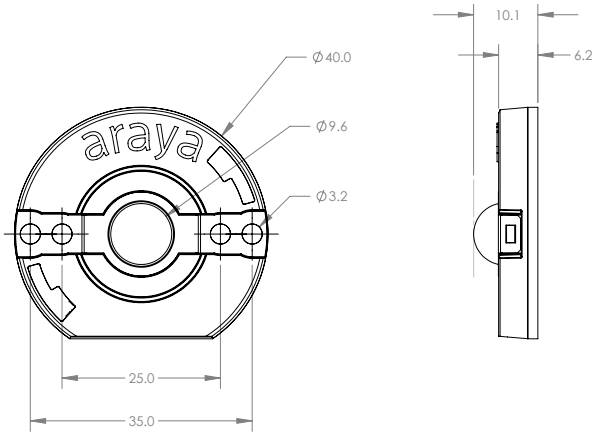
Round LED Light Engine (31.6 mm LES; 5000 lm)



Round LED Light Engine (19.7 mm LES; 3000 lm)



Round LED Light Engine (12.6 mm LES; 2000 lm)



Round LED Light Engine (9.6 mm LES;1500 lm)

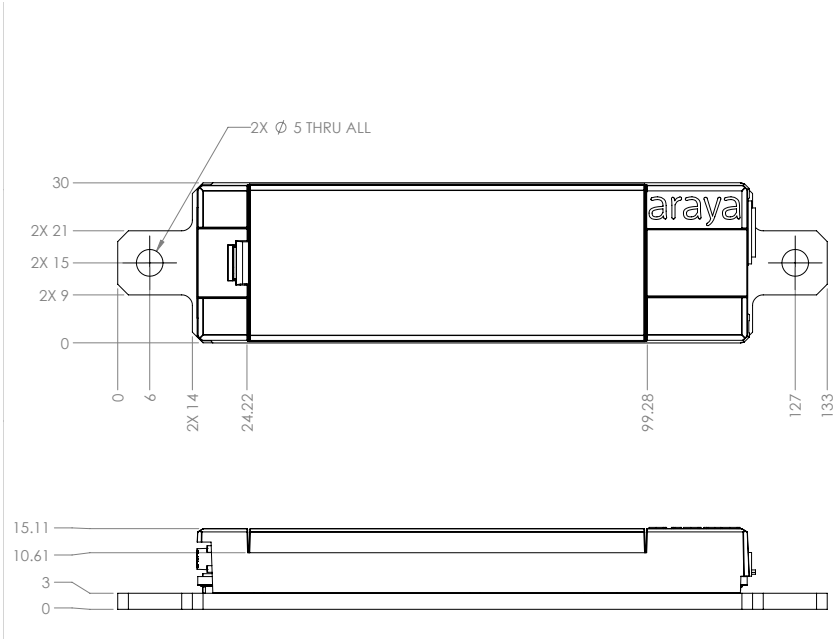
All dimensions are in millimeters.

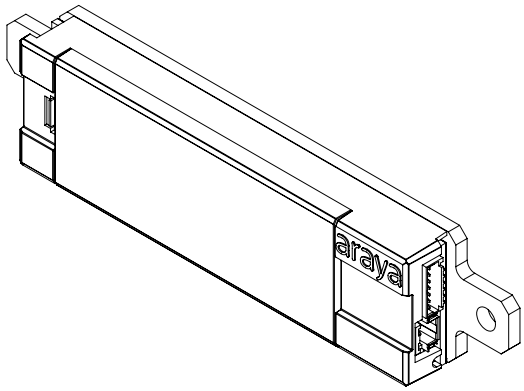
5 ALM2 MECHANICAL SPECIFICATIONS

Araya Logic Module

ALM2 Dimensions (H x W x L)	H = 15.11 mm (0.60 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in)

Dimensions provided are for the ALM2 without optional control cards.





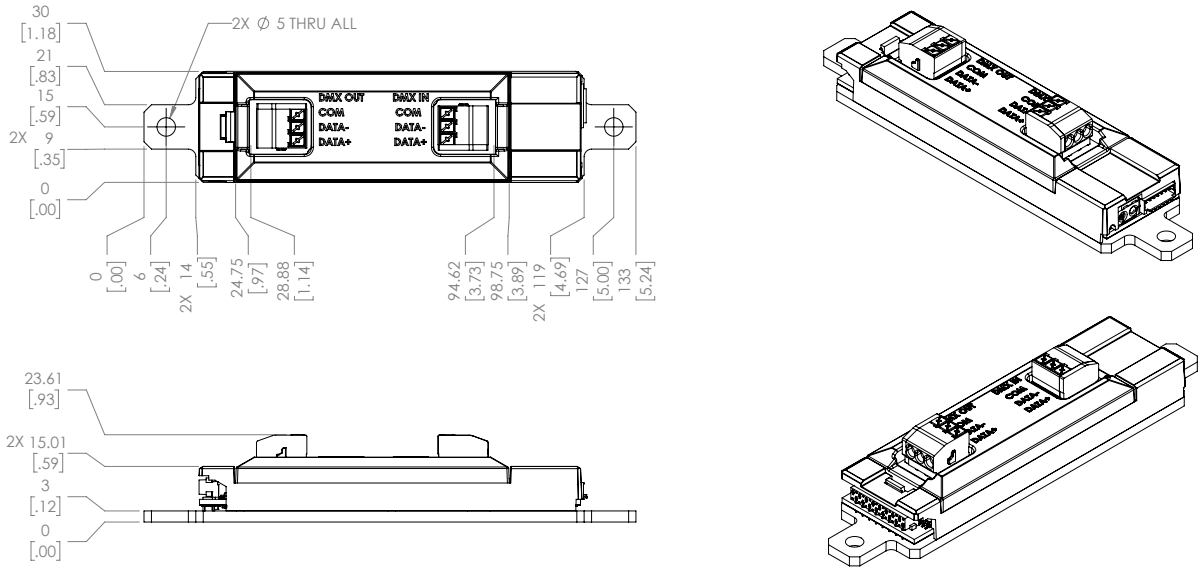
Araya Logic Module (ALM)

All dimensions are in millimeters. The mounting holes are 5 mm in diameter.

6 DMX512-A CONTROL CARD

6.1 ALM with DMX512-A-RDM Control Card (WAGO CONNECTORS)

ALM Dimensions (H x W x L)	H = 23.61 mm (0.93 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in.)

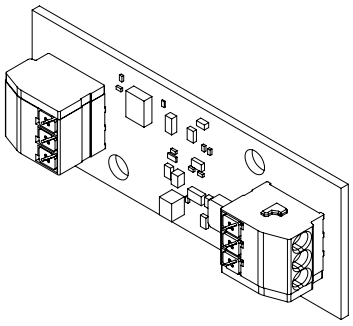


ALM with DMX Control Card and Cover

Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.
The mounting holes are 5 mm in diameter.

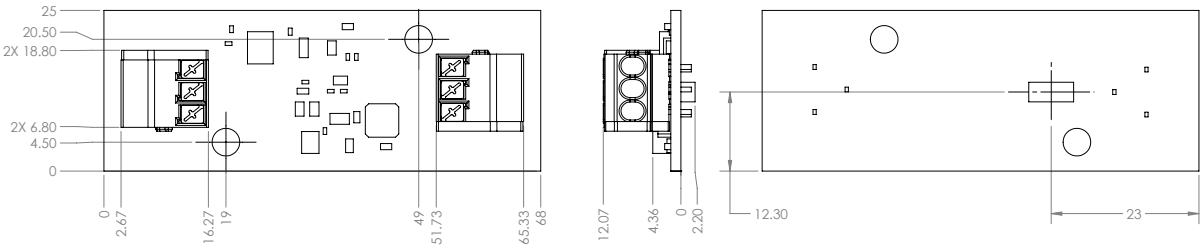
6.2 Mechanical Specifications – DMX512-A-RDM Control Card (WAGO CONNECTORS)

Part Number:
80.003.002.01



Wire Specifications:
22-24 AWG, stranded tinned copper (TC) only

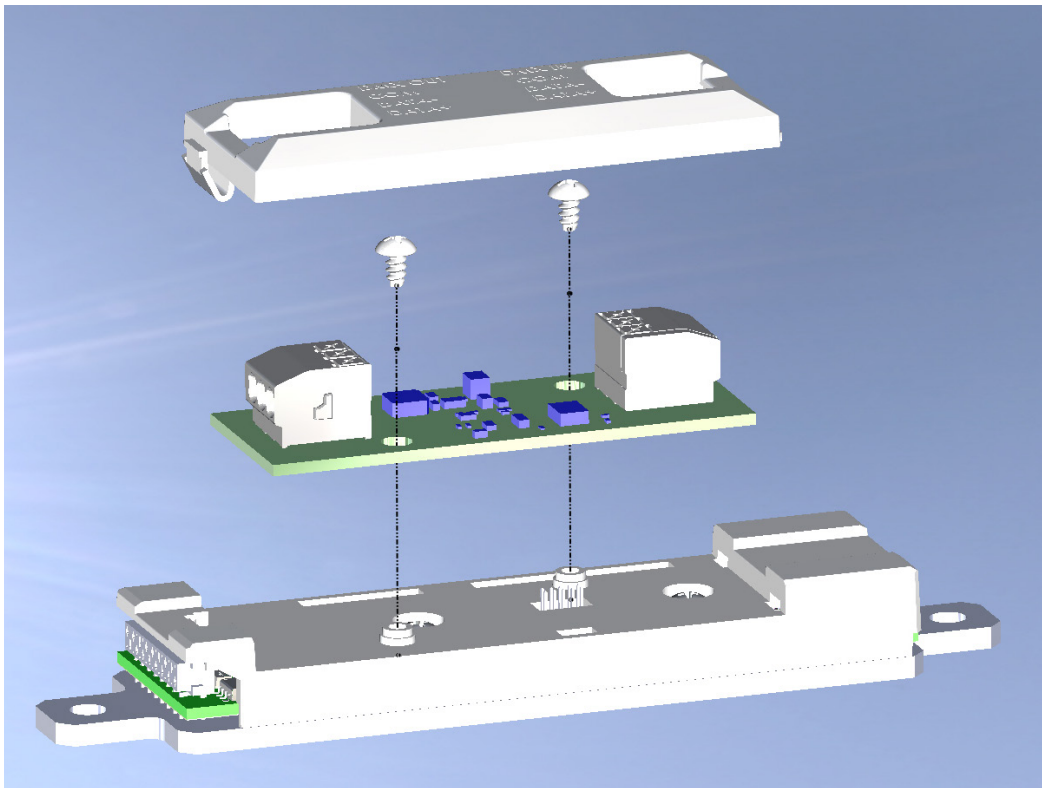
Connector:
Wago 805



DMX Control Card

All dimensions are in millimeters.

6.3 Mounting Specifications – DMX Control Card (WAGO CONNECTORS)



The Control Card is mounted on the 10-pin header and located on the two bosses, and then captured in place to the ALM with two (2) self-tapping screws.

Screw Specifications: Phillips Rounded Head Thread-Forming Screws for Plastic, 18-8 Stainless Steel, Number 4 Size, 1/8" Long;
McMasterCarr # 99461A105.

Torque Specifications: 2.0 to 2.5 in-lb

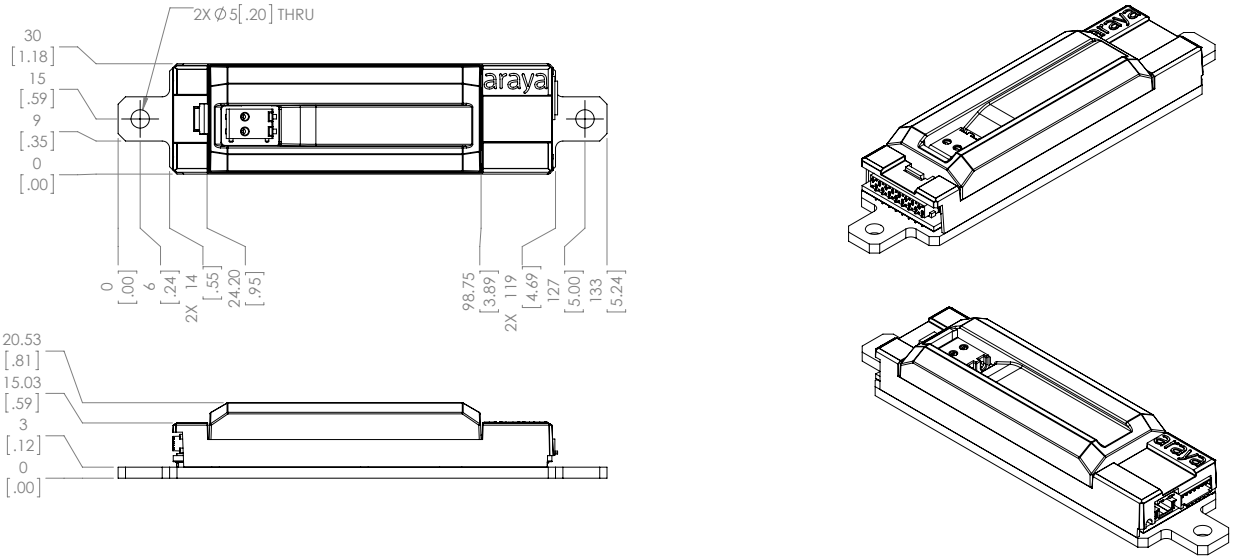
CAUTION: The screws are very small and are self-threaded into small plastic bosses. Overtorquing will strip the plastic and damage the ALM housing.

7 LUTRON CONTROL CARD

ALM2 – Araya Logic Module

7.1 ALM with Lutron® EcoSystem Control Card

ALM Dimensions (H x W x L)	H = 20.53 mm (0.81 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in.)

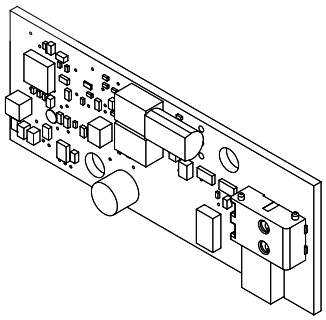


ALM with Lutron Control Card and Cover

Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.
The mounting holes are 5 mm in diameter.

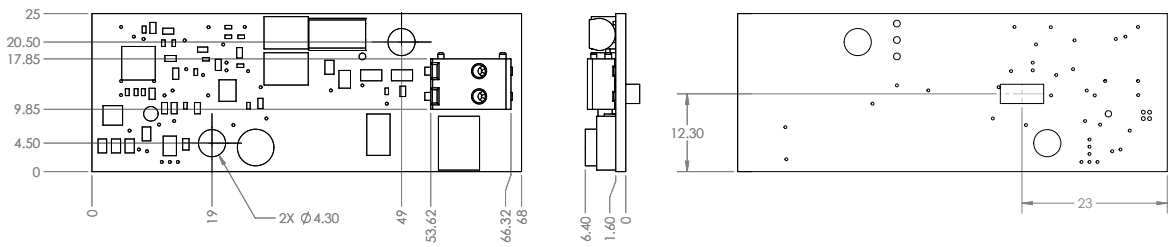
7.2 Mechanical Specifications (Lutron EcoSystem Control Card)

Part Number:
80.003.002.02



Wire Specifications:
18-22 AWG, solid wire or tin-dipped stranded

Connector:
TE 2834006-2

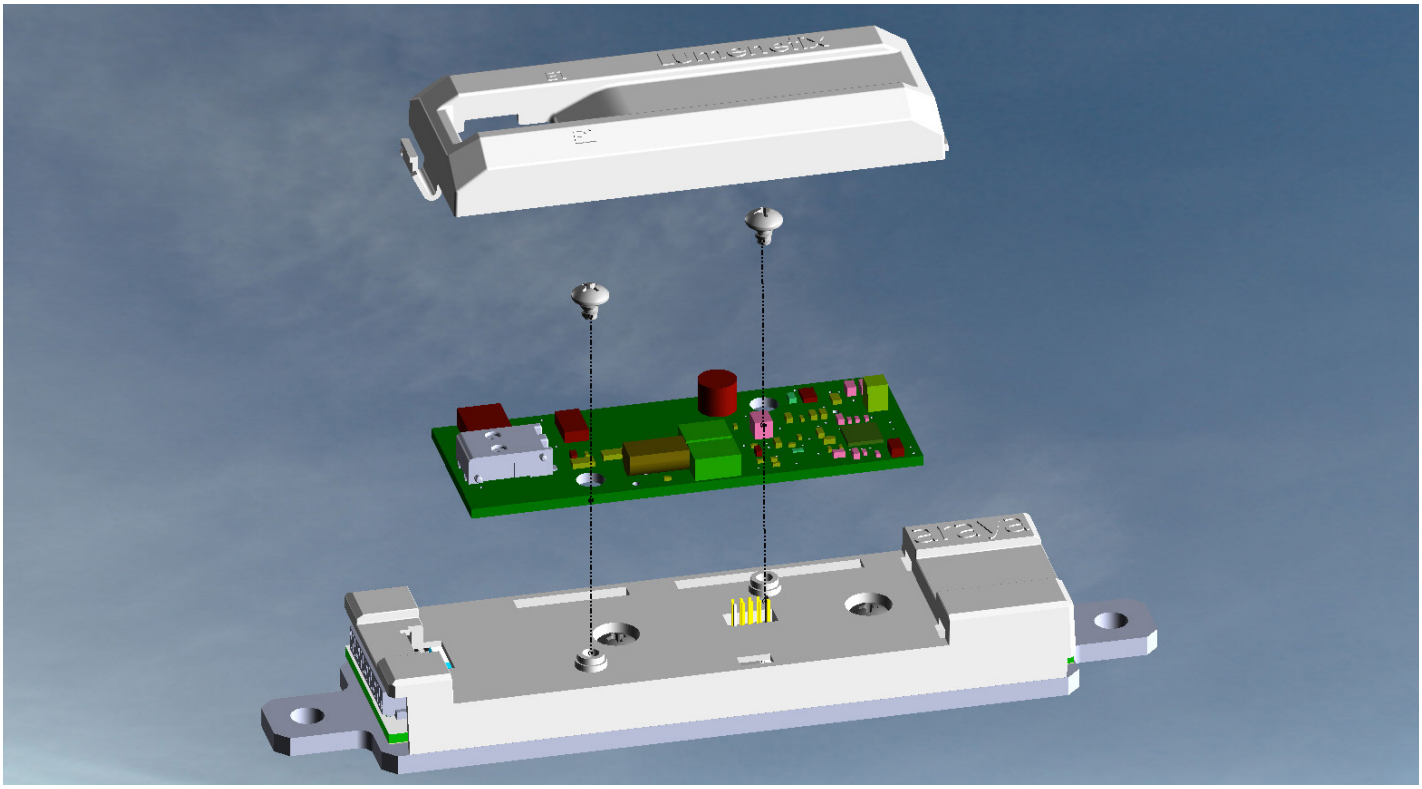


Lutron Control Card

All dimensions are in millimeters.

7 LUTRON CONTROL CARD

7.3 Mounting Specifications (Lutron® EcoSystem Control Card)



The Control Card is mounted on the 10-pin header and located on the two bosses, and then captured in place to the ALM with two (2) self-tapping screws.

Screw Specifications: Phillips Rounded Head Thread-Forming Screws for Plastic, 18-8 Stainless Steel, Number 4 Size, 1/8" Long;
McMasterCarr # 99461A105.

Torque Specifications: 2.0 to 2.5 in-lb

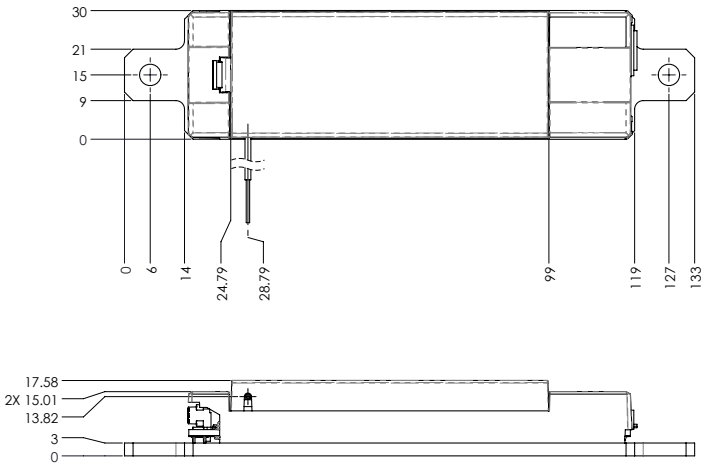
CAUTION: The screws are very small and are self-threaded into small plastic bosses. Overtorquing will strip the plastic and damage the ALM housing.

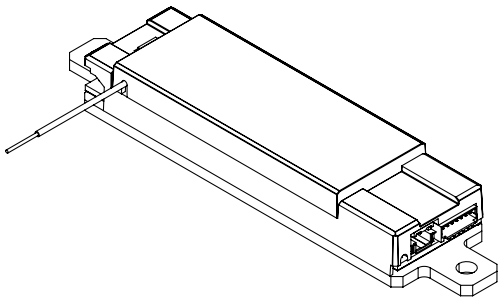
8 AVI-ON BLE MESH CONTROL CARD

ALM2 – Araya Logic Module

8.1 ALM with Avi-on Wireless BLE Mesh Control Card

ALM Dimensions (H x W x L)	H = 17.58 mm (0.69 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in.)



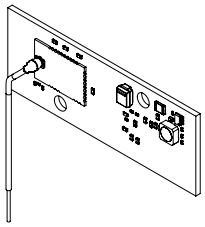


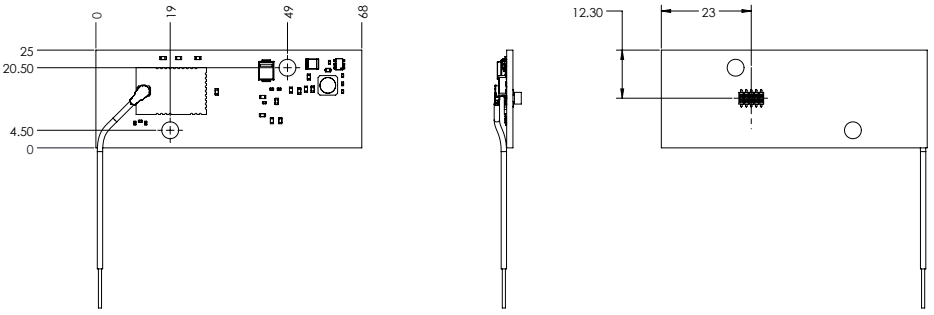
ALM with Avi-on BLE Mesh Control Card and Cover

Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.
The mounting holes are 5 mm in diameter.

8.2 Mechanical Specifications – Avi-on Wireless BLE Mesh Control Card (with Antenna)

Part Number:
80.003.005.01



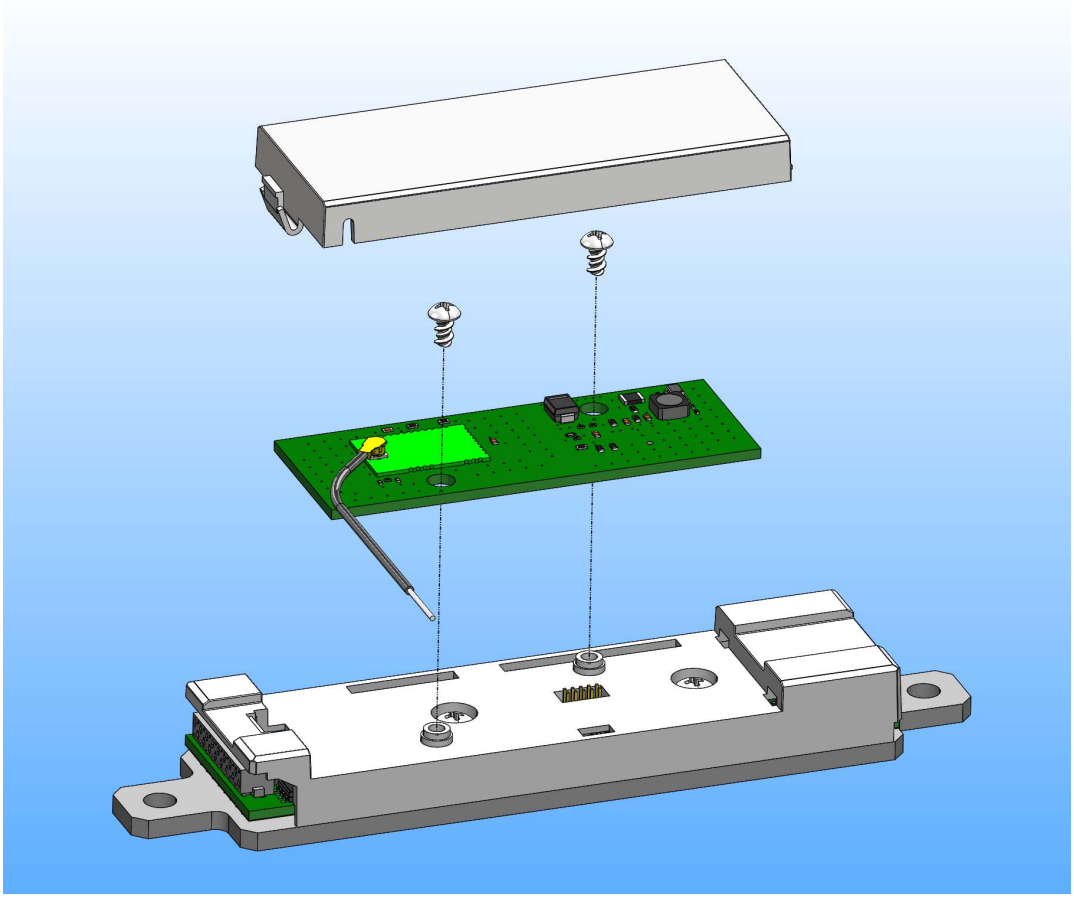


Avi-on BLE Mesh Control Card

All dimensions are in millimeters.

8 AVI-ON BLE MESH CONTROL CARD

8.3 Mounting Specifications – Avi-on Wireless BLE Mesh Control Card

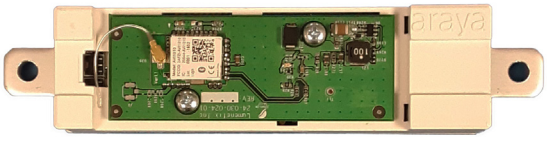


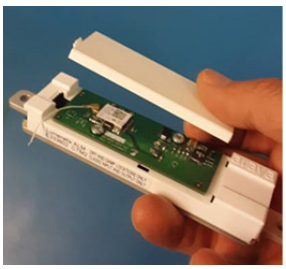
The Control Card is mounted on the 10-pin header and located on the two bosses, and then captured in place to the ALM with two (2) self-tapping screws.

Screw Specifications: Phillips Rounded Head Thread-Forming Screws for Plastic, 18-8 Stainless Steel, Number 4 Size, 1/8" Long;
McMasterCarr # 99461A105.

Torque Specifications: 2.0 to 2.5 in-lb

CAUTION: The screws are very small and are self-threaded into small plastic bosses. Overtorquing will strip the plastic and damage the ALM housing.

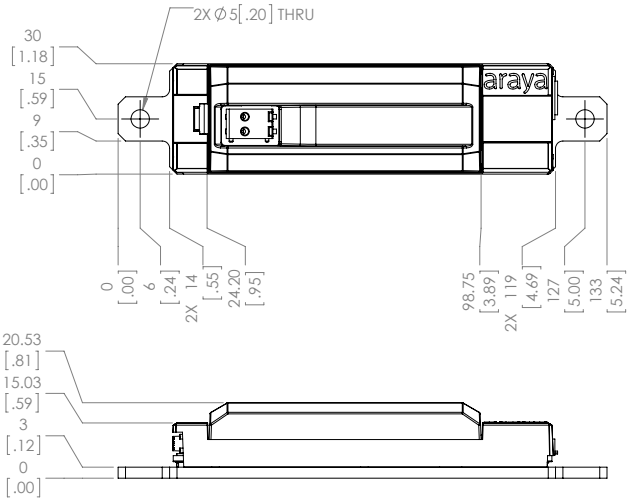


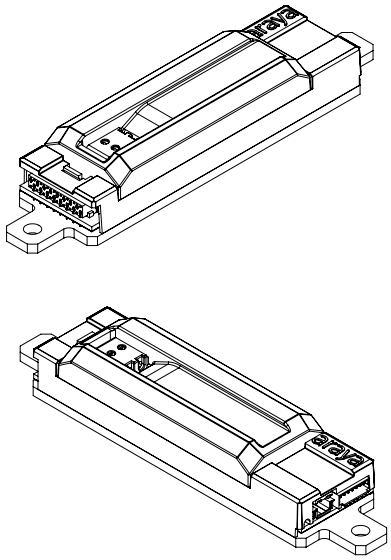


9 DALI TYPE 8 CONTROL CARD

9.1 ALM with DALI Type 8 Control Card

ALM Dimensions (H x W x L)	H = 20.53 mm (0.81 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in.)



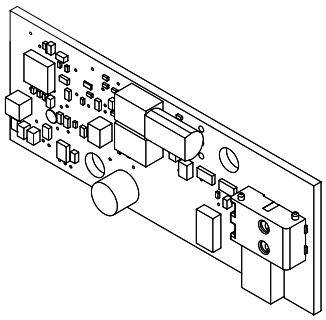


ALM with DALI Control Card and Cover

Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.
The mounting holes are 5 mm in diameter.

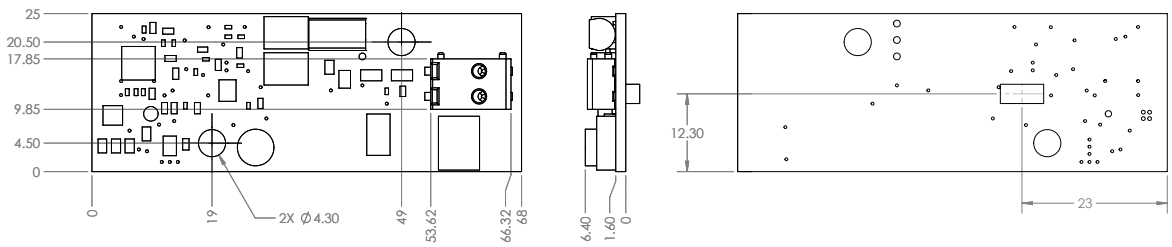
9.2 Mechanical Specifications (DALI Type 8 Control Card)

Part Number:
80.003.004.01



Wire Specifications:
18-22 AWG, solid wire or tin-dipped stranded

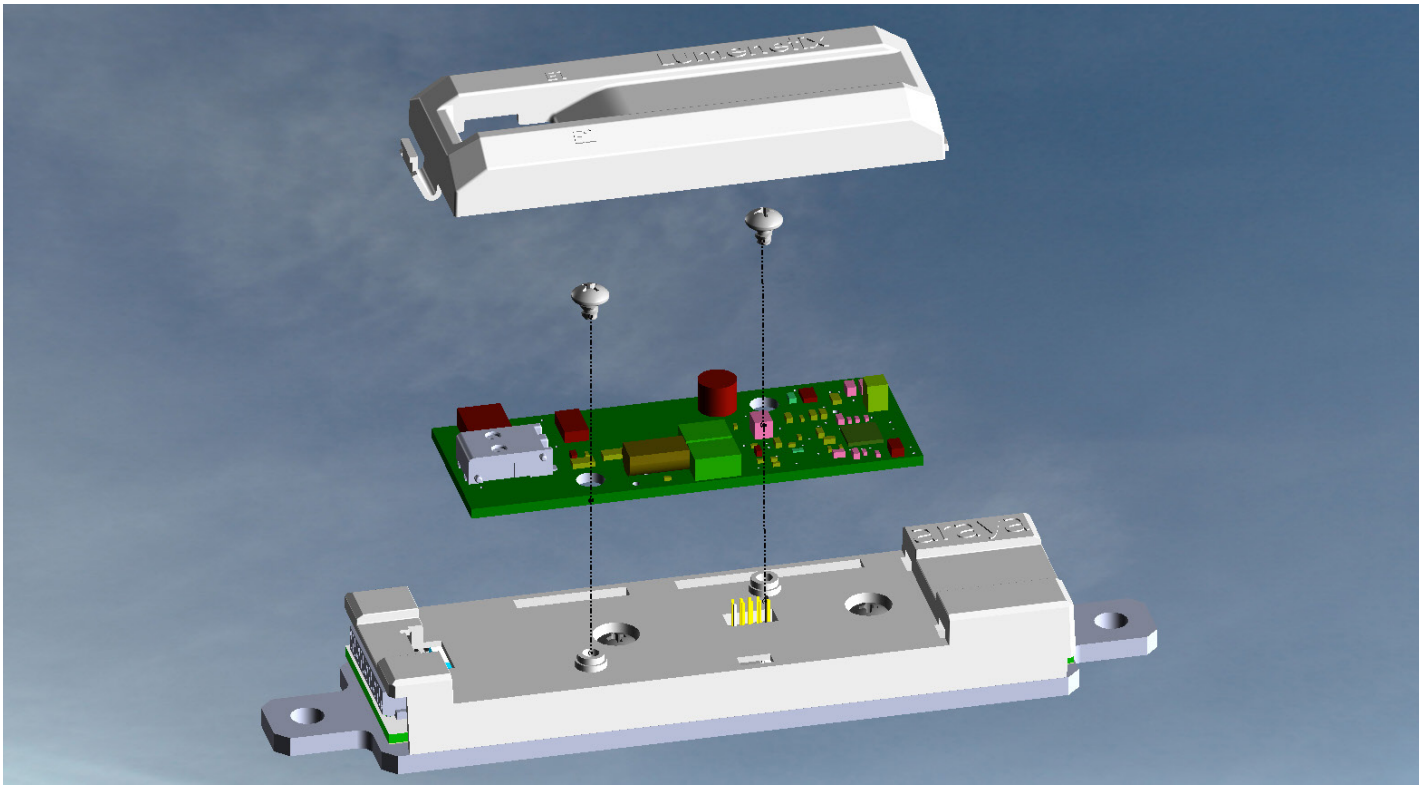
Connector:
TE 2834006-2



DALI Control Card

All dimensionss are in millimeters.

9.3 Mounting Specifications (DALI Type 8 Control Card)



The Control Card is mounted on the 10-pin header and located on the two bosses, and then captured in place to the ALM with two (2) self-tapping screws.

Screw Specifications: Phillips Rounded Head Thread-Forming Screws for Plastic, 18-8 Stainless Steel, Number 4 Size, 1/8" Long;
McMasterCarr # 99461A105.

Torque Specifications: 2.0 to 2.5 in-lb

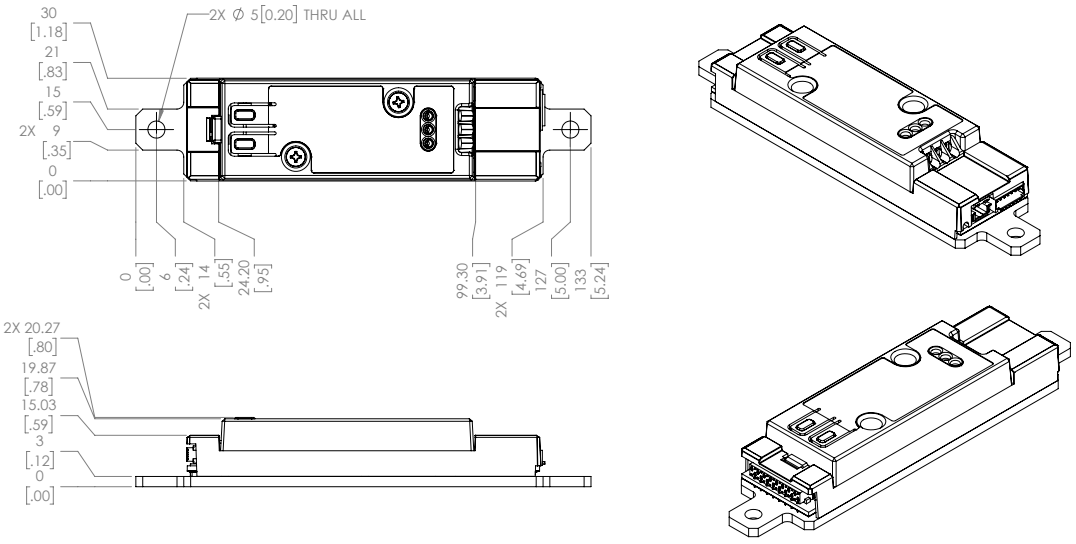
CAUTION: The screws are very small and are self-threaded into small plastic bosses. Overtorquing will strip the plastic and damage the ALM housing.

10 WATTSTOPPER DLM — LMLM INTERFACE

ALM2 – Araya Logic Module

10.1 ALM with Legrand Wattstopper's DLM LMLM Interface

ALM Dimensions (H x W x L)	H = 20.27 mm (0.80 in.); W = 30 mm (1.18 in.); L = 133 mm (5.24 in.)



ALM with LMLM Interface and Cover

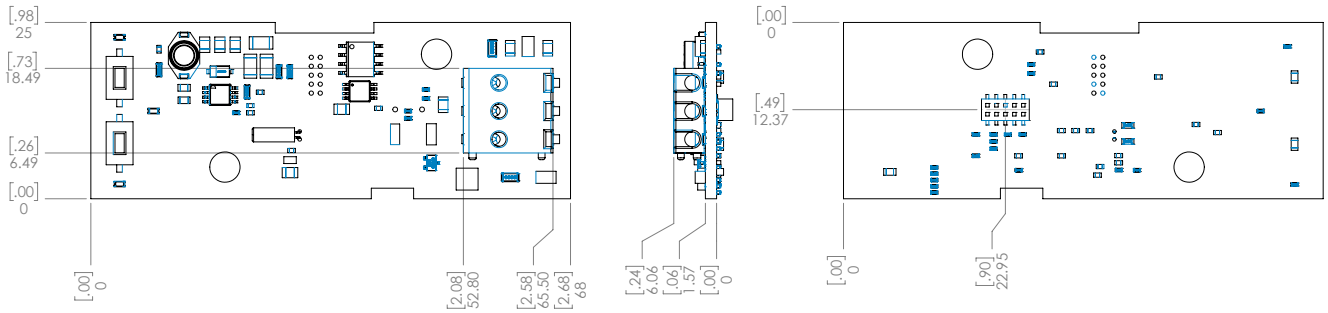
Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.
The mounting holes are 5 mm in diameter.

10.2 Mechanical Specifications (LMLM Interface)

Part Number:
80.003.003.03

Wire Specifications:
Solid 20/3 AWG, red/blue/black

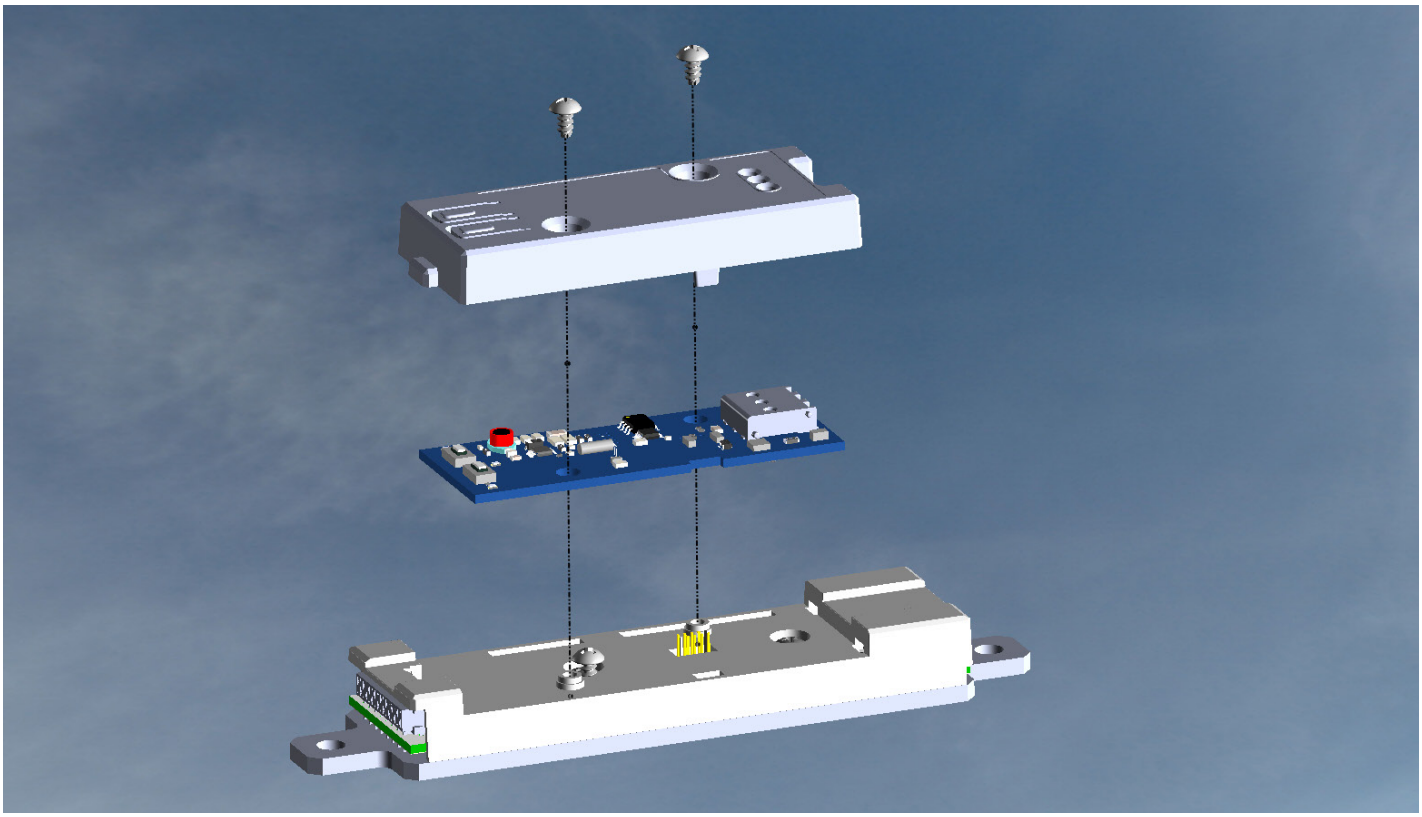
Connector:
TE 2834006-3



Legrand Wattstopper DLM LMLM Interface

Dimensions outside parentheses are in millimeters. Dimensions within parentheses are in inches.

10.3 Mounting Specifications (LMLM Interface)



The LMLM Interface is mounted on the 10-pin header and located on the two bosses, and then captured in place to the ALM with two (2) self-tapping screws.

Screw Specifications: Phillips Rounded Head Thread-Forming Screws for Plastic, 18-8 Stainless Steel, Number 4 Size, 1/8" Long;
McMasterCarr # 99461A105.

Torque Specifications: 2.0 to 2.5 in-lb

CAUTION: The screws are very small and are self-threaded into small plastic bosses. Overtorquing will strip the plastic and damage the ALM housing.

Please refer to the Legrand Wattstopper website for detailed specifications, wiring diagrams and installation instructions.

11 HEAT SINKING RECOMMENDATIONS

The DDM requires an external heat sink in order to ensure proper operating temperature of the LEDs.
The DDM has a conductive aluminum case and an efficient thermal path to the LED light engine. These features promote efficient thermal management and allow for a simple heat sink design in most applications.

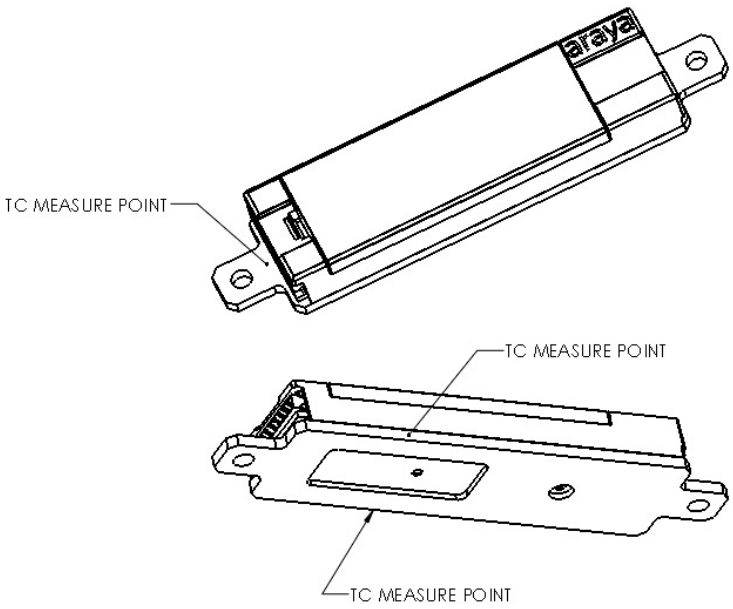
Examples of heat sinking methods are cast or extruded heat sinks. Both carbon and stainless steel are much less efficient at transferring heat than aluminum and therefore are not recommended as heat sink materials. The heat sink mounting surface should be flat and smooth. Metal-to-metal contact surfaces will result in best performance; anodized or unfinished mounting surfaces are recommended. Mounting the DDM on a painted aluminum surface will reduce the performance of the heat sink material.

In many fixtures, the air flow to the heat sinks is obstructed or the heat sink is in an enclosed container with no path to reject heat. The thermal design of the fixture must be optimized so that the maximum temperature is less than the Tc_{max} (maximum case temperature) as indicated in the drawings in the following section. If the Tc_{max} is exceeded in the application, the junction temperature of the LEDs will be higher than that required to meet the L70 life, and the ERP Power warranty will be void.

IMPORTANT: Most heat sinks are qualified in “free air” at an approximate ambient temperature of 25 °C. If the DDM is installed in an insulated can fixture (IC Can), the module may exceed the recommended operating temperature. The heat sink must be evaluated and temperature tested in the fixture at applicable ambient temperatures for the desired application.

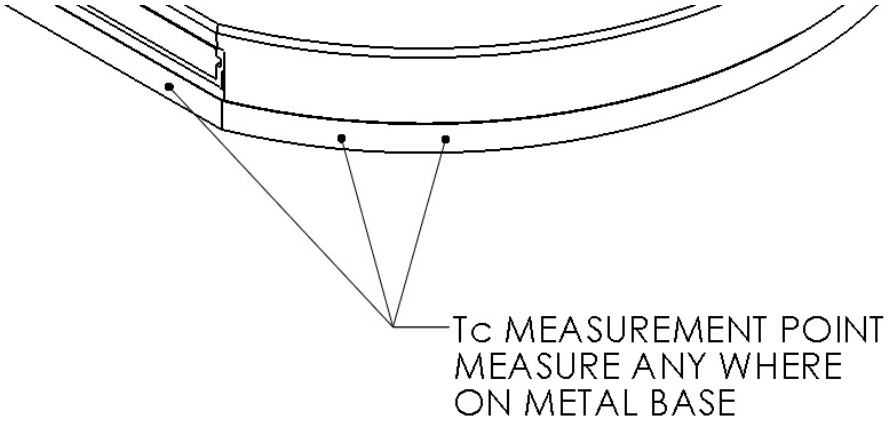
12 CASE TEMPERATURE MEASUREMENT

12.1 Araya Logic Module (ALM) Case Temperature (Tc) Measurement Points



MAXIMUM CASE TEMPERATURE (T_c) FOR ALM: 70 °C

12.2 Round LED Light Engine Case Temperature (Tc) Measurement Point



MAXIMUM CASE TEMPERATURE (T_C) FOR ROUND LED LIGHT ENGINE: 90 °C

c UL us
UL Recognized Component
Dry or Damp Locations Class 2 Input

13.1 Attaching Compatible Reflectors for DDM2

The round LED light engines with 19 mm LES (Light Emitting Surface) accept twist-to-lock reflectors with an attachment collar. The fastener specifications are shown in the following table while mounting hole locations are shown in Figures 1, 2 and 3.

DDM2 Secondary Optics Fastener Specifications:

Attachment Type	Fastener specifications	Screw length	Notes
Twist-Lock (with Adaptor Ring)	M3 x 6; quantity of two	6 mm (1/4”)	Pan head screws
Twist-Lock (with Adaptor Ring & Adaptor)	M3 x 6; quantity of two	6 mm (1/4”)	Pan head screws
TE Type 2 Clip	M3 x 10; quantity of two	10 mm (3/8”)	Rounded head screws

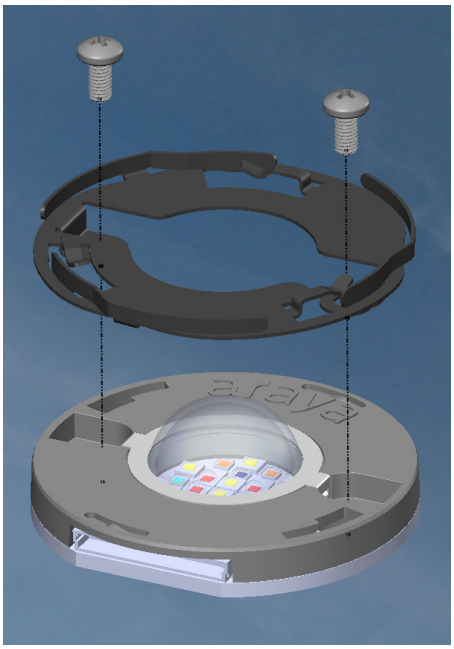


Figure 1: Round LED Light Engine with XSA-242 Adaptor Ring (by Xicato)

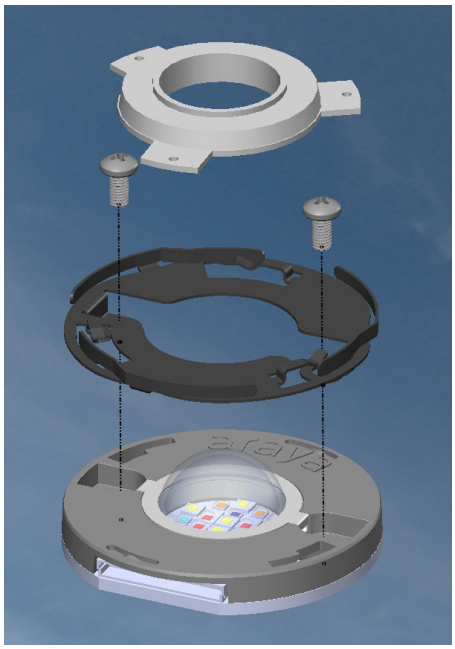


Figure 2: Round LED Light Engine with XSA-242 Adaptor Ring (by Xicato) with Adaptor, used for Reflectors by Diffractive Optics (p/n: P14008) or Khatod (p/n: KE1950W)

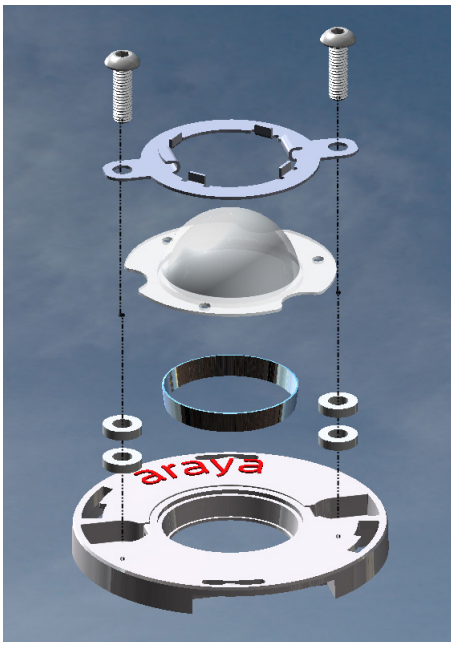


Figure 3: Round LED Light Engine with Lumawise Z50 Type 2 Clip (by TE)

13.2 Compatible Reflectors List (DDM219)

Compatible Reflectors for 19 mm LES round LED light engines **(continued on next page)**

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Diffractive Optics	P13302 (XSA-220)	40	50	29	specular	none	XSA242
Diffractive Optics	P13004 (XSA-221)	40	49.3	28.6	specular	faceted	XSA242
Diffractive Optics	P13008 (XSA-223)	40	54.1	42.3	specular	none	XSA242
Diffractive Optics	P13010 (XSA-224)	20	70	42	specular	none	XSA242
Diffractive Optics	P13016 (XSA-227)	20	94.3	83	specular	faceted	XSA242
Diffractive Optics	P13825	10-15	69	33	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13827	20	69	33	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13829	30	69	33	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13765	10-15	75	42.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13767	20	75	42.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13831	30	75	42.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13769	10-15	85	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13771	20	85	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13833	30	85	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13773	10-15	92	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13775	20	92	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13781	30	92	43.3	specular	superfacet, diamond	XSA242 + P14008
Diffractive Optics	P13713	20	75	37	specular	faceted	XSA242 + P14008
Diffractive Optics	P13715	35	75	37	specular	faceted	XSA242 + P14008
JORDAN	11324 10 10101	25	111	66	specular	super facet	none
JORDAN	11324 00 10101	40	111	66	specular	super facet	none
Khatod EASY	KCLP 1858CR	12	72	52	combination	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1858ME	30	72	52	honeycomb lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1858WI	50	72	52	bugeye lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1859CR	12	110	61	combination	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1859ME	30	110	61	honeycomb lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1859WI	50	110	61	bugeye lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1799 CR	asym			specular	none	Zhaga Screw 35mm
Khatod	KCLP 1682 CR (1429CR)	11	65	35	specular	none	TE Type II / XSA242 + KE1950W
Khatod	KCLP 1682 ST (1429ST)	20	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1683 CR (1430CR)	26	65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1683 ST (1430ST)	24	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1431 CR		65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1432 CR		65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1685 ST (1432ST)	32	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1684 ST	28	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1686 CR	44	65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1687 CR	27	65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1687 ST	31	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1688 CR	37	65	35	specular	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1688 ST	38	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1689 ST	42	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1690 ST	50	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	KCLP 1691 ST	56	65	35	diffuse	none	TE Type II / XSA242 + KE1950W
khatod	PLJT 1866	n/a			diffuse ball		XSM242

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP Power, and should be used as guidelines.

Final reflector evaluation should be made by fixture manufacturers with all optics in place.

13.3 Compatible Reflectors List (DDM219)

Compatible Reflectors for 19 mm LES round LED light engines **(continued from previous page)**

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Nata	3990-E	24	75	43	diffuse	super facet	none
Nata	3991-E	36	75	43	diffuse	super facet	none
Nata	3993-E	40	85	50.5	diffuse	super facet	none
Nata	2-1050A	25	65	44	satin	none	XSA242
Nata	2-1131E	18	68	51	m-diffuse	facets	XSA242
Nata	2-1132E	30	68	51	m-diffuse	super facet	XSA242
Nata	2-1133E	45	68	51	m-diffuse	super facet, flare	XSA242
Nata	4-1150E5	39	111	65	m-diffuse	super facet	none
Nata	4-1405E	16	98	66.4	specular	facets	none
Nata	4-1406E				diffuse	super facet	none
Nata	2-1535E				m-diffuse	super facet	none
Nata	4-1536E	20	110	65.3	m-diffuse	super facet	none
Nata	4-1537E	30	110	62	diffuse	super facet	none
Nata	4-1664E	24	111	65	m-diffuse	super facet	none / 3 tabs
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs
Nata	3-1901M	28	79	51	m-diffuse	super facet	XSA242
Nata	3-1903M	40	79	51	m-diffuse	super facet	XSA242
Nata	4-1966E	7	111	65	m-diffuse	super facet	XSA242
Widegerm	1009T-XC	38	49	30.5	specular	faceted	XSA242
Widegerm	1010T-XC	55	50	30.5	specular	none, trumpet	XSA242
Widegerm	208x-XM		71.5	54	satin	lightfaceted	XSA242
Widegerm	2201T-XM	19	72	44	m-diffuse	faceted	XSA242
Widegerm	2202T-XM	35	72	44	m-diffuse	faceted	XSA242
Widegerm	3150T-XM	17	75	48	m-specular	faceted	XSA242
Widegerm	3204T-XM	27	82	46	m-diffuse	faceted	XSA242
Widegerm	3205T-XM	36	82	46	specular	faceted	XSA242
Widegerm	3207T-XC	-	82	46	satin	none	XSA242
Widegerm	4219T-XM	20	111	36	diffuse	faceted	XSA242
Widegerm	4220T-XM	37	111	36	m-specular	faceted	XSA242
Widegerm	4221T-XM	47	111	36	m-specular	faceted	XSA242
Widegerm	4301T-XM	36	111	69	m-diffuse	faceted	XSA242
Widegerm	4401T-XM	43	111	69	m-diffuse	faceted	XSA242

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP Power, and should be used as guidelines. Final reflector evaluation should be made by fixture manufacturers with all optics in place.

13.4 Compatible Reflectors List (DDM232)

Compatible Reflectors for 32 mm LES round LED light engines

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Jordan	11324 10 10101	25	111	66	specular	super facet	none
Jordan	11324 00 10101	40	111	66	specular	super facet	none
Nata	4-1150E5	39	111	65	m-diffuse	super facet	none
Nata	4-1536E	20	110	65.3	m-diffuse	super facet	none
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs

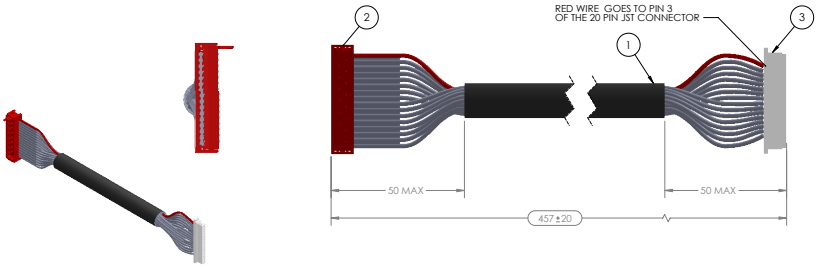
NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP Power, and should be used as guidelines. Final reflector evaluation should be made by fixture manufacturers with all optics in place.

14 RIBBON CABLE ASSEMBLIES

14.1 Flexible Tape-Wrapped 16-Pin Ribbon Cable (Nominal 18” Length)

Part Number:
28.700.004.02

16-pin Tyco Connector at one end, 20-pin JST connector at other end; for connecting ALM to round light engine.

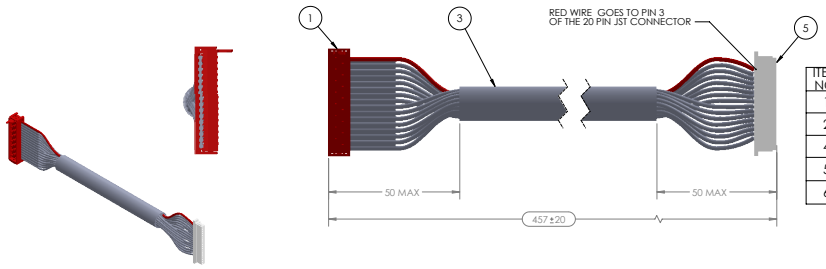


ITEM NO.	PART NUMBER	QTY.
1	16 PIN RIBBON CABLE 3M 3365-16 WRAPPED WITH BLACK ACETATE CLOTH TAPE	1
2	16 PIN CONNECTOR 1-215083-6 TE CONNECTIVITY	1
3	CONNECTOR SHR-20V-S-B JST	1
4	CRIMP SSSH-003T-P0.2-H JST	16

14.2 Jacketed / Round 16-Pin Ribbon Cable (Nominal 18” Length)

Part Number:
28.700.003.03

16-pin Tyco Connector at one end, 20-pin JST connector at other end; for connecting ALM to round light engine.

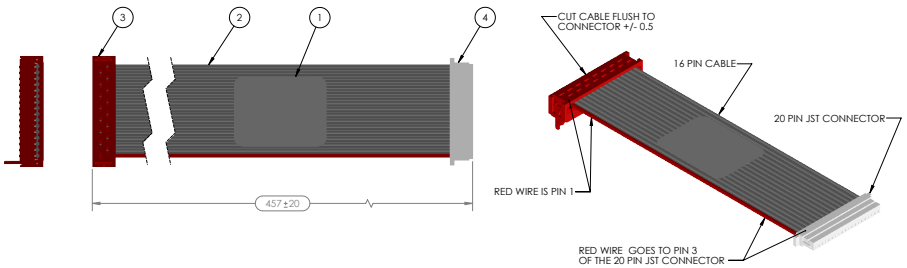


ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	16 PIN CONNECTOR 1-215083-6	CONNECTOR 16 PIN 1-215083-6	1
2	476.011 CRIMP SSH-003T-PO.2-H		16
4	3M ROUND JACKED FLAT CABLE 3759-16	3M ROUND JACKED FLAT CABLE 3759/16	1
5	460.042 CONNECTOR SHR-20V-S-B	CONNECTOR SHR-20V-S-B	1
6	LABEL, LUMENETIX, PART#, DESCRIPTION, REVISION	LUMENETIX, P/N, DESCRIPTION, REVISION	1

14.3 Flat 16-Pin Ribbon Cable (Nominal 18” Length)

Part Number:
28.700.001.05

16-pin Tyco Connector at one end, 20-pin JST connector at other end; for connecting ALM to round light engine.



1	LABEL, LUMENETIX, PART#, DESCRIPTION, REVISION	1
2	16 PIN RIBBON CABLE 3M 3365-16	1
3	16 PIN CONNECTOR c-1-215083-6-t-3d	1
4	460.042 CONNECTOR SHR-20V-S-B	1
5	CRIMP SSH-003T-PO-2	16

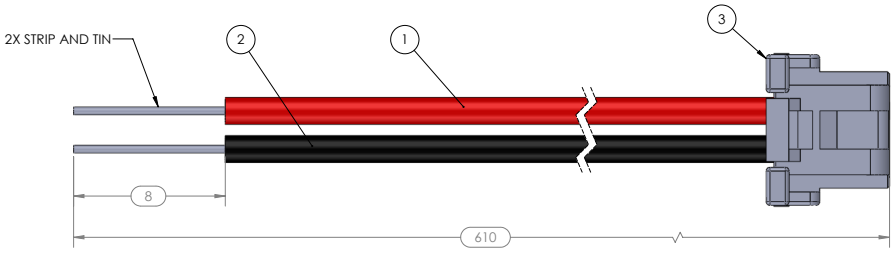
Note: All dimensions are in millimeters.

15 POWER / CONTROL CABLE ASSEMBLIES

15.1 Power Cable Assembly (Nominal 24” Length)

Provides power to each module. Included with all versions of ALM3.

Part Number:
28.030.001.01

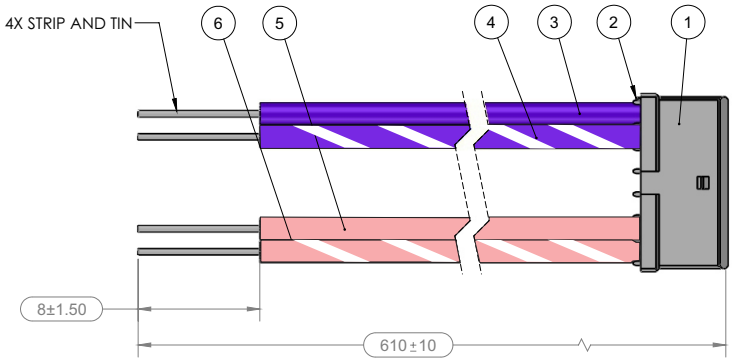


Item Number	Part Number	Description	Input	Quantity
1	Red Wire 24 AWG	Hook-up Wire Stranded 7/32 24 AWG Red	Power DC (+)	1
2	Black Wire 24 AWG	Hook-up Wire Stranded 7/32 24 AWG Black	Power Common (-)	1
3	Connector Molex 5023510200		N/A	1
4	Crimp Molex 0503728000		N/A	2

15.2 Control Cable Assembly (Nominal 24” Length)

Provides 0–10 V control and RS-485 signals to each module.

Part Number:
28.002.002.02



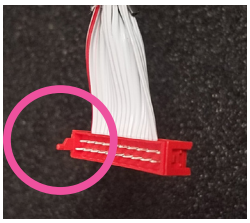
Item Number	Part Number	Manufacturer	Description	Input	Quantity
1	874390700	Molex	Connector 7-Pin	N/A	1
2	874210000	Molex	Connector Crimp	N/A	4
3	UL 1061	Any	Wire Stranded Tinned 24 AWG 7-32 Violet	0–10 V Dimming (+)	1
4	UL 1061	Any	Wire Stranded Tinned 24 AWG 7-32 Violet with White Spiral*	0–10 V Color (+)	1
5	UL 1061	Any	Wire Stranded Tinned 24 AWG 7-32 Pink*	0–10 V Dimming (-)	1
6	UL 1061	Any	Wire Stranded Tinned 24 AWG 7-32 Pink with White Spiral*	0–10 V Color (-)	1

* Some previous versions of this cable assembly may be shipped with differently colored leads.

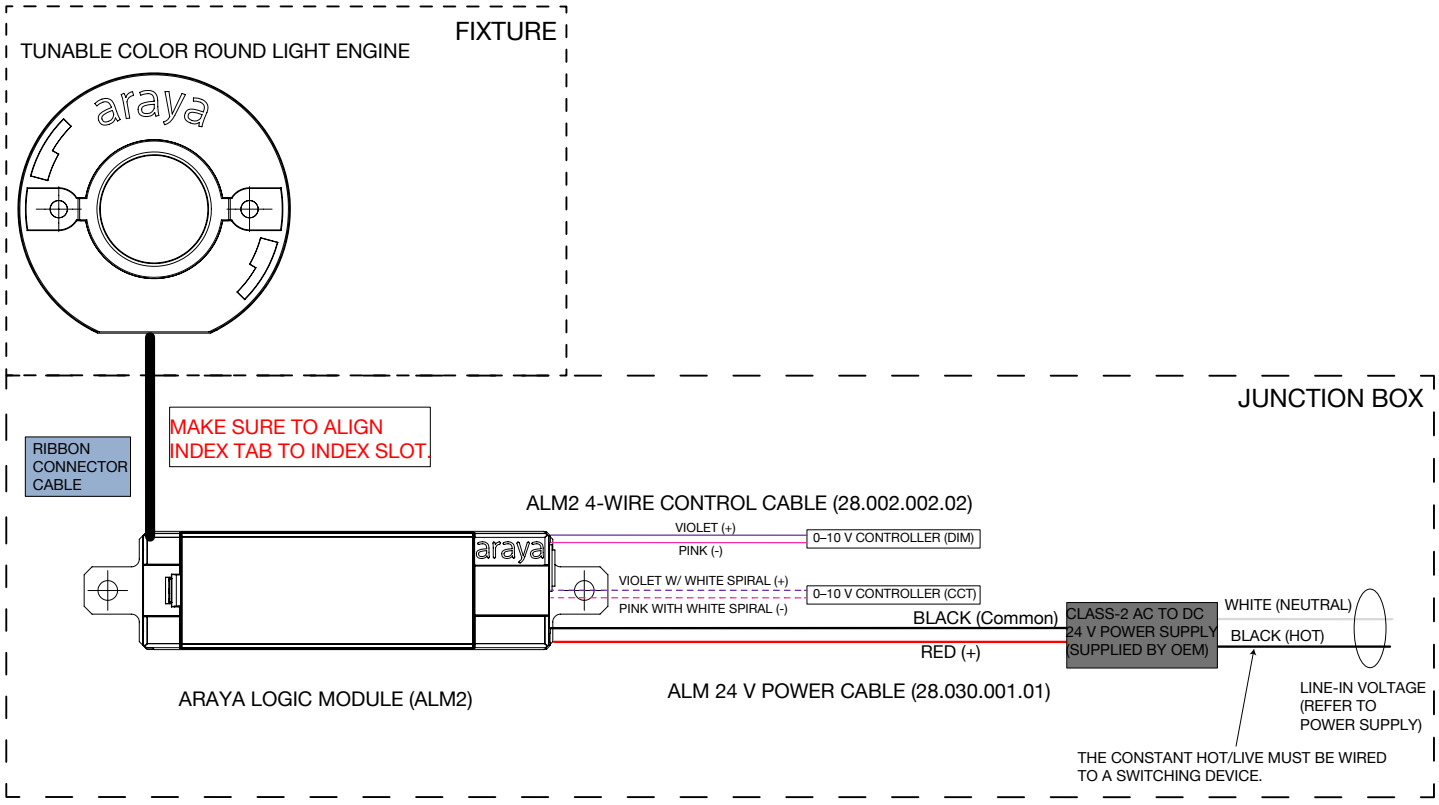
Note: All dimensions are in millimeters.

16 0–10 V WIRING DIAGRAM

Please refer to the separate 0–10 V Protocol and Wiring Specifications Guide, for more detailed information.



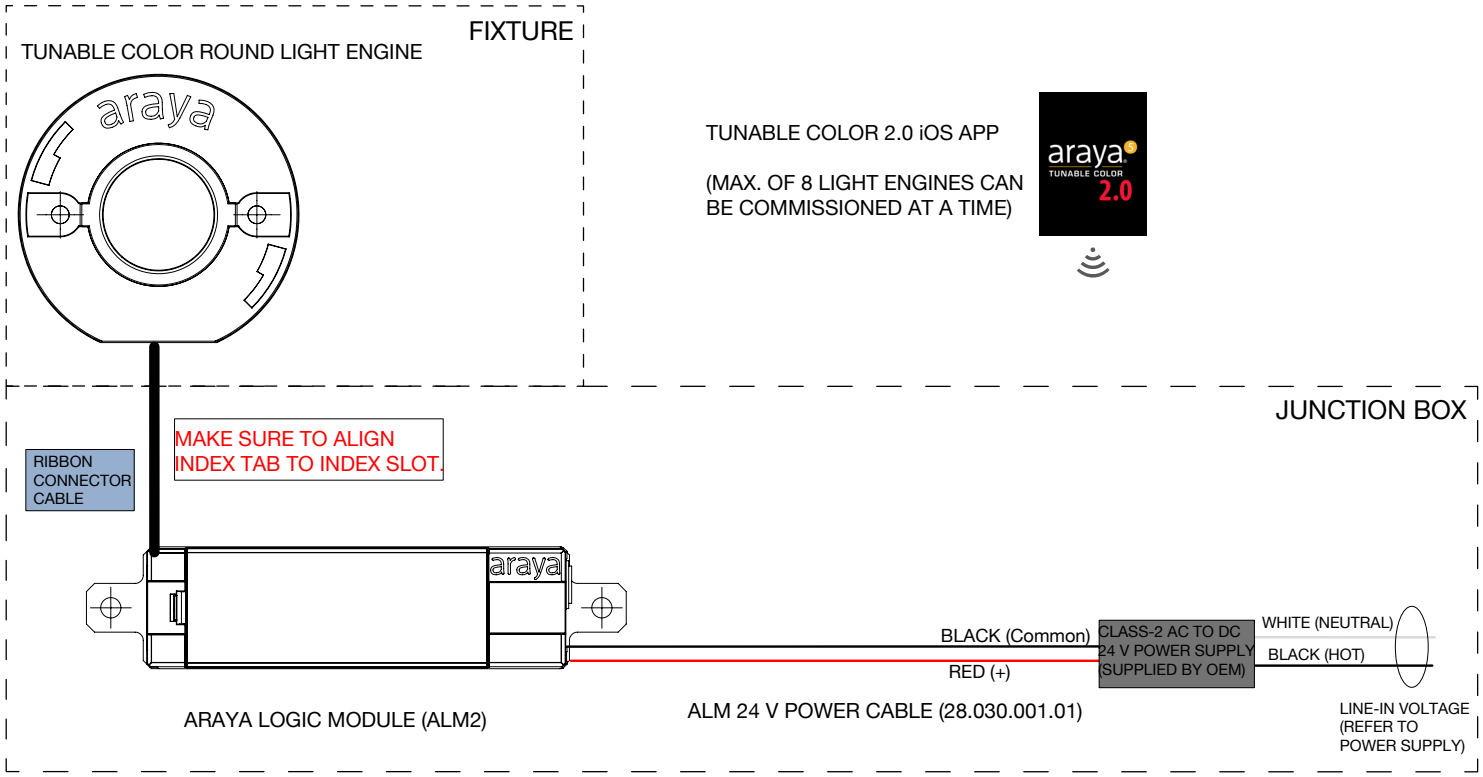
INDEX TAB ON RED END OF CABLE CONNECTOR SHOULD LINE UP WITH INDEX SLOT ON ALM.



NOTE: SOME OLDER VERSIONS OF THE 4-WIRE CONTROL CABLE ASSEMBLY MAY BE SHIPPED WITH DIFFERENTLY COLORED LEADS.

17 BLUETOOTH COMMISSIONING

Bluetooth Operation using the Tunable Color 2.0 iOS App



NOTE: BLUETOOTH OPERATION IS FOR COMMISSIONING THE MODULES ONLY, NOT FOR CONTROLLING THEM.

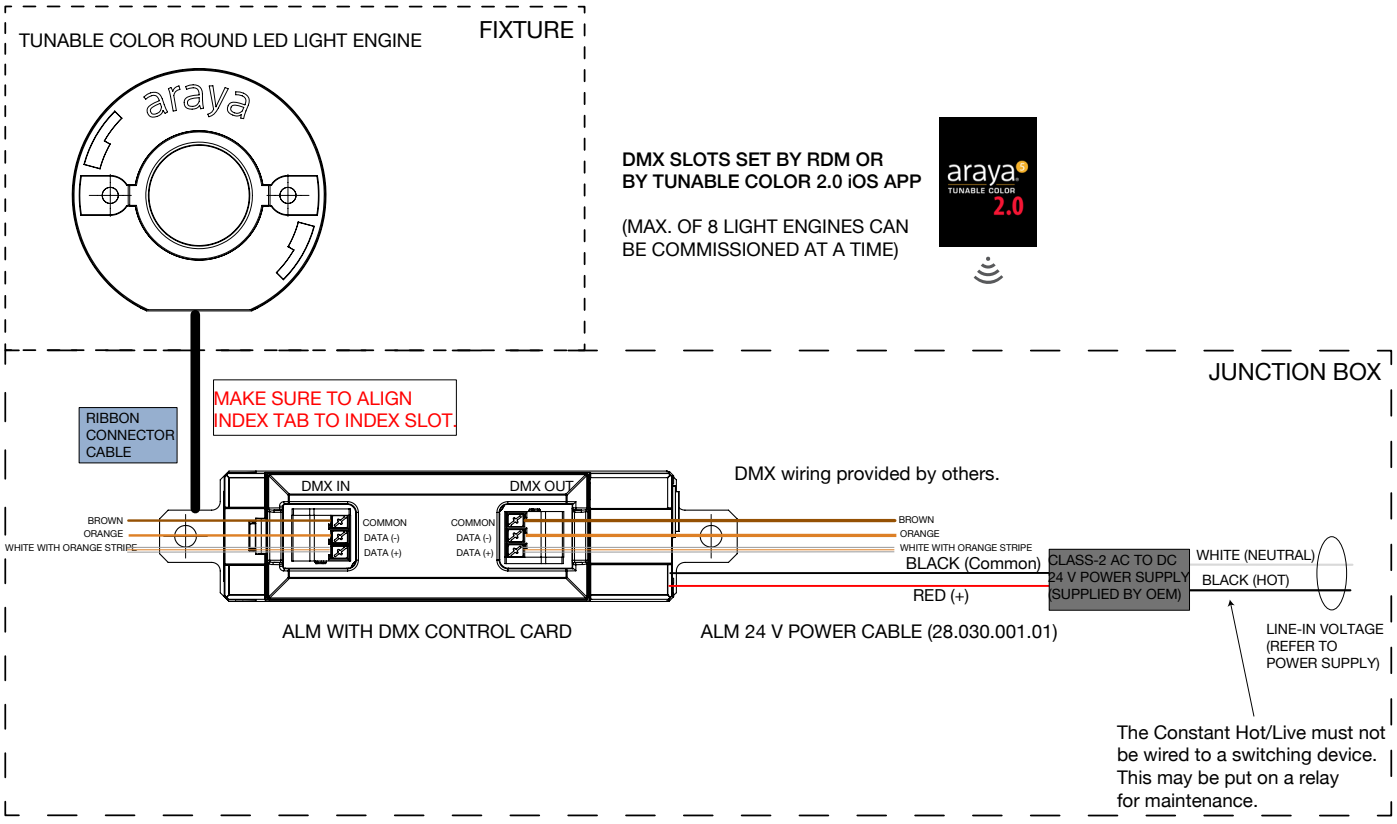
18 DMX512 WIRING DIAGRAM

DMX512-A-RDM Control Card Wiring Diagram

Please refer to the separate DMX512-A Protocol and Wiring Specifications Guide, for more detailed information.

Notes:

1. 24 V power (red/black) is Class-2 rated.
2. Adapter is configured at factory for DMX inputs.
3. If more than one line of DMX is needed, then a DMX Splitter must be used to create multiple independent branches of a DMX signal and/or to extend the usable distance of each branch. Each of the splitter's 4, 6, 8, or 16 output ports generates an independently protected DMX signal.



NOTE: BLUETOOTH OPERATION IS ONLY FOR COMMISSIONING THE LIGHT ENGINES, NOT FOR CONTROLLING THEM.

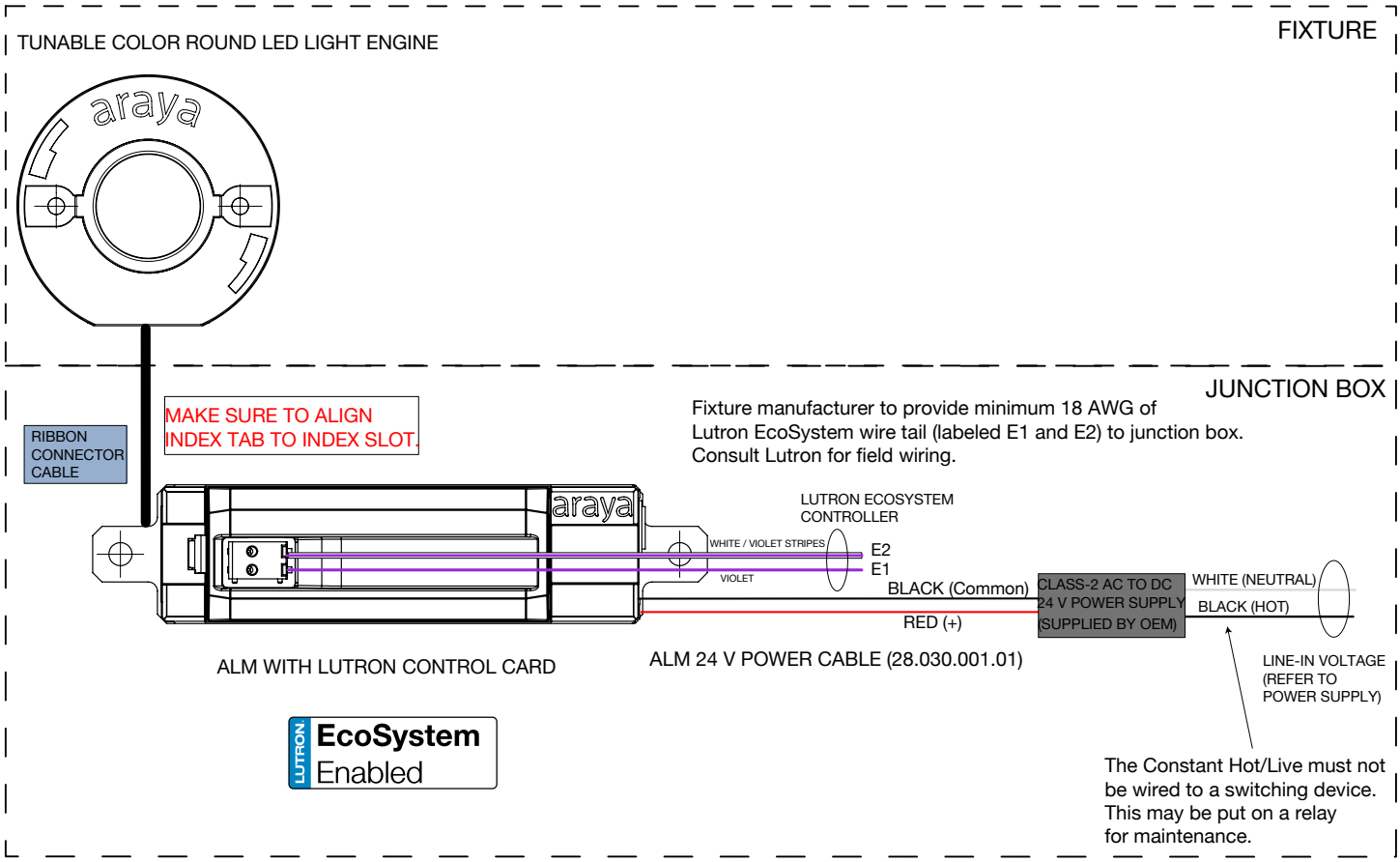
19 LUTRON ECOSYSTEM WIRING DIAGRAM

Lutron® EcoSystem Control Card Wiring Diagram

Please refer to the separate Lutron EcoSystem Protocol and Wiring Specifications Guide, for more detailed information.

Notes:

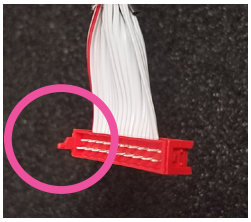
1. 24 V power (red/black) is Class-2 rated.
2. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
3. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650–8000 K.
4. The Tunable Color 2.0 iOS App should be turned on, and the DMX channels should be set to 2, 4, 6, 8.



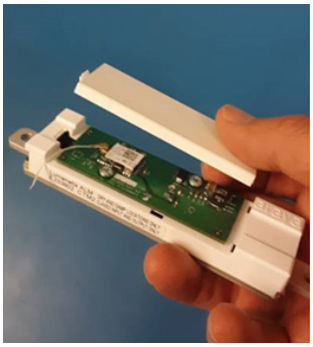
20 AVI-ON WIRELESS BLE MESH NETWORK

Avi-on Wireless BLE Mesh Control Card Wiring Diagram

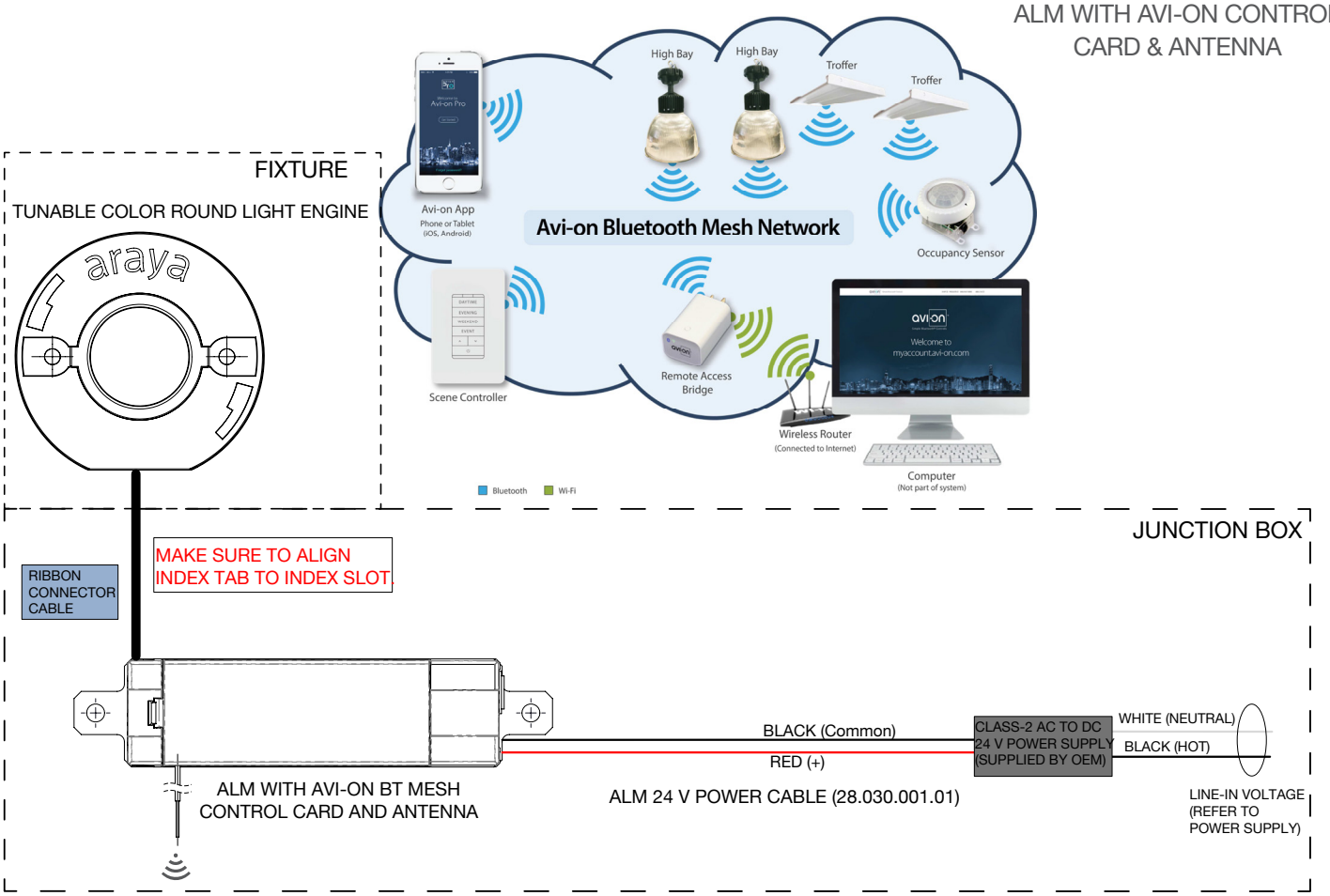
Please refer to the separate Avi-on BLE Mesh Protocol Specifications Guide, for more detailed information.



INDEX TAB ON RED END OF CABLE CONNECTOR SHOULD LINE UP WITH INDEX SLOT ON ALM.



ALM WITH AVI-ON CONTROL CARD & ANTENNA



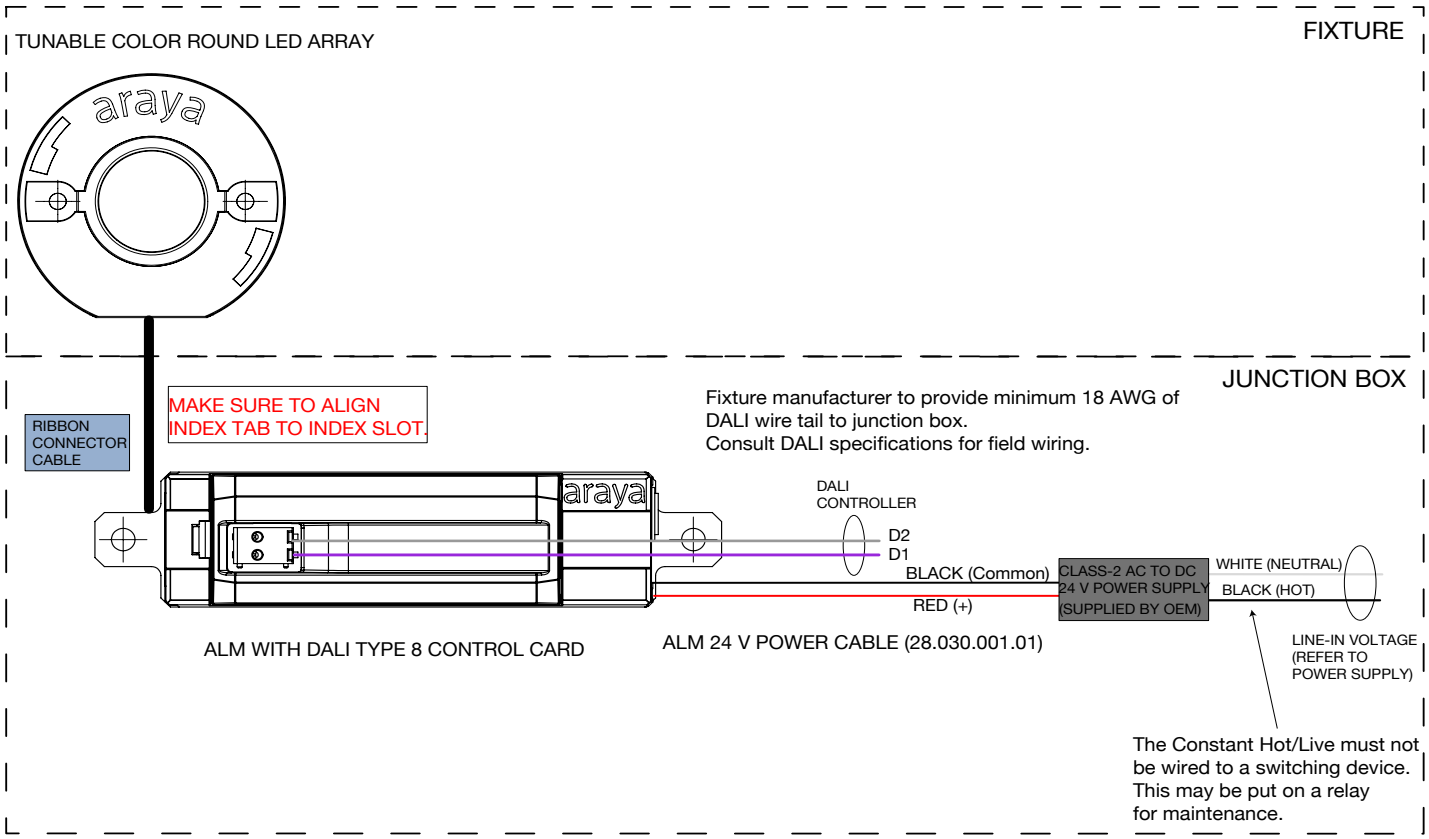
21 DALI TYPE 8 WIRING DIAGRAM

DALI Type 8 Control Card Wiring Diagram

Please refer to the separate DALI Type 8 Protocol and Wiring Specifications Guide, for more detailed information.

Notes:

1. 24 V power (red/black) is Class-2 rated.
2. One DALI address per round light engine/ALM kit.



22 PRE-INSTALLATION NOTES

WARM/DYNAMIC DIMMING ROUND LED LIGHT ENGINES

- **Exercise caution** when connecting the ribbon cables to the LED light engines. Do not press the domed lens against a hard surface (like a table or workbench) as they can be damaged. Do not break off the indexing tabs.

RIBBON CABLE CONNECTORS

- The ribbon cable connector slot is located on one side of the round LED light engine.

ARAYA LOGIC MODULE

- Mount the ALM to the fixture with 6 mm – 8 mm (M2.5 – M4) screws in desired location.

Test-fit all components prior to installation. Mark edges for correct alignment.

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