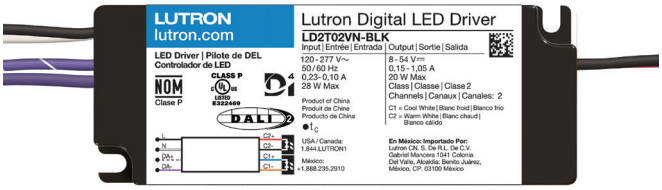
Lutron Digital LED Driver

Lutron DALI-2 digital LED drivers provide a high-performance tunable white and static white solution with single-address digital control.



Case Type V

1.60 in (40.64 mm) W x 1.07 in (27.18 mm) H x 4.30 in (109.22 mm) L

Features

- UL® 8750 Listed Class P
- Configurable by the OEM with QwikFig Air for either tunable white or static white dimming mode
- Tunable white operates at 1% or higher. Static white operates at 0.1% or higher. See page 9 for more details [1]
- 20 W max 0.15 – 1.05 A 8 – 54 V⎓ [2,3]
- Dimming Method:
  - Constant-current reduction (CCR) dimming to 250 mA
  - Pulse-width modulation (PWM) dimming below 250 mA
    - PWM Frequency = 7.6 kHz
    - Outputs of the two channels are synchronized
- DALI Bus Power Supply: [4]
  - Can provide power to compatible devices via the DALI wires
  - No more than 4 drivers can supply the link simultaneously
- Driver consumes one digital address, encompassing intensity and color temperature
- Guaranteed performance and compatibility when used with Lutron DALI-2 and D4i application controllers
- Rated lifetime of 50,000 hours at 185 °F (85 °C) calibration point (t_c)
- FCC Part 15 Class B
- 100% performance tested at factory before shipping
- RoHS compliant
- For more information please visit: www.lutron.com

DALI Link Features [5]

- Simpler to wire and more reliable than 0–10 V⎓
- Guarantees compatibility between Lutron DALI-2 controllers and Lutron DALI-2 LED drivers
- Accommodates zone and control changes without rewiring
- Topology-free
- Non-volatile memory restores all settings after power failure

1 Light output at low-end depends on the efficacy of the LED light engine used with the driver.
2 Output voltage range changes with output current and according to power limits. Check driver specifications on the following pages carefully to understand output voltage range. Purchaser is responsible for electrical compatibility between LED driver and LED load.
3 If a higher wattage driver is required, please refer to Lutron Digital Driver Spec Submittal (Lutron P/N 3691275) at www.lutron.com for more options.
4 For compatible Lutron digital controllers only. See page 9 for more details.
5 Not compatible with HomeWorks digital. For information on HomeWorks digital refer to the HomeWorks Digital Power Module Spec Submittal (Lutron P/N 3691217) at www.lutron.com

Job Name:	Model Numbers:	
Job Number:		

Specifications

Regulatory Approvals and Compliance

- cULus Listed Class P
- NOM certified
- Lutron Quality Systems registered to ISO 9001.2015
- Inrush current less than NEMA 410-2011 limit
- FCC Part 15 Class B
- Meets UL® 8750, "Light Emitting Diode (LED) Equipment For Use in Lighting Products"
- Class 2 outputs
- Compliant with perfomance criteria for ENERGY STAR for Luminaires Version 2.1 in designated areas (see Load Compatibility graph in Output Ranges page 5)
- Compliant with DLC version 4.3 in designated areas (see Load Compatibility graph in Output Ranges page 5)
- DALI-2 certified:
  - IEC62386-101 (General Requirements - System Components)
  - IEC62386-102 (General Requirements - Control Gear)
  - IEC62386-207 (LED Modules)
  - IEC62386-209 (DT8 Tc - Tunable White)
- D4i certified:
  - IEC62386-250 (Integrated Bus Power Supply)
  - IEC62386-251 (Luminaire Data)
  - IEC62386-252 (Energy Data)
  - IEC62386-253 (Diagnostics & Maintenance Data)

Performance

- Dimming Range: 100% to 0.1% [1]
- Operating Voltage: 120 — 277 V~ at 50/60 Hz
- Lifetime: 50,000 hours when calibration point (t_c) at 185 °F (85 °C) [2]
- For rated warranty, t_c not to exceed 185 °F (85 °C) [2]
- At turn on, lighting fades smoothly to the desired level
- Typical standby power consumption: < 0.2 W at 120 — 277 V~
- Open-circuit protected output
- Short-circuit protected output
- Over temperature protected

Environmental

- Relative Humidity: maximum 90% non-condensing
- Minimum Operating Ambient Temperature: t_a = 0 °C (32 °F) [3]
- Indoor use only
- Rated for dry and damp locations

OEM Notes

- For best dimming performance, Lutron recommends electrical insulation with 50/60 Hz impedance of at least 12 MΩ and minimum breakdown voltage of at least 1500 V~ between LEDs and fixture chassis
- Lutron digital LED drivers are only available in bulk (BLK) models to be configured by the fixture OEM using QwikFig Air.

Driver Wiring and Mounting

- For use with static white loads, wire the LED light engine to output channel 2 (C2+ and C2-)
- Digital link can be wired Class 1 or Class 2
- It is possible to daisy-chain the DALI link. See example on page 10
- Fixture must be grounded in accordance with local and national electrical codes
- Use only within an enclosure
- This driver does not support the common anode or common cathode wiring configuration on the output channels
- Maximum driver-to-LED light engine wire length for:

Wire Gauge	Maximum Lead Length	
	150 mA to 700 mA	710 mA to 1.05 A
18 AWG (0.75 mm²)	30 ft (9 m)	15 ft (4.5 m)
16 AWG (1.5 mm²)	35 ft (10.5 m)	25 ft (7.5 m)
14 AWG (2.5 mm²)	50 ft (15 m)	40 ft (12 m)
12 AWG (4.0 mm²)	100 ft (30 m)	60 ft (18 m)

[1] Tunable white operates at 1% or higher. Static white operates at 0.1% or higher. Light output at low-end depends on the efficacy of the LED light engine used with the driver.
[2] To maintain warranty, installer is responsible for ensuring that the driver calibration point does not exceed 185 °F (85 °C).
[3] Where t_a is the temperature of the air directly surrounding the driver.

Job Name:	Model Numbers:	
Job Number:		

How to Determine Compatibility Between an LED Driver and LED Load

1. Review the specifications of the LED load.

2. Identify the minimum and maximum operating voltage of the LED load at the desired operating current. This "current" will be the rated output current of the LED driver. Consult the LED load manufacturer for any questions.

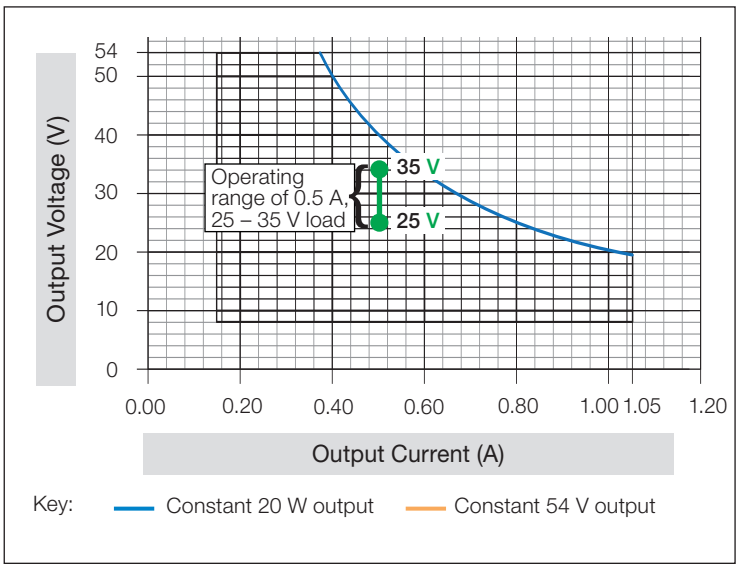
   Example: An LED load that is rated at 0.7 A and 30 V nominally, has an input (forward) voltage range of 25–35 V (at 0.7 A) due to unit-to-unit variation, temperature, etc.

3. Examine the LED driver load compatibility graphs below for each output range to ensure that the voltage range of the LED load is within the load compatibility range.

   Example: Lines[1] marked below indicate two load specifications:
   Load A (25 – 35 V) at 0.5 A
   Load B (25 – 35 V) at 0.7 A

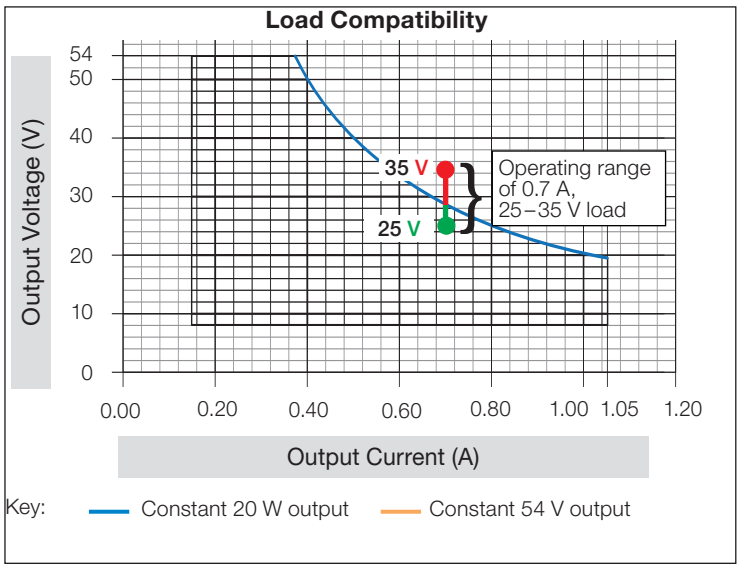
Load A (Compatible) ✓

Operating voltage range for load A is 25 – 35 V at 0.5 A. Since the load specifications are within the operating range, the combination of LED load and LED driver is compatible.



Load B (Not Compatible) ✗

Since the maximum voltage of the load, 35 V, exceeds the 28.5 V allowable at 0.7 A, this combination of LED load and LED driver is <u>not</u> compatible.



4. See **Lutron Digital LED Driver Model Number** to create the appropriate model number for the desired driver. Lutron digital LED drivers are only available in bulk (BLK) models to be configured by the fixture OEM using QwikFig Air.

[1] Lines are an example and not the range of the Lutron digital LED driver.

Job Name:	Model Numbers:	
Job Number:		

Lutron Digital LED Driver Model Number

L D 2 T 0 _ _ _ – B L K

T _ _

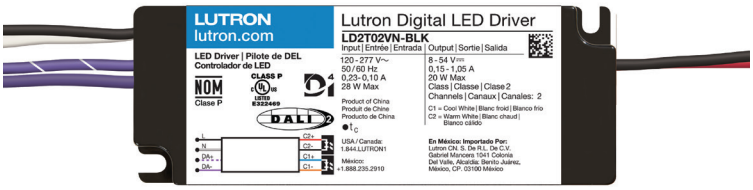
LED Load Output Range: Class 2 Constant Current

(see the following pages for more detail)

- **2:** 20 W Max 0.15 – 1.05 A 8 – 54 V⎓ [1]

Case Type

- **VN:** Case Type V



Case Type V

20 W Output Range

	Driver Type	Output Voltage	Output Current	Output Power	Standards Recognition	Maximum Rated Temp. @ t_c for Warranty
Case Type V	Constant Current Driver (Class 2)	8–54 V⎓	0.15–1.05 A [2]	20 W [3]	c UL us LISTED CLASS P E322469	185 °F (85 °C)

[1] Output voltage range changes with output current and according to power limits. Check driver specifications on the following pages carefully to understand output voltage range of a particular SKU. Purchaser is responsible for electrical compatibility between LED driver and LED load.

[2] Configurable with QwikFig Air by the OEM to any current within this range in 0.005 A increments.

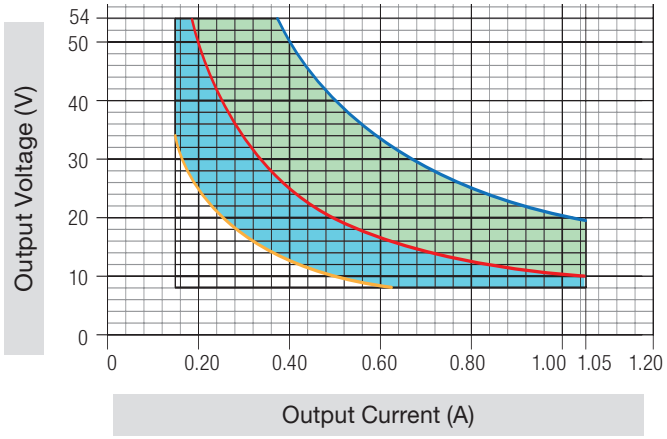
[3] The combined output of both channels will not exceed 20 W total.

Job Name:	Model Numbers:	
Job Number:		

20 W Output Range *(continued)*

Typical Performance Specifications

Load Compatibility

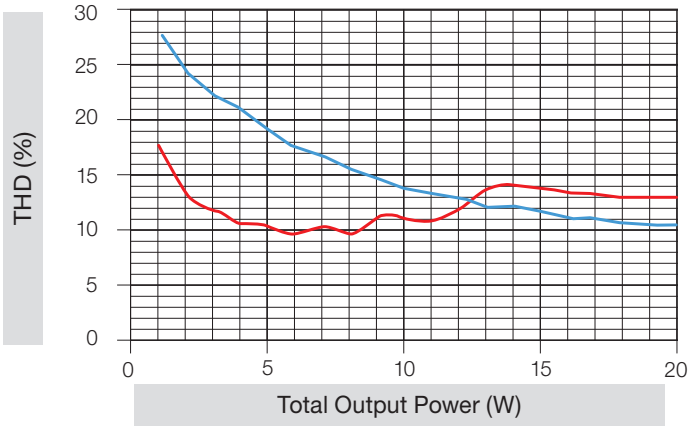


Key: Constant 10 W output; Constant 20 W output; Constant 5 W output

Shaded area meets both ENERGY STAR Luminaires V2.1 Specification and DLC Version 4.3 (W case only). Areas outside of shaded areas may not meet THD or PF requirements.

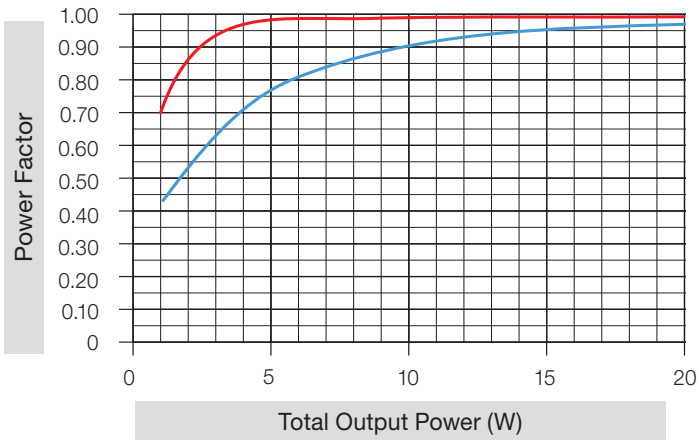
Shaded area meets only ENERGY STAR Luminaires V2.1 Specification. Areas outside of shaded areas may not meet THD or PF requirements.

Typical THD vs Total Power Output



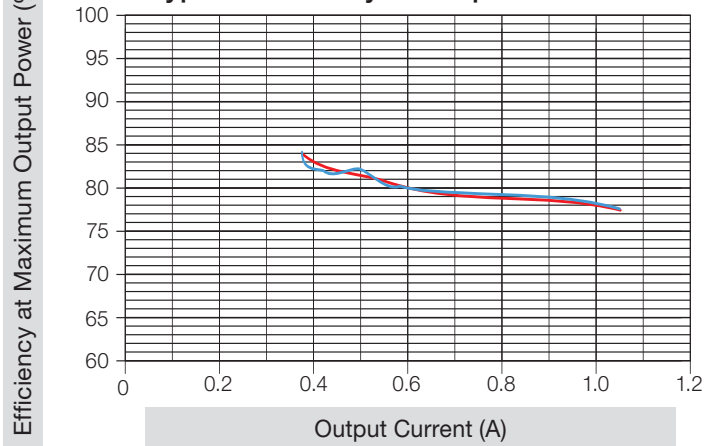
Key: Case Type V: 120 V~ 277 V~

Typical Power Factor vs Total Power Output



Key: Case Type V: 120 V~ 277 V~

Typical Efficiency vs Output Current



Key: Case Type V: 120 V~ 277 V~

Job Name:	Model Numbers:	
Job Number:		

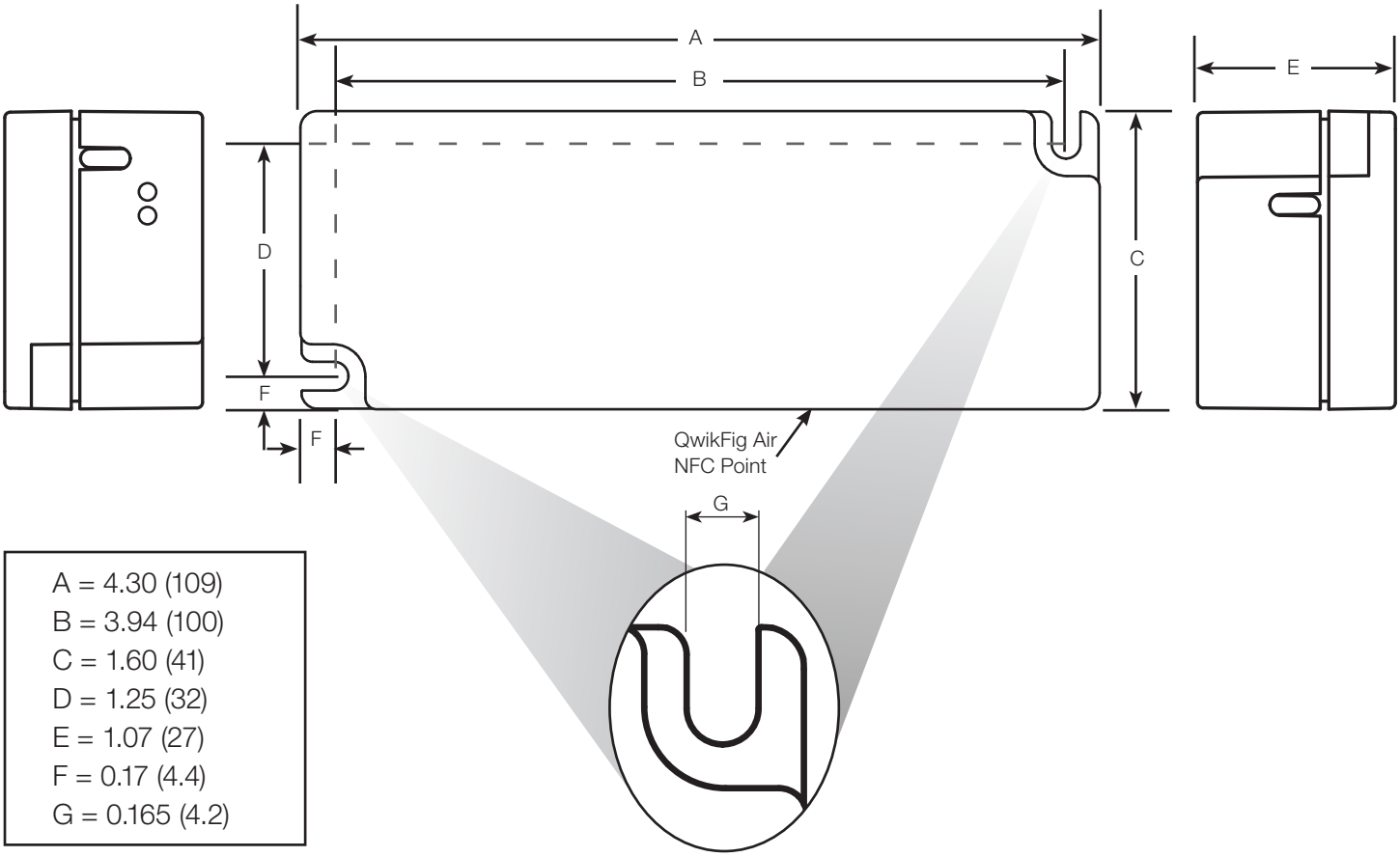
Example of Performance Specifications:

		120 V~		277 V~	
	Parameter	**Value**	**Test Conditions**	**Value**	**Test Conditions**
Case Type V	Input Current	0.14 A	V_i = 120 V~ t_a = 25 °C I_o = 1.05 A V_o = 12 V⎓	0.06 A	V_i = 277 V~ t_a = 25 °C I_o = 1.05 A V_o = 12 V⎓
	Power Factor (PF)	0.99		0.93	
	Total Harmonic Distortion (THD)	13%		12.7%	
	Driver Efficiency	77%		77%	

Job Name:	Model Numbers:	
Job Number:		

Dimensions (Case Type V)

All measurements shown as: in (mm)

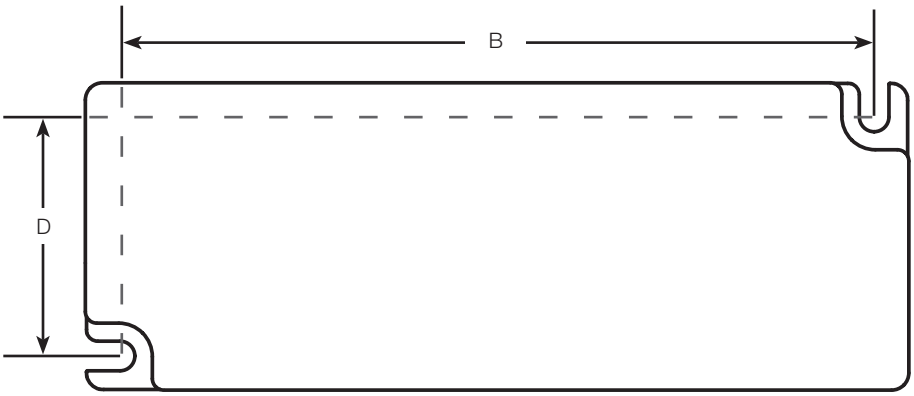


A = 4.30 (109)
B = 3.94 (100)
C = 1.60 (41)
D = 1.25 (32)
E = 1.07 (27)
F = 0.17 (4.4)
G = 0.165 (4.2)

Mounting

All measurements shown as: in (mm)

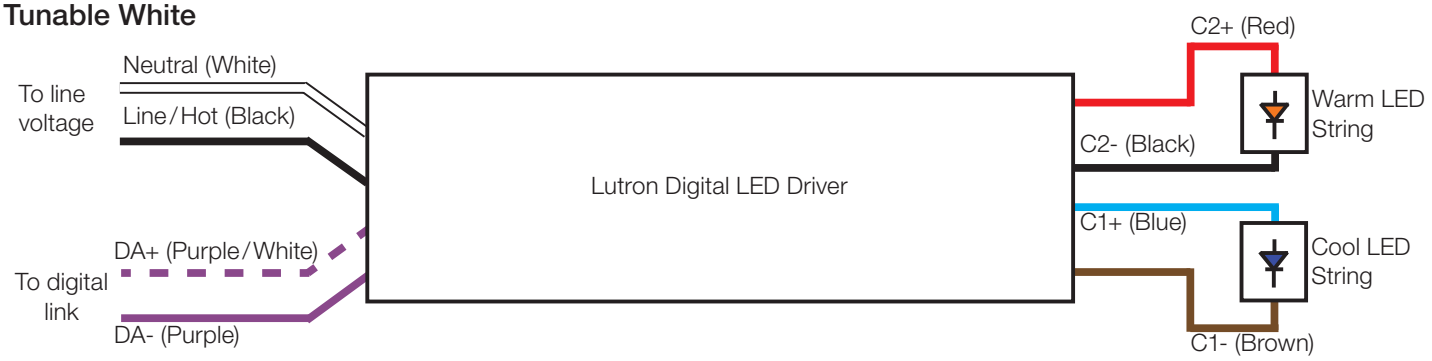
Accommodates #6 screws for mounting. Ensure that the driver is fully secured to the mounting surface. Do not clamp with more than 8 in-lb (0.9 N•m) of torque.



Job Name:	Model Numbers:	
Job Number:		

Wiring Diagram

Tunable White



Static White

Job Name:	Model Numbers:	
Job Number:		

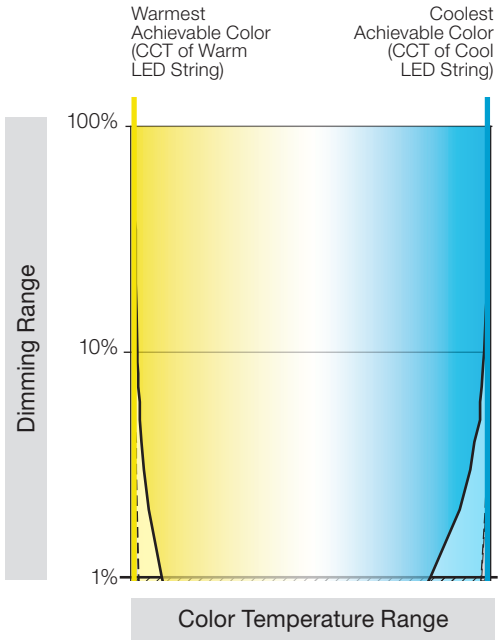
Static White Considerations

- The driver will consume one digital address for intensity control.
- Static white LED light engines must be wired to channel 2. Channel 1 is not used for static white applications.
- The driver default minimum intensity level for static white mode is set to 0.1%

Tunable White Considerations

- The driver will consume one digital address, encompassing intensity and color temperature.
- The highest kelvin light source must be connected to channel 1 (cool white).
- The lowest kelvin light source must be connected to channel 2 (warm white).
- The driver can accept LED light sources with a physical CCT value between 1500 K and 6500 K.
- The driver default minimum intensity level is set to 1% for tunable white. See **Tunable White Capability** diagram to the right for more information.
- For optimal tunable white performance, it is recommended to set high-end and low-end logical trims which reduce the overall CCT range to less than the maximum capability of the light source.

Tunable White Capability



Compatible Controls: Lutron DALI Digital Controls

Guaranteed performance specifications with the controls listed in the chart below.

Lutron Digital Compatible Controls	DALI Bus Power Supply Configuration Status
DALI-2 Controller without DALI Link Power Supply[1]	Enabled[2]
DALI-2 Controller with DALI Link Power Supply[3]	Disabled

[1] e.g., Athena Wireless Node (A-WN-D01-RF/OCC).

[2] Supports up to 4 drivers with enabled DALI link power supplies. Any additional drivers must be configured with the power supply disabled.

[3] e.g., DALI Universal Energi Savr Node (QSN-2DALUNV-D/S).

Job Name:	Model Numbers:	
Job Number:		

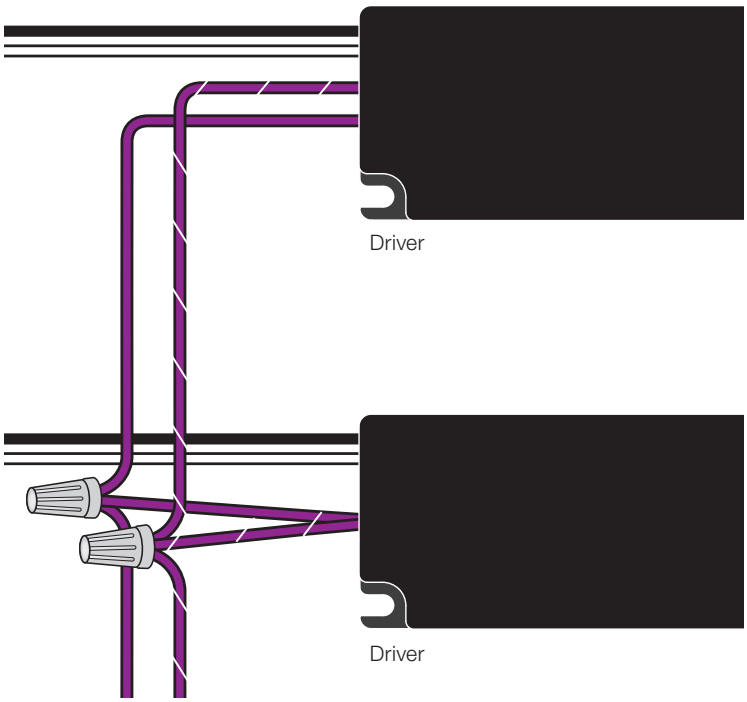
Lutron Digital LED Driver Wiring

DALI Link Overview

- The DALI wiring (DA+ and DA-) connects the digital ballasts and drivers together to form a lighting control system.
- DA+ and DA- can be wired in any topology (e.g., T-tap and daisy-chain).
- Power may be supplied to the DALI link from the control system or from the driver power supply.
- When multiple power supplies are enabled on the DALI link, the DA+ and DA- terminals must connect to positive and negative terminals respectively.
- Guaranteed current is 50mA with a maximum of 62 mA.
- When used with the Athena wireless node, no more than 4 drivers can have the power supply enabled.
- Bus supply must be disabled on the drivers when they are not supplying power to the DALI link.
- Short circuit protection with automatic re-start.

DALI Wiring

- Ensure that the supply breaker to the drivers is OFF when wiring.
- The DALI link should not receive more then 250 mA.
- Using two different colors for DA+ and DA- will reduce confusion when wiring several drivers together.
- The DALI link may be wired Class 1 or Class 2. Consult applicable electrical codes for proper wiring practices.
- For additional details on emergency applications see Lutron Application Note #106 (P/N 048106 at lutron.com)



To the Lutron DALI-2 controller and additional drivers

Notes

- The control device and/or supply does not have to be located at the end of the DALI link.
- The DALI link length is limited by the wire gauge used for DA+ and DA- as follows:

Wire Gauge	Maximum Wire Length [1]
18 AWG (0.75 mm^2)	679 ft (207 m)
16 AWG (1.5 mm^2)	984 ft (300 m)
14 AWG (2.5 mm^2)	1000 ft (305 m) [2]
12 AWG (4.0 mm^2)	1000 ft (305 m) [2]

[1] The table gives the limits for each of the wires in the DALI link pair.

[2] Do not exceed cable lengths of 1000 ft (305 m).

Job Name:	Model Numbers:	
Job Number:		

Service

Warranty

For warranty information, please visit www.lutron.com/driverwarranty

Replacement Parts

When ordering Lutron replacement parts, please provide the full model number. Consult Lutron if you have any questions.

Further Information

For further information, please visit us at www.lutron.com

Job Name:	Model Numbers:	
Job Number:		