LuxiTune™ Generation 2.3 Tunable White 1100lm Light Engine
For halogen-style warm dimming and CCT tuning

LTC-X3T1xxxxx-1C1

Key Features

- Small form factor LED light engine consisting of a multi-channel emitter + driver + TIR lens
- Beam angle options: 24° / 34° / 45°
- Precisely tracks a short distance below the Black Body Locus
- Two modes of operation:
  - Warm dimming mode: Warms from 3000K to below 1600K as it dims halogen-style
  - CCT tuning mode: Tunes from 2100K to 4300K with independent brightness control
- Stable flux and CCT over operating temperature
- Accurate color rendition with CRI 90
- Single 2 SDCM CCT bin at 3000K
- 70 lm/W light engine efficiency (emitter + driver + lens) at steady state (hot) use conditions
- Works with standard controllers for 0-10V
- Driver design meets UL low voltage guidelines
- Lead (Pb) free and RoHS compliant

Typical Applications

- Down lighting
- Accent lighting
- Track lighting

Description

LuxiTune™ is the only tunable white light engine capable of simulating a halogen-style Warm Dimming and CCT Tuning in the same product. LuxiTune delivers consistent and energy-efficient Lux-on-Target™ directional lighting for restaurants, entertainment, hotels and other hospitality lighting applications.

With a high color rendering index (CRI) throughout the dimming range, LuxiTune ensures accurate color rendition at all intensity levels. Furthermore, unit-to-unit variations of less than 3 SDCM over the operating conditions guarantees consistent light quality. LuxiTune, which is based on LED Engin's proven LuxiGen™ emitter technology, is available in three beam options: 24°/ 34°/45°, providing flexibility and freedom in lighting design.

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LuxiTune Ordering Part Number Options

Part Number	Description
LTC-X3T124470-1C1	1800K-4300K LZC LuxiTune 1100lm Gen 2.3 - includes emitter & integrated 0-10V driver on connectorized board, Narrow Flood (24°) Lens and Holder
LTC-X3T134470-1C1	1800K-4300K LZC LuxiTune 1100lm Gen 2.3 - includes emitter & integrated 0-10V driver on connectorized board, Flood (34°) Lens and Holder
LTC-X3T145470-1C1	1800K-4300K LZC LuxiTune 1100lm Gen 2.3 - includes emitter & integrated 0-10V driver on connectorized board, Wide Flood (45°) Lens and Holder
LTC-X3T100000-1C1	1800K-4300K LZC LuxiTune 1100lm Gen 2.3 - includes emitter & integrated 0-10V driver on connectorized board (use this 0000 kit for ordering optics separately)
Use the following if ordering TIRs in holder separately with the LTC-X3T100000-1C1 kit	
LLNF-4T08-H	Narrow Flood (24°) Lens and Holder
LLFL-6T08-H	Flood (34°) Lens and Holder
LLWF-6T08-H	Wide Flood (45°) Lens and Holder

A daughter card, for other control interfaces such as DMX-512A, DALI or BLE, is compatible with Gen 2.3, but has to be wired to the light engine. Firmware supports all control interfaces supported on Gen 3 LuxiTune. LED Engin can provide guidance for the wiring and the daughter cards (without the pin-headers), but customers are required to solder the wires to the daughter cards. This is an option for high volume customers and is not a standard released configuration.

Firmware revisions that are supported with released product are as follows.

Revision	Released	Supported functionalities
V1.60		All functionalities in v1.31 (same as Gen 3) Casambi interface support – added

LuxiTune Chromaticity Bin @T_C = 65°C; 100% intensity; 2 SDCM Single Bin

Bin coordinates are listed below in the table.

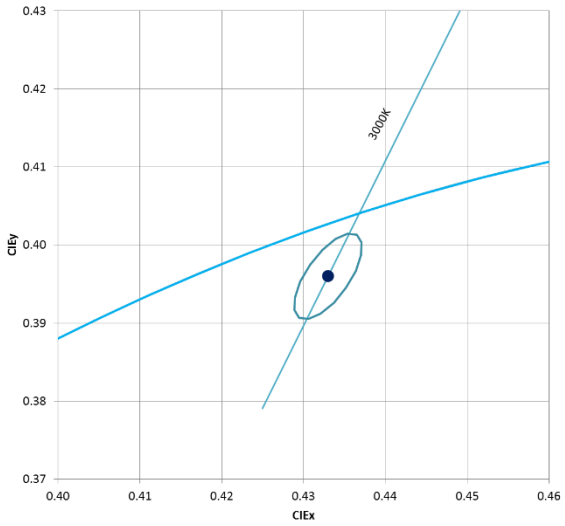


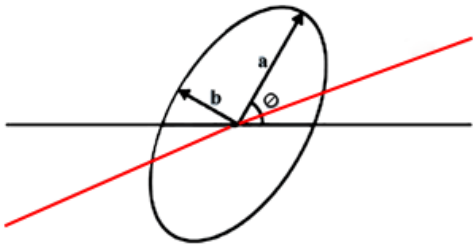
Figure 1: Single chromaticity bin plotted on excerpt from the CIE 1931 (2°) x-y chromaticity diagram.

Chromaticity Bin @T_C = 65°C; 3000K, 100% intensity, 2 SDCM

Center point Cx	Center point Cy	Major axis a	Minor axis b	Rotation, φ
0.4329	0.3957	0.0063	0.0026	56.3

Chromaticity Bin @ T_C = 15°– 85°C; 3000K, 100% intensity, 3 SDCM

Center point Cx	Center point Cy	Major axis a	Minor axis b	Rotation, φ
0.4329	0.3957	0.0095	0.0040	56.5



Operating Conditions @ T_C = 15°– 85°C

Parameter	Symbol	Min	Typical	Max	Unit
Input Voltage	V_{in}	21.0	24.0	27.0	V
Input Current	I_{in}		660	1050	mA
Input Power	P_{in}		16	22[1]	W
Standby Power	P_{min}			0.5	W
Thermal Resistance, Electrical	$R_{j\text{-}b,\ el}$[2]		1.3		°C/W
Thermal Resistance, Real	$R_{j\text{-}b,\ real}$[2]		1.6		°C/W
Storage Temperature Range - Light Engine[3]	T_{stg}	-40		+110	°C
Operating Temperature Range[4,5]	NTC1 [6]	+15	25	+85	°C

Notes:
1. The max power 22W is measured at 2100K, 85C, 100% intensity.
2. $R_{j\text{-}b}$ is the thermal resistance between the LED junction and the bottom of the hybrid board
3. Light Engine is defined as emitter + driver + lens.
4. LuxiTune is operational at temperatures below 15°C, however there is risk of condensation and unit needs to be protected against moisture.
5. If NTC1>85°C, the device goes into thermal protection mode. The luminous flux is reduced in steps of 10% until it turns "off" at NTC1 = 105°C. Once the temperature drops to NTC1 <65°C, the brightness will be fully restored.
6. The temperature measurement point is labeled NTC1 in Fig 12 and is located next to the LED emitter. Junction temperature T_j is derived from this measurement.

Optical Characteristics @ T_C = 15° – 85°C

Parameters	Symbol	Min	Typical	Max	Unit
Luminous Flux[2] – Light Engine[1] @3000K, 100% intensity, T_C=65°C	Φ_V	1045	1100	1200	lm
Luminous Flux[2] – Emitter only @3000K, 100% intensity	Φ_V		1250		lm
Efficiency – Light Engine[1] @3000K, 100% intensity			70		lm/W
Color Rendering Index (CRI) @3000K, 100% intensity	R_a		90		
Warm Dim Parameters	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Correlated Color Temperature @100% intensity	CCT		3000		K
Correlated Color Temperature @<0.5% intensity	CCT		1600		K
CCT Tuning Parameters	**Symbol**	**Min**	**Typical**	**Max**	**Unit**
Luminous Flux[2] – Light Engine[1] @4300K, 100% intensity	Φ_V		935		lm
Luminous Flux[2] – Light Engine[1] @2100K, 100% intensity	Φ_V	830	1070		lm

Notes:
1. Light Engine: Emitter + driver board + 34° secondary lens.
2. Luminous flux performance guaranteed within published operating conditions. LED Engin maintains a tolerance of ± 10% on flux measurements.

Beam Characteristics @ $T_C = 15^o – 85^oC$

Lens Description	Part number	Beam angle[1] FWHM (degrees)	Field angle[2] (degrees)	CBCP[3] 3000K; full intensity (cd)
Narrow Flood	LLNF-4T08-H	24°	53°	2700
Flood	LLFL-6T08-H	34°	83°	1500
Wide Flood	LLWF-6T08-H	45°	89°	1250

Notes:
1. Beam angle is defined as the full width at 50% of the max intensity (FWHM).
2. Field angle is defined as the full width at 10% of the max intensity.
3. CBCP (Center Beam Candlepower) is on-axis luminous intensity measured in candela.

Typical Relative Intensity over Angle – TIR Optics

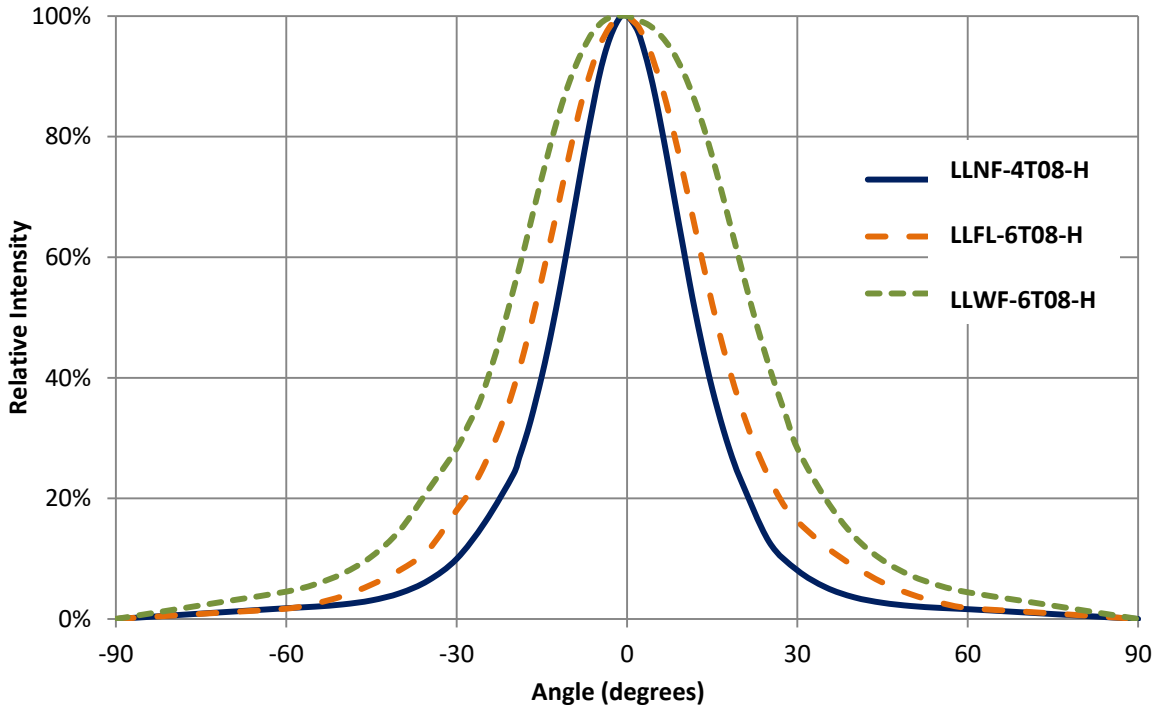


Figure 2: Typical relative intensity over angle

Average Lumen Maintenance Projections

Based on long-term reliability testing, LED Engin projects that LuxiTune will deliver, on average, 70% Lumen Maintenance for 50,000 hours of operation at specified operating conditions.

Typical Relative Spectral Power Distribution

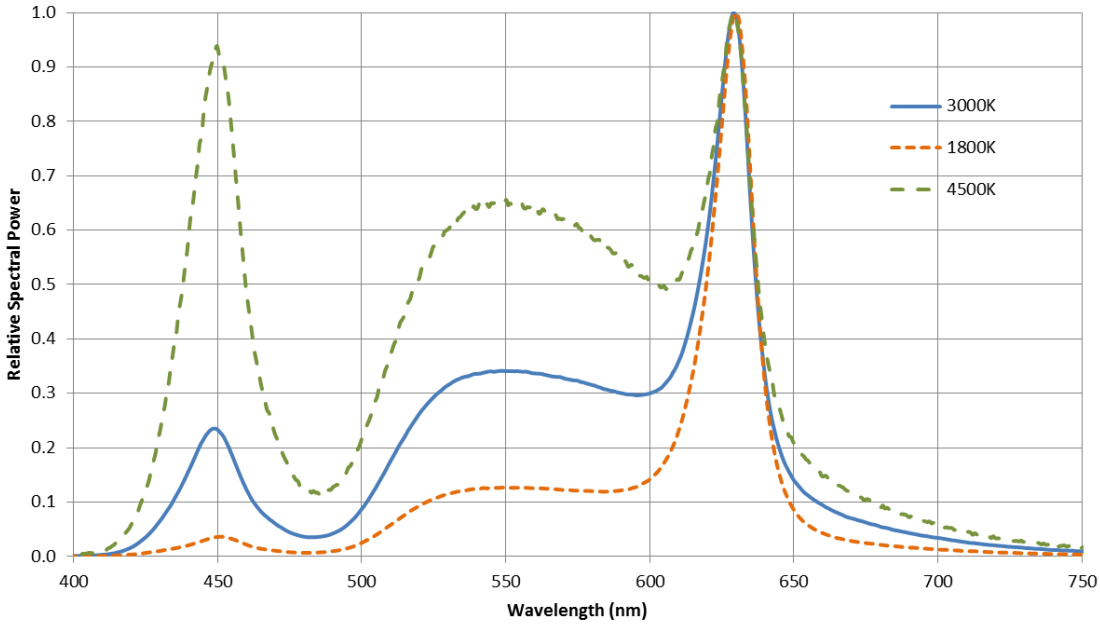


Figure 3: Typical relative spectral power vs. wavelength

CCT Range in Warm Dimming Mode

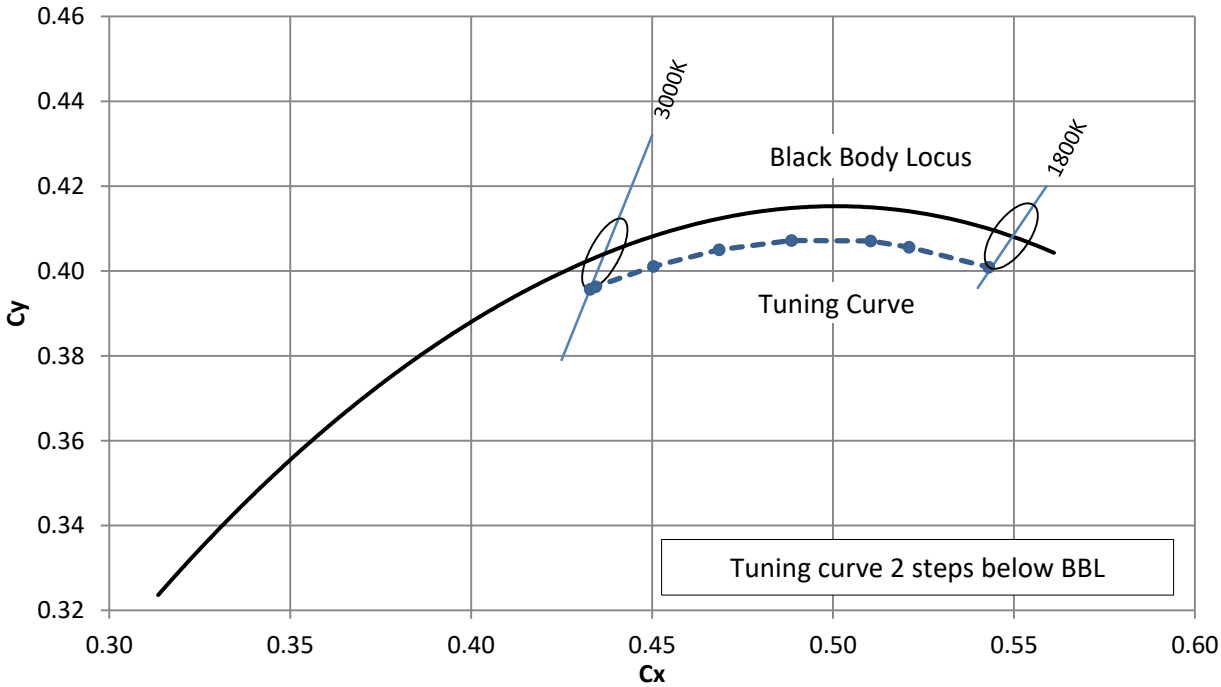


Figure 4: Typical CCT range in warm dim mode

Relative Intensity vs. CCT in Warm Dimming Mode

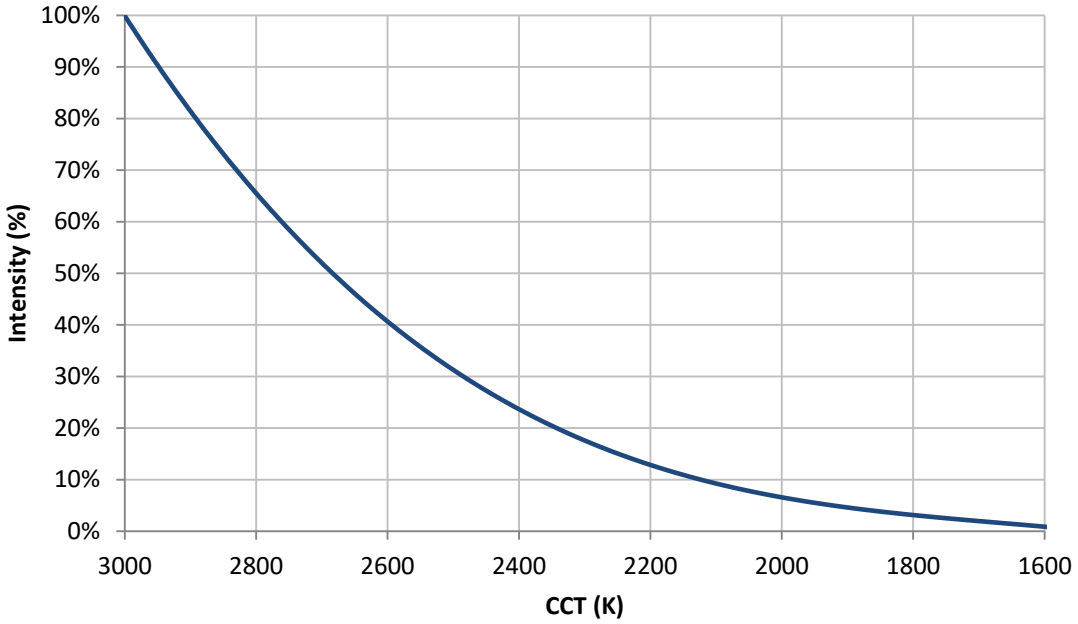


Figure 5: Intensity vs. CCT dimming profile in warm dim mode

CCT vs. Control Voltage in Warm Dimming Mode

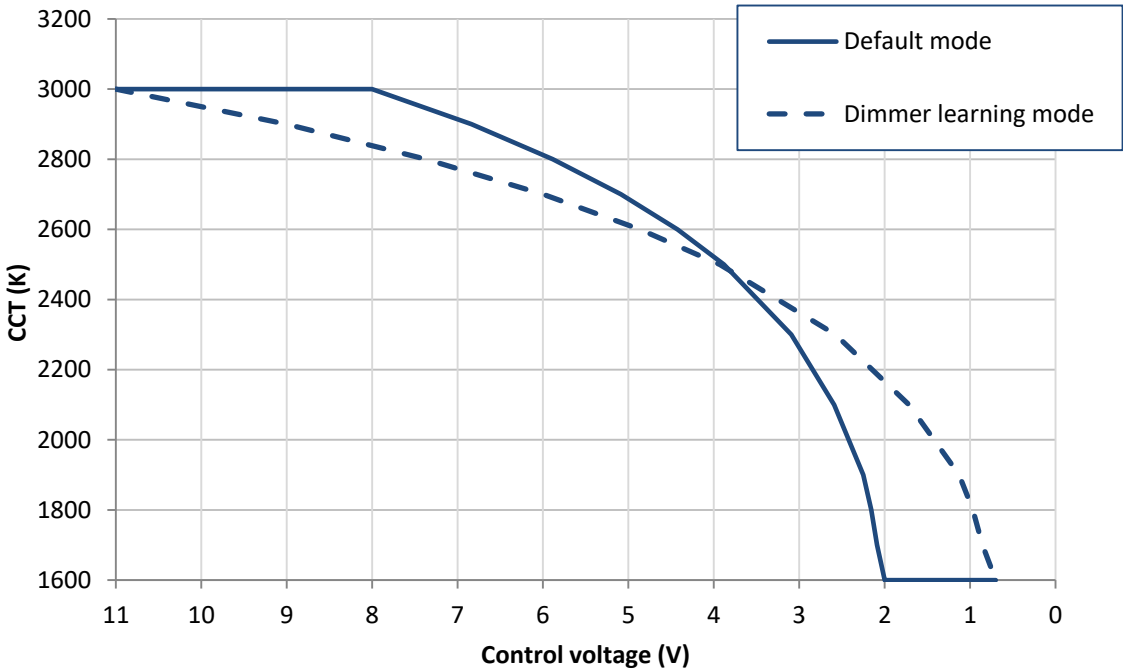


Figure 6: CCT vs. control voltage in warm dim mode

Relative Intensity vs. Control Voltage in Warm Dimming Mode

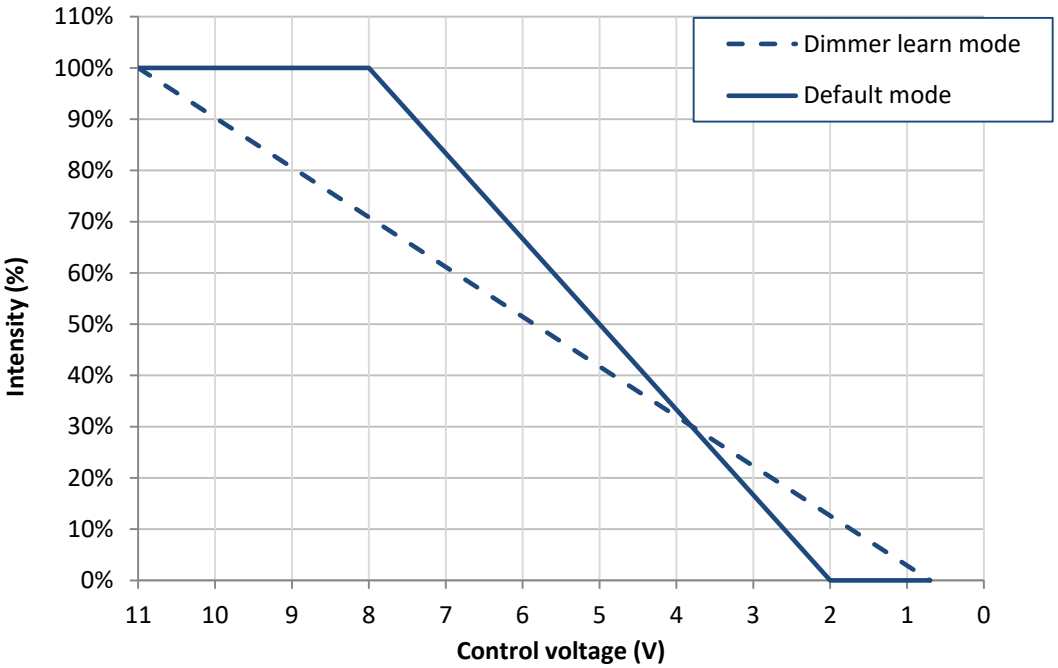


Figure 7: Intensity vs. control voltage in warm dim mode

Notes:
LuxiTune driver has a linear response, i.e. it will produce linear output with linear dimmer and logarithmic output with logarithmic dimmer.

CCT Range in CCT Tuning Mode

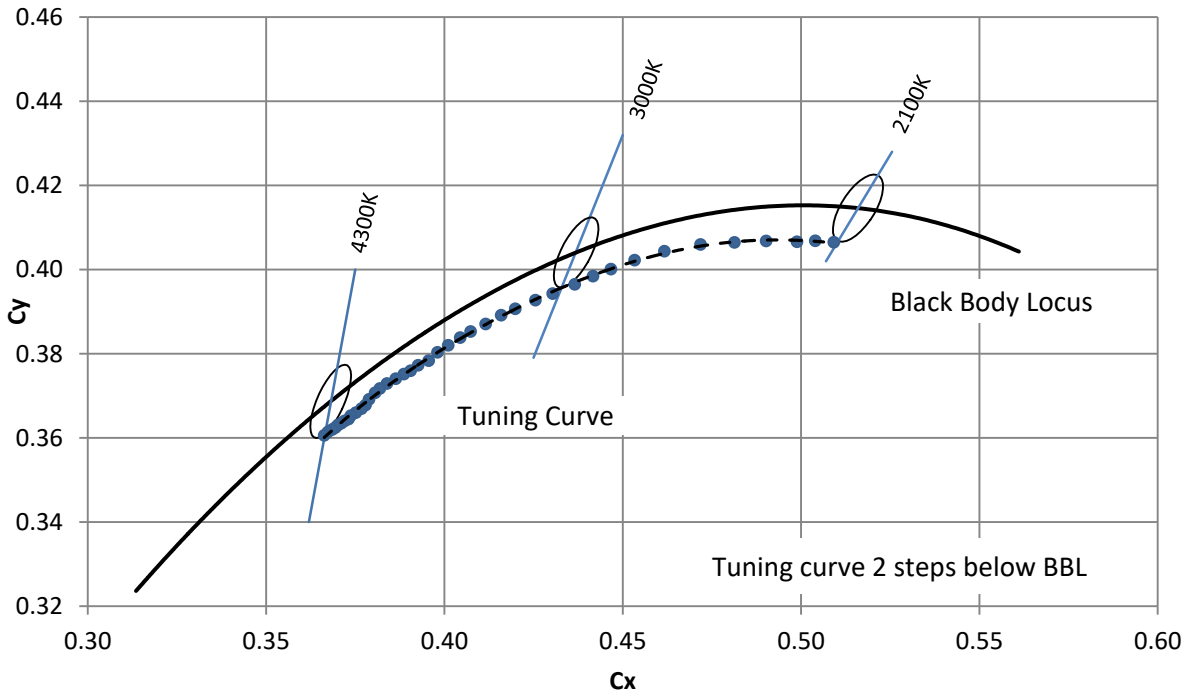


Figure 8: Typical CCT range in CCT tuning mode

Relative Intensity vs. CCT in CCT Tuning Mode

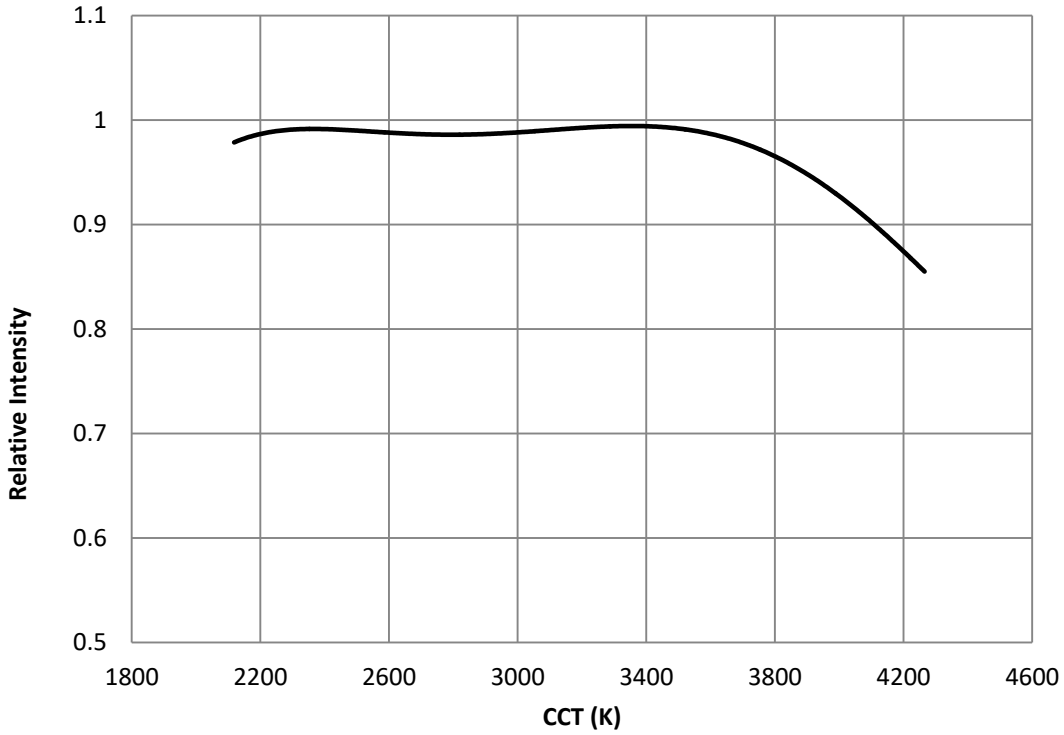


Figure 9: Relative Intensity vs. CCT in CCT tuning mode

CCT vs. Control Voltage in CCT Tuning Mode

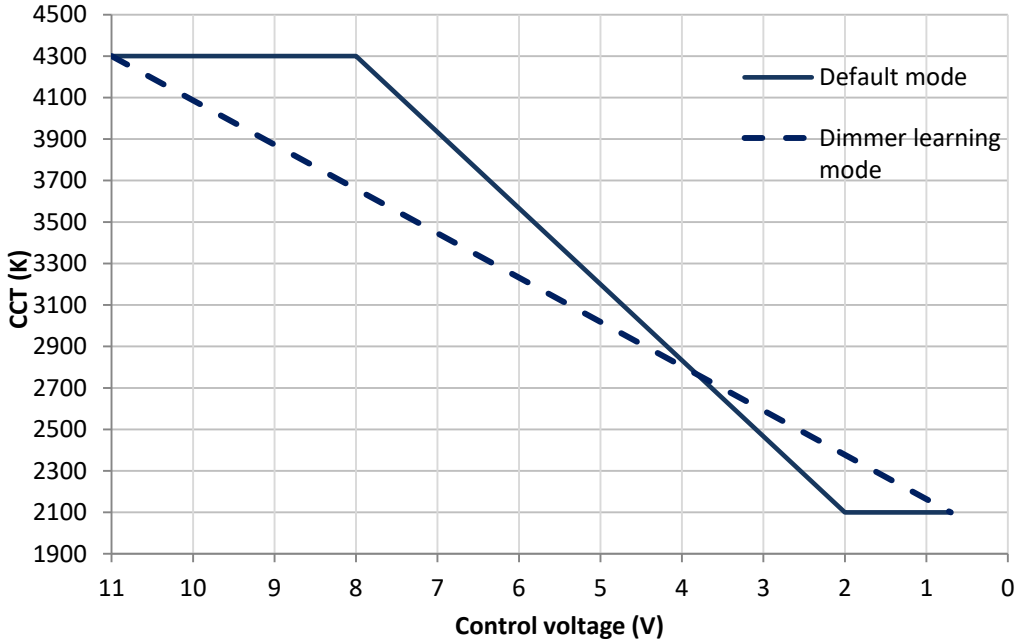


Figure 10: CCT vs. control voltage in CCT tuning mode

Relative Intensity vs. Control Voltage in CCT Tuning Mode

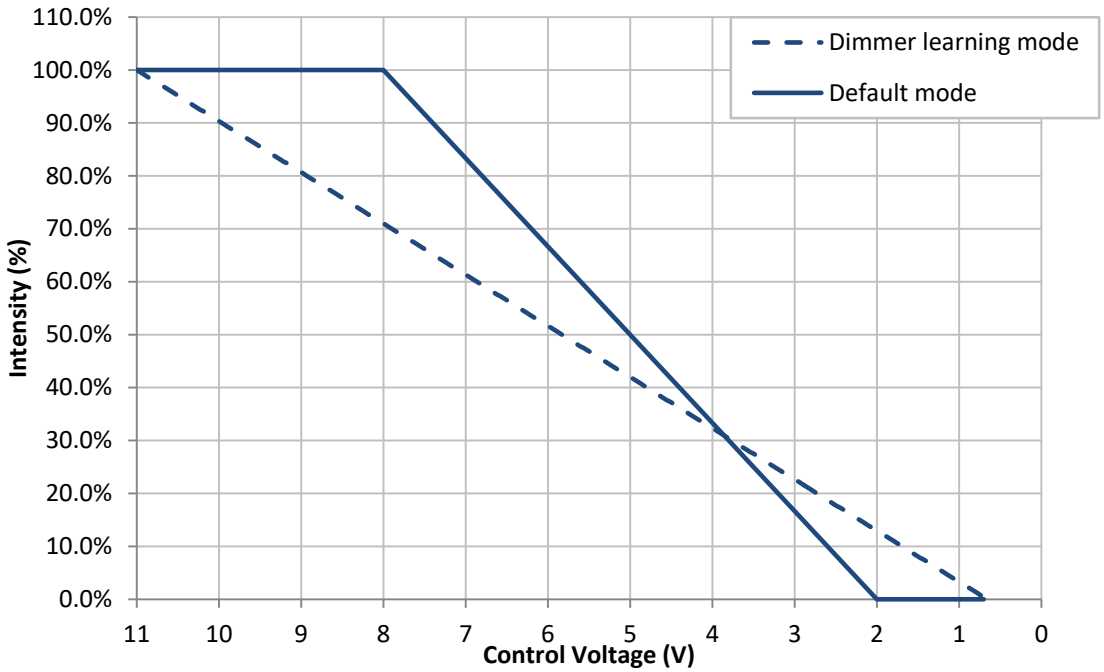


Figure 11: Relative intensity vs. control voltage in CCT tune mode

Notes:
LuxiTune driver has a linear response, i.e. it will produce linear output with linear dimmer and logarithmic output with logarithmic dimmer.

CRI vs. CCT in CCT Tuning Mode

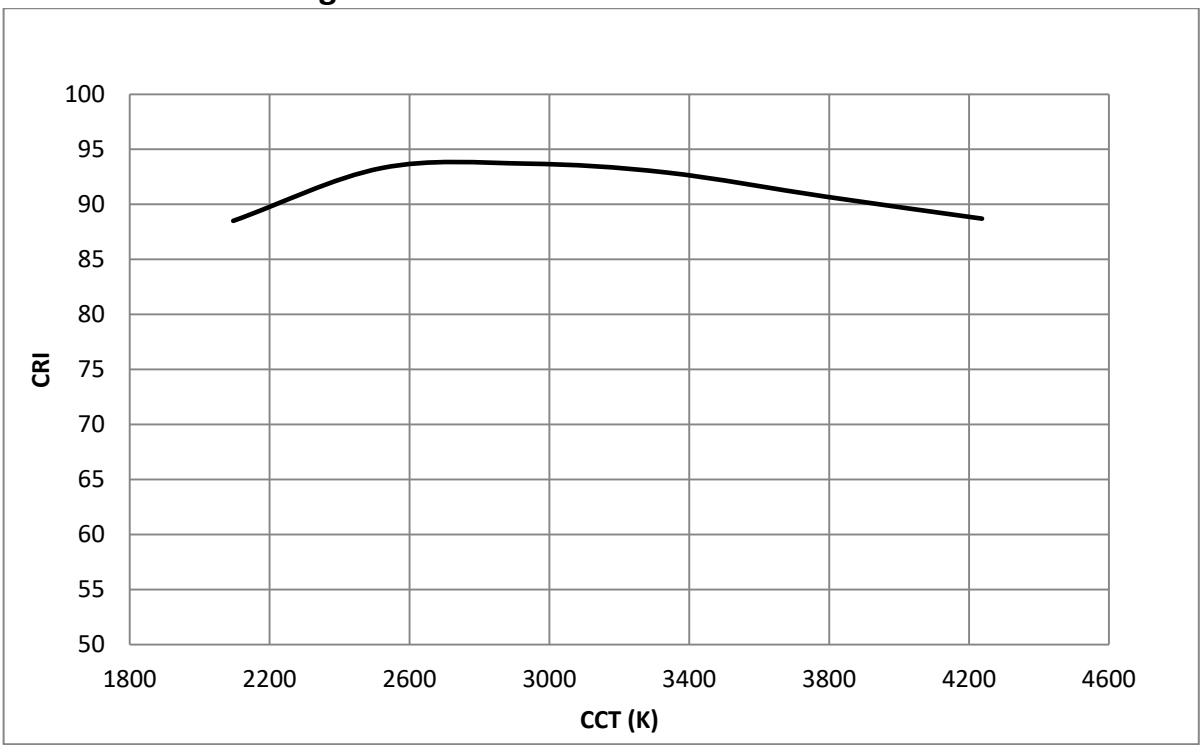


Figure 11: Relative intensity vs. control voltage in CCT tune mode

LuxiTune Light Engine – Without Secondary Lens

Mechanical Dimensions (mm)

LED Engin recommends that customers purchase the LuxiTune light engine with the supported secondary optics as the optics is optimized for color mixing and efficiency. However, some luminaire manufacturers have their unique secondary optics that they would like to use with LuxiTune. The following mechanical dimensions are provided as a guidance.

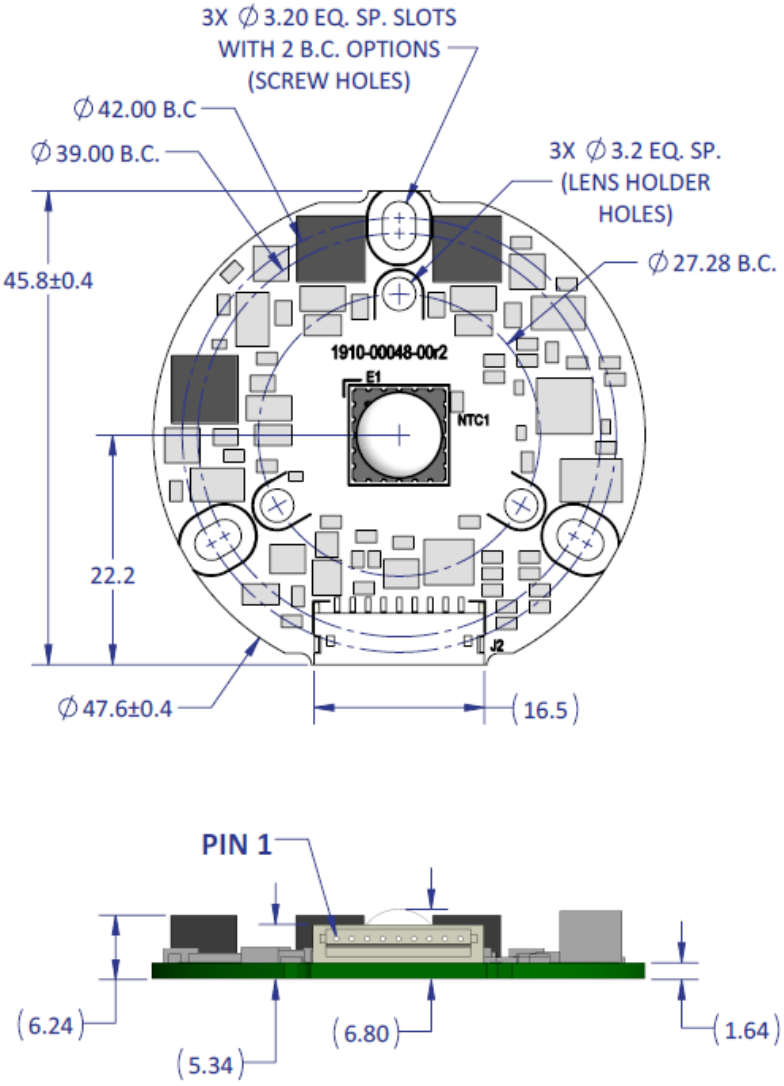


Figure 12: Mechanical dimensions of LuxiTune light engine – without secondary lens

Notes

1. Unless otherwise noted, the tolerance = +/- 0.2mm.
2. Suggested location of optional heat spreader for 0-10V driver in dotted lines. Heat spreader should keep clearance with solder pads. Refer to thermal section.

LuxiTune Light Engine – With Secondary Lens

Mechanical Dimensions (mm)

The standard LuxiTune light engine is sold with supported secondary optics optimized for color mixing and efficiency. The following mechanical dimensions are provided as a guidance for luminaire design. The 3-legged lens holder sits in the 3 holes shown in Fig 12.

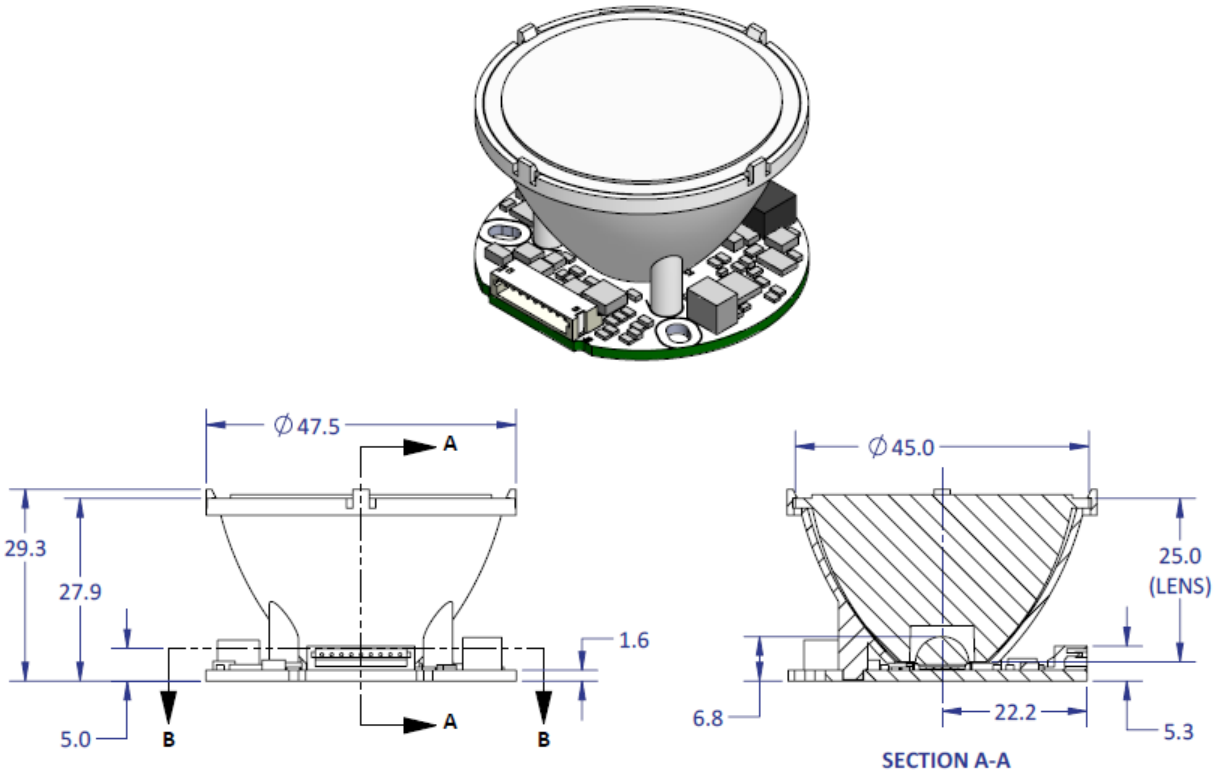


Figure 13: Mechanical dimensions of LuxiTune light engine – with secondary lens

Notes

1. Unless otherwise noted, the tolerance = +/- 0.2mm.
2. Suggested location of optional heat spreader for 0-10V driver in dotted lines. Heat spreader should keep clearance with solder pads. Refer to thermal section.

Lens Assembly Instructions

Lens holder legs may be inserted into MCPCB mounting holes. An epoxy or polyurethane-based adhesive should be used to adhere the lens holder to the MCPCB.
While there are many suitable adhesives, LED Engin recommends Dow Corning 3145 RTV.
Cyanoacrylate adhesives (superglue) must not be used, because they are known to cause lens contamination effects due to “blooming” of the adhesive.

Lens Cleaning

For the removal of dust, use a lint-free soft cloth.
For the removal of stains, use a neutral detergent, i.e. dishwashing soap.
Do not use any solvents, abrasive liquids or abrasive fabrics because they may damage the optical grade lens surfaces.

Thermal and Mechanical Design Considerations

Heat Sink Thermal Resistance

Thermal design is critical for optimal performance of the LuxiTune engine; therefore it is important to choose an efficient heat sink. Design attributes such as heat sink size and shape, active or passive cooling options, material, surface finish etc. need to be selected such that the thermal resistance of the heat sink is optimized for the specific environment the fixture will be operating in.

The board thermal reference point referred to as NTC1 is marked in Fig. 12 and is used to control the performance of the light engine. In the case of insufficient cooling, the light engine will be protected by the driver. The driver continuously monitors the temperature at NTC1 and will reduce the power in steps of 10% when the temperature rises above 85°C. At 105°C the light engine will be turned off.

The temperature at NTC1 is correlated to the junction temperature of the dies in the emitter and is also an indicator for thermal design. LED Engin recommends that the following thermal resistance values are met in the luminaire design.

$T_{ambient}$ [1] (°C)	T @NTC1 (°C)	P_d [2] (W)	Tj (°C)	Required minimum heat sink Rth_(heatsink + TIM) [3] (°C/W)
25	85	14.6	112	4.1
45				2.7
55				2.0

$T_{ambient}$ [1] (°C)	T @NTC1 (°C)	P_d [2] (W)	Tj (°C)	Required minimum heat sink Rth_(heatsink + TIM) [3] (°C/W)
25	65	14.6	92	2.7
45				1.4
55				0.7

Notes:

1. $T_{ambient}$ is defined as the air temperature surrounding the heat sink. Eg. if the heat sink is mounted inside an enclosed fixture, $T_{ambient}$ is the temperature of the air inside the fixture.
2. P_d is the thermal power dissipation.
3. R_{th} values are calculated based on typical data sheet operating conditions.

Thermal Design Guidance

A good thermal design requires an efficient heat transfer from the LuxiTune hybrid board to the heat sink. In order to minimize air gaps between the board and the heat sink, it is common practice to use thermal interface materials (TIM) such as thermal pastes, thermal pads, phase change materials and thermal epoxies. Each material has its pros and cons depending on the design. Thermal interface materials are most efficient when the mating surfaces of the board and the heat sink are flat and smooth. Rough and uneven surfaces may cause gaps with higher thermal resistances, increasing the overall thermal resistance of this interface. It is critical that the thermal resistance of the interface is low, allowing for an efficient heat transfer to the heat sink and keeping LuxiTune hybrid board temperatures low.

LED Engin recommends the use of the following thermal interface materials:

1. Bergquist's Gap Pad 5000S35, 0.020in thick
    - Part Number: Gap Pad® 5000S35 0.020in/0.508mm
    - Thickness: 0.020in/0.508mm
    - Thermal conductivity: 5 W/m-K
    - Continuous use max temperature: 200°C
    - Using M3 Screw (or #4 screw), with polycarbonate or glass-filled nylon washer (#4) the recommended torque range is: 20 to 25 in-oz (3.13 to 3.75 in-lbs or 0.35 to 0.42 N-m)

2. 3M's Acrylic Interface Pad 5590H
    - Part number: 5590H @ 0.5mm
    - Thickness: 0.020in/0.508mm
    - Thermal conductivity: 3 W/m-K
    - Continuous use max temperature: 100°C
    - Using M3 Screw (or #4 screw), with polycarbonate or glass-filled nylon washer (#4) the recommended torque range is: 20 to 25 in-oz (3.13 to 3.75 in-lbs or 0.35 to 0.42 N-m)

Mechanical Mounting Considerations

The mounting of LuxiTune hybrid board assembly is a critical process step. Excessive mechanical stress in the board can cause the board to warp, which can lead to emitter substrate cracking and subsequent cracking of the LED dies. To relax some of the stress, it is advisable to use polycarbonate or glass-filled nylon washers between the screw head and the board and to follow the torque range listed above.

LED Engin recommends the following steps to avoid excessive mechanical stress affecting the emitter:

1. Inspect hybrid board and heat sink for flatness and smoothness.
2. Select appropriate torque for mounting screws. Screw torque depends on the mounting method (thermal interface materials, screws, and washer). Follow the torque range listed above.
3. Always use three M3 or #4-40 screws with #4 plastic washers.
4. When fastening the three screws, it is recommended to tighten the screws in multiple small steps.
5. Always use plastic washers in combinations with the three screws. This helps maintain, roughly, constant pressure on the board as the assembly heats up.
6. In designs with non-tapped holes using self-tapping screws, it is common practice to follow a method of three turns tapping a hole clockwise, followed by half a turn anti-clockwise, until the appropriate torque is reached.

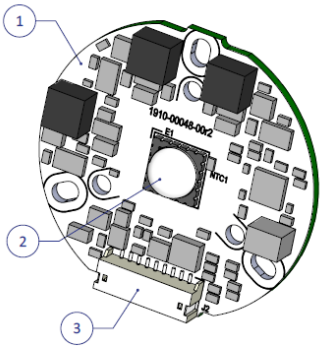
Thermal Feedback and Protection

The LuxiTune light engine has a closed loop thermal feedback mechanism which controls color stability such that color coordinates are constant over the entire operating temperature range of 15°C - 85°C (NTC1 = +15 … +85°C).
When the board temperature exceeds 85°C (NTC1 > 85°C), the LuxiTune emitter goes into thermal protection mode. The light intensity is reduced in steps of 10% until the emitter turns "off" when it reaches 105°C (NTC1 = 105°C). When the temperature drops again and reaches 65°C (NTC1 <65°C), the light intensity is fully restored.

Electrical Interfaces

Connectors

A 9-pin connector, J2, is used for supply power, 0-10V dimming signals and automatic range dimmer option



ITEM NO.	PartNo	Description	QTY.
1	3300-00048-00, Rev02	LTC Luxitune Hybrid Board	1
2	LZC-03T10R	Emitter: LZC, 12 die, Luxitune, w/ Frosted Lens	1
3	JST PN: S9B-ZR-SM4A-TF(LF)(SN)	(@ J2): 9 Positions Header, Shrouded Connector 0.059" (1.50mm) Surface Mount, Right Angle Tin	1

Figure 17: Wiring of hybrid board through J2

24VDC Power Supply Requirements

Class 2 power supply, max current 1.5A
Minimum Output Voltage: 21V
Maximum Output Voltage: 27V
Minimum Output Power: 24W

24VDC Power Supply Wiring

Connect 24VDC power supply Vout+ to LuxiTune connector J2, pins 2, 3 (Vin+). Both pins must be connected to Vout+ of the 24VDC power supply to spread the current load.
Connect 24VDC power supply Vout- to LuxiTune connector J2, pins 1, 6 (GND). Both pins must be connected to Vout- of the 24VDC power supply to spread the current load.
LuxiTune must not be connected in reverse polarity, because reverse operation can cause permanent damage to the drive circuitry.
See tables below for pin description.

J2

Pin	Name	Description
1	GND	Common ground
2	Vin+	+24V, supply power
3	Vin+	+24V, supply power
4	DIM	Dimming 0-10V input.
5	CCT	CCT tuning 0-10V input.
6	GND	Common ground
7	GPIO1	Programmable general purpose I/Os for LED Engin use
8	GPIO2	Programmable general purpose I/Os for LED Engin use
9	RSET/GPIO3	RSET in default mode/Programmable general purpose I/Os for LED Engin use

Recommended Power Supplies

Input Voltage	Manufacturer	Part Number	Maximum Output Power
90-305VAC	Roal	RSLP035-24	36W
90-264VAC	Mean Well	DR-30-24	30W
90-264VAC	Mean Well	MDR-40-24	40W
90-264VAC	Mean Well	PLC-45-24	45W
90-264VAC	Mean Well	DR-45-24	45W
100-240VAC	MagTech	GFP451DA-2419EW	45W

Dimming and Tuning Control Functions

LuxiTune works with the following control inputs:

1. 0-10V

0-10V Control Functions

LuxiTune implementation of the 0-10V interface in non-isolated. The following are supported:

1. All 0-10V dimmers with either current sink (IEC60929) or current source configuration.
2. All 1-10V dimmers with either current sink (IEC60929) or current source configuration.
3. All 0-100K Ohm variable resistors.

Default Control Range:
The default input control range is 2V for <0.5% and 8V for 100% and <0.7V for 0% (See figures 6 and 8). This setup guarantees a full 0.5-100% control range even with dimmers that do not have a well-defined voltage range below the 2V and above the 8V limits. See wiring diagram in Fig 18 for connecting to the driver board.

Self-learning ARD Mode:
LuxiTune Automatic Range Dimming mode (ARD) allows the LuxiTune module to learn the actual voltage range of a dimmer. In this mode, LuxiTune learns the minimum dimmer voltage between 0.7V and 2V and sets it to the lowest light intensity level (~0.5% of max lumens) that the unit can be dimmed to. Similarly, it learns the maximum dimmer voltage between 8V and 11V and sets it to the maximum intensity of light (max lumens). Down to 0.7V, the light engine does not switch off, but stays at the lowest intensity level. Below 0.7V, the light will turn off.

Note:
The input voltage should not be larger than 11V. If slightly larger than 11 volt the unit will interpret the input signal incorrectly which can result in a non-standard and delayed dimming response.

The following sequence will setup the ARD self-learning feature:

1. **Getting into the ARD learning mode:** This can be done in 3 ways
   a. Change the state of P1 when the units is off
   b. Change the state of P1 when the unit is on
   c. Briefly change the state of P1 when the unit is on. (>2sec and <5 sec)

   The state of P1 can be changed by connecting or disconnecting P1 (J8, pin 7) to GND (pin 6).
   The light engine will flash 3 times with an orange color indicating going into learning mode. The intelligent driver will reset any previous learning and start from 2-8V learning any new DIM/CCT range.
   If pushed by the dimming control if will move from the default 2-8V to the maximum 0.7-11V range.

2. **Learn dim range:**
   a. Adjust DIM controller to min/max settings. Fixture will follow and store DIM controller travel. (If the controller stays between 2-8V or >11V (=open pins) then the defaults 2-8V range will be used)
3. **Learn CCT range:**
   a. Adjust CCT controller to min/max settings. Fixture will follow and store CCT controller travel. (If the controller stays between 2-8V or >11V (=open pins) then the defaults 2-8V range will be used)
4. **Getting out of ARD mode:** (This can be done in 3 ways)
   a. Power power-cycle the light engine(s).
   b. Change the state of P1 when the unit is on
   c. Briefly change the state of P1 when the unit is on. (>2sec and <5 sec)

   The light engine will flash 3 times a green color indicating going out of the learning mode. The intelligent driver will stop learning any new DIM/CCT range.
   The light engine will now use the new range for DIM and CCT and remember it's last P1 state so that it's ready to be put into the learning mode again if needed.

Notes

1. When the power is turned “off” and “on” (power cycling) and no mode change has taken place, the emitter will not blink but will immediately begin functioning and adjust to the set dimming level.
2. When a new/different dimmer is connected, the LuxiTune unit needs to be placed again into ARD learning mode again, so that it’s ready to learn the voltage range of the new dimmer. (Start again from step 1)
3. The ARD sequence works in both Warm Dimming and CCT Tuning mode.

Compatible Dimmers & Controls

LuxiTune has been tested internally with these products and found to be compatible.

Common 0(1)-10V Dimmers

Supplier	Model	Log/Linear	Voltage Range
Lutron	Diva, DVTV (logarithmic)	Log	0-10V
Lutron	Nova-T, NTFTV	Log	0-10V
Lutron	Diva, NFTV	Log	0-10V
Lutron	Grafik Eye -GRX-TVI with GRX3503	Log	0-10V
Lutron	Energi Savr Node - QSN-4T16-S	Log	0-10V
Lutron	TVM2 Module	Log	0-10V
Leviton	IP710-DLX	Linear	0-10V
Lightolier	V2000FAMU	Linear	0-10V
Lightolier	ZP600FAM120	Linear	0-10V
Lightolier	MP1500FAM120	Linear	0-10V
Jung	240-10	Linear	1-10V
Gira	0308 00	Linear	1-10V
Merten	5729	Linear	1-10V
Busch-Jaeger	2112U-101	Linear	1-10V
Hunt	PS-(LED)-010	Linear	0-10V
Pass & Seymour	CD4FB-W	Linear	0-10V
Watt Stopper	DCLV1	Linear	0-10V

Notes:
1. This table only lists a small subset of available dimmer. LuxiTune works with any 0-10V dimmer.
2. Depending on the type of dimmer selected, make sure that its installation meets local electrical wiring standards. Observe electrical isolation requirements with dimmers that connect to 220VAC/110VAC mains.

Notes

UL

LuxiTune driver assembly meets UL guidelines for low voltage electronic circuit designs. Existing luminaire products using LuxiTune have passed UL testing and are UL and cUL listed.

RoHS Compliance

LuxiTune products do not contain any restricted hazardous substances (RoHS) with levels above the threshold limits permitted in accordance with EU Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Declarations for this product can be obtained from your local LED Engin representative.

About LED Engin

LED Engin, an OSRAM business based in California's Silicon Valley, develops, manufactures, and sells advanced LED emitters, optics and light engines to create uncompromised lighting experiences for a wide range of entertainment, architectural, general lighting and specialty applications. LuxiGen™ multi-die emitter and secondary lens combinations reliably deliver industry-leading flux density, upwards of 5000 quality lumens to a target, in a wide spectrum of colors including whites, tunable whites, multi-color and UV LEDs in a unique patented compact ceramic package. Our LuxiTune™ series of tunable white lighting modules leverage our LuxiGen emitters and lenses to deliver quality, control, freedom and high density tunable white light solutions for a broad range of new recessed and downlighting applications. The small size, yet remarkably powerful beam output and superior in-source color mixing, allows for a previously unobtainable freedom of design wherever high-flux density, directional light is required. LED Engin is committed to providing products that conserve natural resources and reduce greenhouse emissions; and reserves the right to make changes to improve performance without notice.

For more information, please contact LEDE-Sales@osram.com or +1 408 922-7200.