

PhlatLight™ PT121 Projection Chipset

PRELIMINARY DATA SHEET



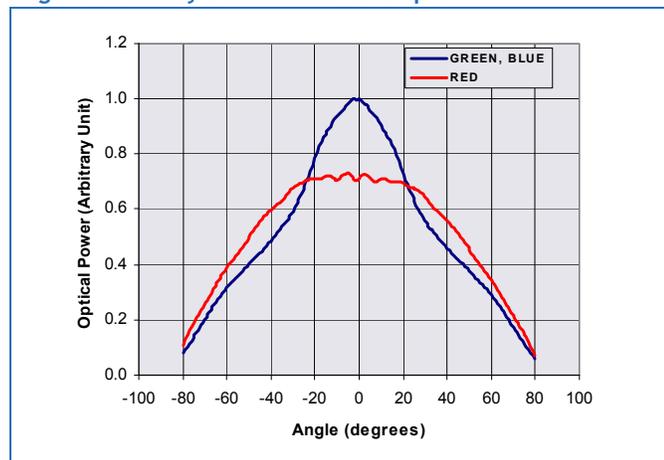
Technology Overview

Luminus Devices' Projection Technology (PT) is an innovative solid-state light source created to replace arc lamps in projection systems, enabling a new category of lamp-free projectors. Enabled by unique use of Photonic Lattice technology, PhlatLight chipsets represent a major breakthrough in brightness that delivers all the benefits of solid state light sources in projections applications:

- Wide color gamut for vivid colors, exceeds NTSC.
- Environmentally friendly technology - Mercury-free.
- Instant start and re-start - no more wait time.
- High reliability; no more lamp replacement.
- Electronic control of color points and light intensity on a frame by frame basis

PhlatLight products benefit from numerous innovations in the domain of packaging, thermal management and optical coupling that allow designers to achieve efficient light engine designs and deliver high screen brightness.

Angular Intensity Distribution- Example



PT121 Features

- Matched RGB Chipset with 12mm² emitting area per device designed for projection applications
- 4:3 aspect ratio matched with micro-display and screen aspect ratio
- Wide color gamut: RED 623 nm, GREEN 526 nm, BLUE 460nm typical dominant wavelength
- Photonic lattice technology for very high surface brightness
- 100% surface emission for high collection efficiency and low optical losses
- Single emitting area per color allows for collection with single lens for simplified optics
- Over 3575 emitted white lumens at 8000K color temperature from single chipset (Continuous Wave Operation)
- Over 2300 emitted white lumens at 8000K color temperature from single chipset under Pulsed Operation
- Uniform surface emission
- Thermally efficient Type CX Common Anode package
- RoHS (lead-free) compliant

Applications

- Data front projectors and professional Rear-Projection Displays with 4:3 aspect ratio
- Optimized for Micro-Display diagonal sizes ranging from 0.7" to 0.96" with 4:3 aspect ratio.
- Suitable for DLP™(0.7"XGA, 0.96SXGA), LCoS, HTPS and 3LCD microdisplays

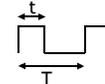
Optical and Electrical Characteristics

	Symbol	Red	Green	EP-Blue	Unit
Emitting Area		12	12	12	mm ²
Emitting Area Dimensions		4 x 3	4 x 3	4 x 3	mmxmm
Characteristics at recommended Pulsed Drive Current $I_F^{1,2}$					
Reference Duty Cycle ³		25	50	25	%
Recommended Peak Drive Current ⁴	typ I_F	30	30	30	A
Peak Luminous Flux ⁵	typ Φ_V	1800	3500	750	lm
Peak Radiometric Power	typ Φ_r	10.4	7.3	16.3	W
Dominant Wavelength	λ_{dmin}	619	516	450	nm
	typ λ_d	623	525	460	nm
	λ_{dmax}	630	535	468	nm
FWHM - Spectral bandwidth at 50% of Φ_V	typ $\Delta\lambda_d$	19	39	20	nm
Color Saturation ^{6,7}	typ	1.00	0.79	0.99	
Chromaticity Coordinates ^{6,7}	typ x	0.697	0.171	0.154	
	typ y	0.303	0.702	0.024	
	min V_{Fmin}	2.2	3.5	3.2	V
Forward Voltage	typ V_F	2.6	4.9	4.0	V
	max V_{Fmax}	3.4	5.9	5.2	V
Dynamic Resistance	typ Ω_{dyn}	0.02	0.03	0.02	Ω
Device Thermal Characteristics and Lifetime					
Thermal Coefficient of Photometric Flux	typ	-1.1	-0.2	-0	% / °C
Thermal Coefficient of Radiometric Flux	typ	-0.7	-0.2	-0.2	% / °C
Forward Voltage Temperature Coefficient	typ	-3.0	-3.0	-3.0	mV / °C
Median Lifetime ⁸		>60,000	>60,000	>60,000	Hours

Optical and Electrical Characteristics

		Symbol	Red	Green	EP-Blue	Unit
Characteristics at Reference Continuous Drive Current I_F (Continuous Waveform)¹						
Reference Drive Current	typ	I_F	18	18	18	A
Luminous Flux	typ	Φ_V	1010	2450	540	lm
Radiometric Flux	typ	Φ_r	5.8	4.7	10.8	W
Dominant Wavelength	typ	λ_d	624	528	462	nm
Color Saturation ^{6,7}	typ		1.00	0.83	0.99	
FWHM - Spectral bandwidth at 50% of Φ_V	typ	$\Delta\lambda_d$	18	38	21	nm
	typ	x	0.698	0.183	0.153	
Chromaticity Coordinates ^{6,7}	typ	y	0.301	0.703	0.025	
	min	V_{Fmin}	2.0	3.1	2.8	V
Forward Voltage	typ	V_F	2.3	4.4	3.6	V
	max	V_{Fmax}	3.0	5.3	4.6	V
Dynamic Resistance	typ	Ω_{dyn}	0.02	0.03	0.05	Ω

Note 1: All ratings are based on operation with a constant heat sink temperature $T_{hs} = 40^\circ\text{C}$. See Thermal Resistance section for T_{hs} definition.

Note 2: Parameters rated at typical duty cycle and Pulsed operation frequency $f > 240\text{Hz}$; $DC = \frac{t}{T}$ 

Note 3: Duty Cycle used to specify device ratings under Pulsed operation. PhlatLight devices can operate at duty cycles ranging from 1% to 100%. At higher duty cycles, drive current should be adjusted to maintain the junction temperature at desired levels to meet the application lifetime requirements.

Note 4: In pulsed operation, rise time from 10 to 90% of forward current should be larger than 0.5 microseconds.

Note 5: For EP-Blue devices, total flux from emitting area at reference dominant wavelength at recommended peak drive current conditions.

Note 6: In CIE 1931 chromaticity diagram coordinates, normalized to $X+Y+Z=1$

Note 7: For Reference only

Note 8: Assuming $T_j < 80^\circ\text{C}$ for Red devices, $T_j < 115^\circ\text{C}$ for Blue devices and $T_j < 125^\circ\text{C}$ for Green devices.

Absolute Maximum Ratings

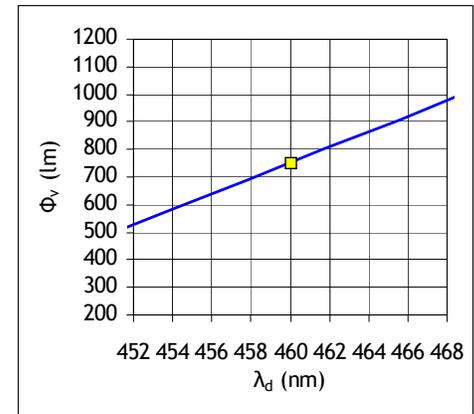
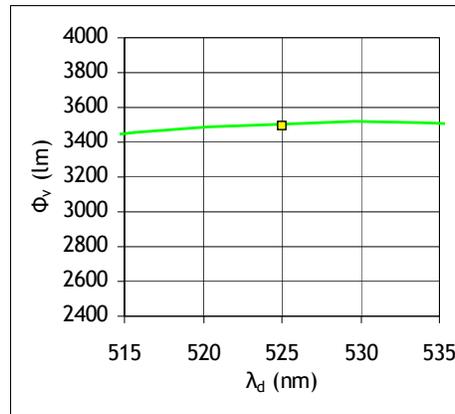
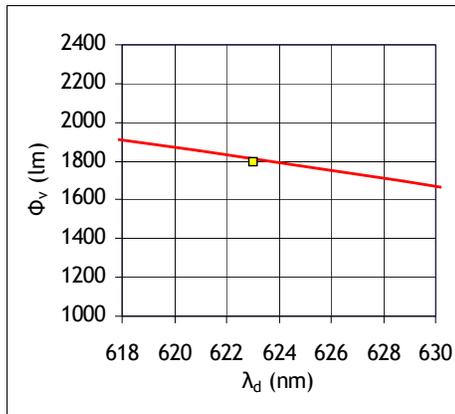
	Symbol	Red	Green	EP-Blue	Unit
Maximum Current ^{1,2}	Max	36	36	36	A
Maximum Operating Junction Temperature ³	Max T_{jmax}	110	170	170	°C
Storage Temperature Range		-40/+100	-40/+100	-40/+100	°C

Note 1: Luminus PhlatLight LEDs are designed for operation to an absolute maximum forward drive current density of $2.5A/mm^2$ cw, and $3A/mm^2$ pulsed ($f > 240Hz$, duty cycle $< 60%$). Please refer to absolute maximum rating table above for specific absolute maximum currents for the products covered in this datasheet. Product lifetime data is specified at recommended forward drive currents. Sustained operation at absolute maximum currents will result in a reduction of device lifetime compared to recommended forward drive currents. Actual device lifetimes will also depend on junction temperature. Refer to the lifetime derating curves (available from Luminus) for further information.

Note 2: In pulsed operation, rise time from 10 to 90% of forward current should be larger than 0.5 microseconds.

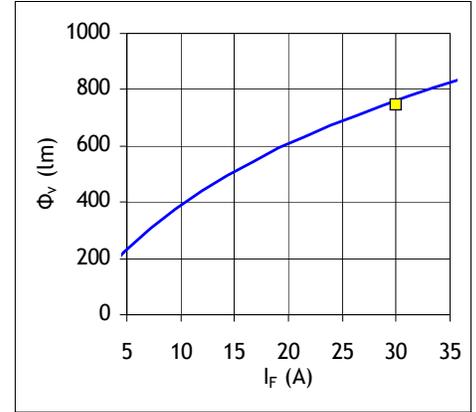
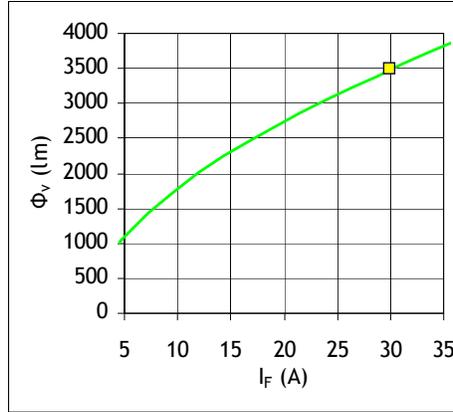
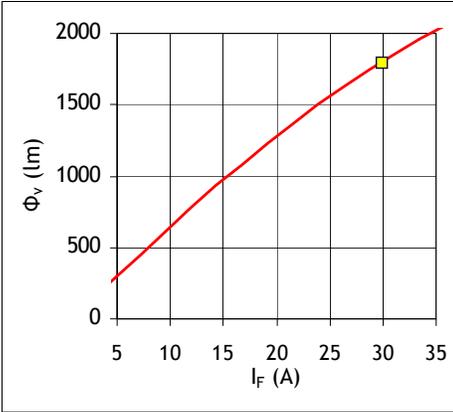
Note 3: Sustained operation at Maximum Operating Junction Temperature (T_{jmax}) will result in reduced device life time.

Luminous Flux variation with Wavelength: $\Phi_v = f(\lambda_d)$ at Recommended Operating Current I_F



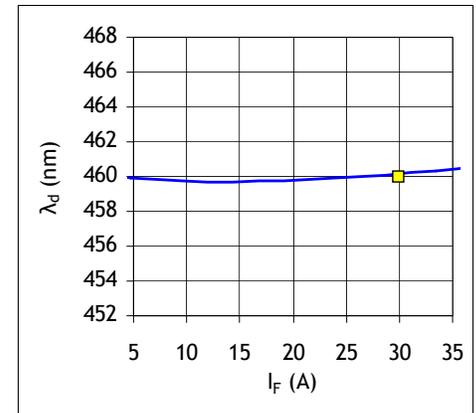
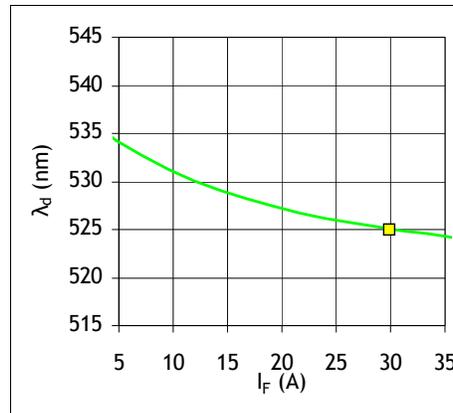
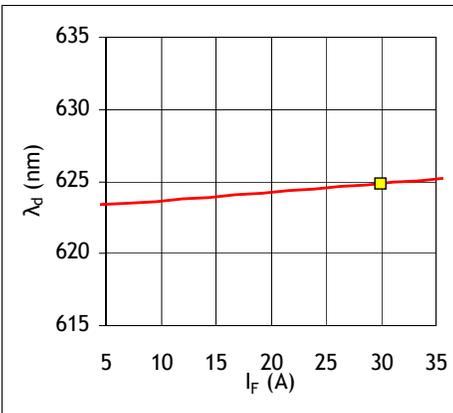
See note 1 on page 7.

Luminous Flux variation with Drive Current - $\Phi_v = f(I_F)$ - Typical



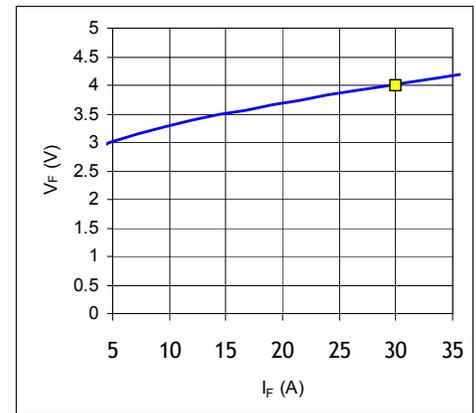
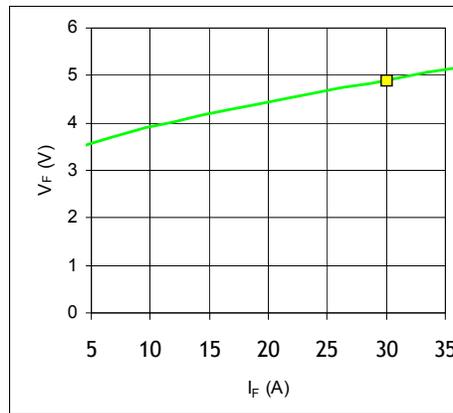
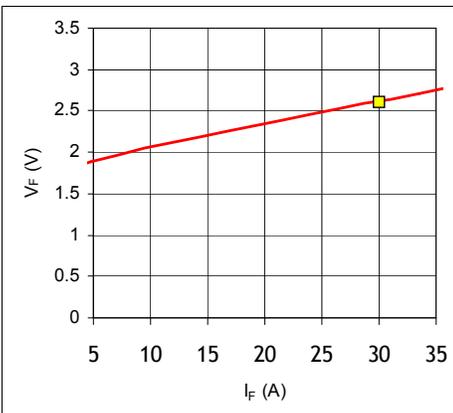
See notes 1,2 on page 6.

Dominant Wavelength variation with Forward Current - $\lambda_d = f(I_F)$ - Typical



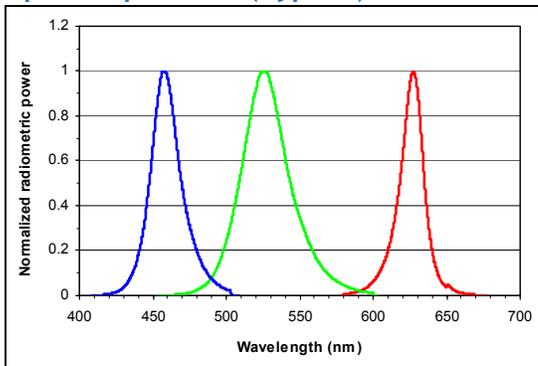
See notes 1,2 on page 6.

Forward Voltage variation with Drive current - $V_F = f(I_F)$ - Typical



See notes 1,2 on page 6.

Optical Spectrum (Typical)

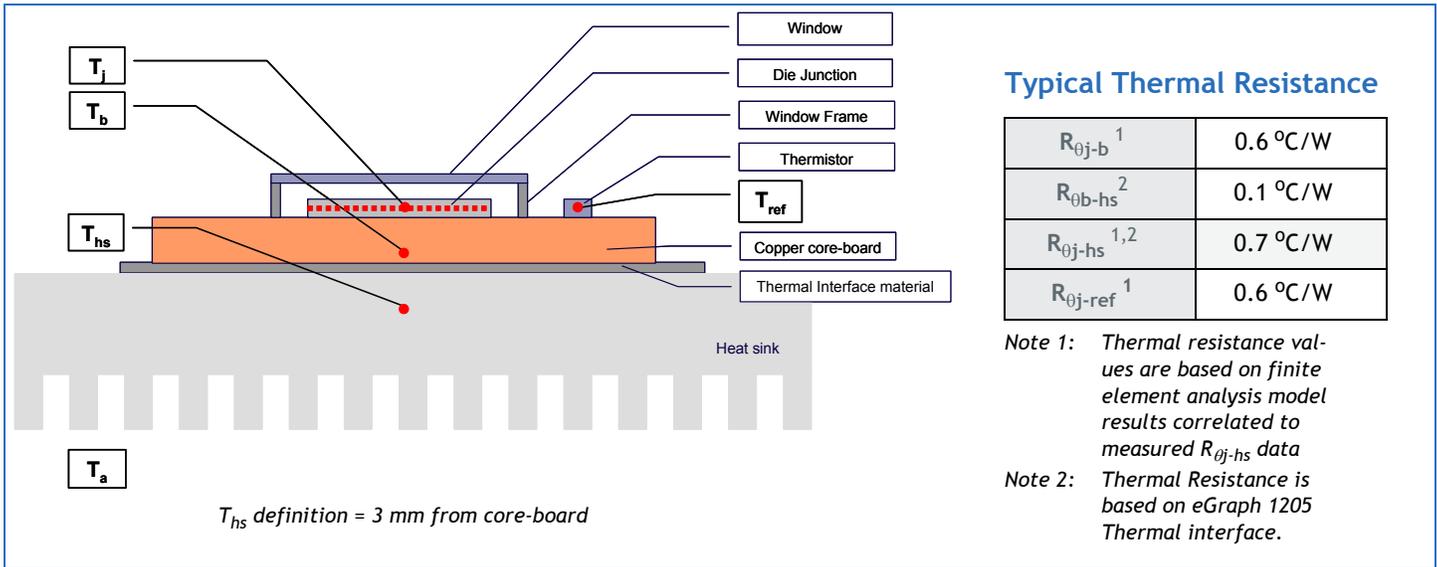


See note 3 on page 6.

Chart Notes

- Note 1:** For Pulsed operation, typical RGB duty cycles used are 25%, 50% and 25% respectively for pulsed operation ($T_{hs} = 40^{\circ}\text{C}$).
- Note 2:** Yellow square indicate device operating point under recommended conditions listed in the Optical and Electrical Characteristics table.
- Note 3:** Typical Spectrum at recommended peak drive current.

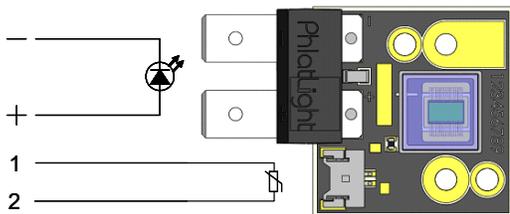
Thermal Resistance



Thermistor Information

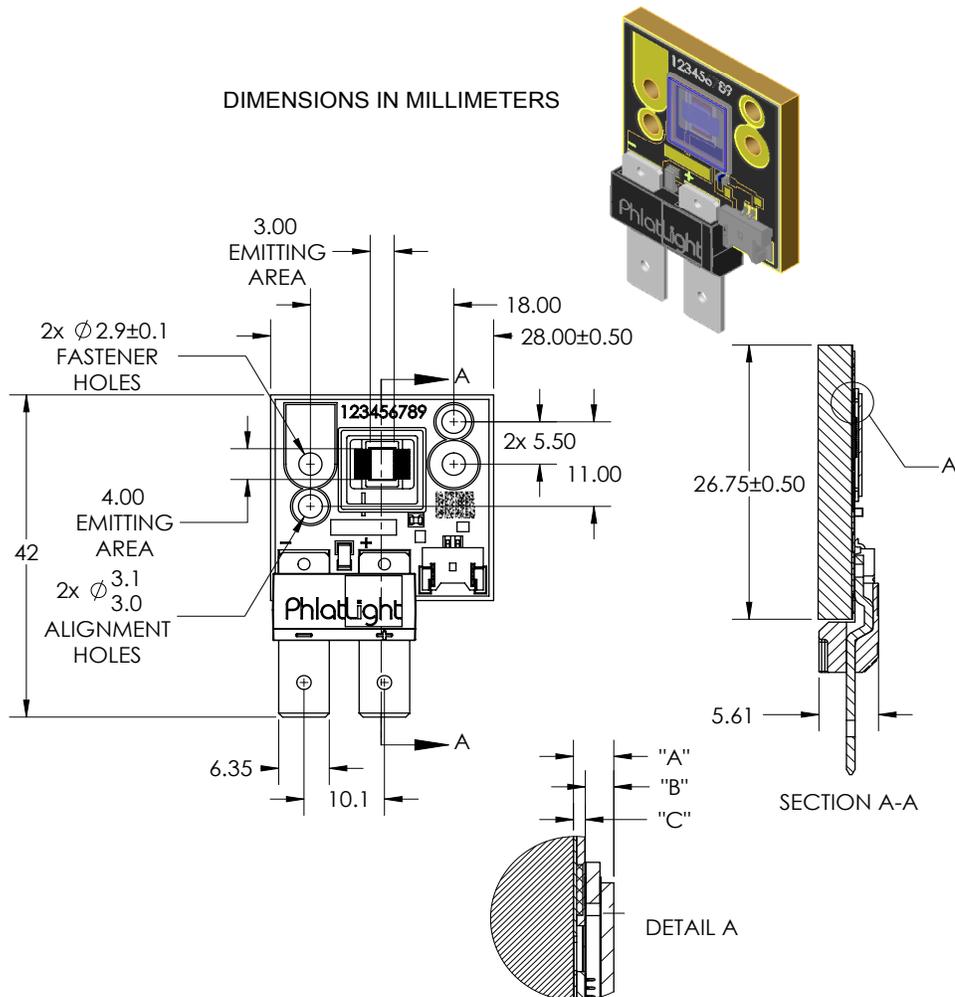
The thermistor used in PhlatLight™ devices mounted on core-boards is from Murata Manufacturing Co. The global part number is NCP15XH103J03RC. Please see <http://www.murata.com/> or <http://www.murata.co.jp> for details on calculating thermistor temperature.

Electrical Pinout



Mechanical Dimensions

Package: Type CX



DIMENSION NAME	DESCRIPTION	NOMINAL DIMENSION	TOLERANCE
"A"	TOP OF METAL SUBSTRATE TO TOP OF GLASS	0.95	±0.13
"B"	EMITTING AREA TO TOP OF GLASS	0.67	±0.16
"C"	TOP OF METAL SUBSTRATE TO EMITTING AREA	0.28	±0.05

Recommended connector for Anode and Cathode: Panduit Disco Lok™ Series P/N: DNG14-250FL-C or equivalent
 Thermistor Connector: MOLEX P/N 53780-0270. Recommended Female: MOLEX P/N 51146-0200 or equivalent
 For detailed drawing of the PT121 Type CX package, please refer to the DWG-001268document

Ordering Information

Device Part Number	Color	Description
PT-121-R-C11-MPB	Red	Red PhlatLight PT121 device consisting of a 12mm ² LED (4:3 aspect ratio), thermistor and connector mounted on a type CX copper-core PCB
PT-121-G-C11-MPB	Green	Green PhlatLight PT121 device consisting of a 12mm ² LED (4:3 aspect ratio), thermistor and connector mounted on a type CX copper-core PCB
PT-121-B-C11-EPA	Blue	Blue PhlatLight PT121 device consisting of a 12mm ² LED (4:3 aspect ratio), thermistor and connector mounted on a type CX copper-core PCB

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