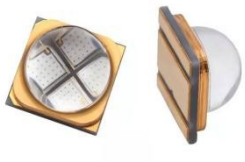
HK405S65CL-S4504

Specification Datasheet



CFCL Optoelectronics (Shenzhen) Co., Ltd.

Model No.: HK405S65CL-S4504

Product: 6565 Round Lens Package UVA LED (4 × 45 × 45 mil chips, 2P2S)

Revision: V1.0

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Address: 6th Floor, Building D, No. 48 Paotai Road, Lisonglang Community, Gongming Sub-district, Guangming District, Shenzhen, Guangdong, P.R. China
Website: www.cfclopot.com E-mail:uvclcd@qq.com

1. General Description

This is a high-power long-wave UVA / violet-blue solid-state light source designed for 1000 mA continuous operation (500 mA per chip), with a typical peak wavelength of 405.0 nm. Four 45 × 45 mil GaN LED chips are bonded onto a 6.50 × 6.50 mm aluminum nitride (AlN) ceramic substrate in a 2-parallel / 2-series (2P2S) configuration and encapsulated under a φ5.50 mm high-purity quartz glass spherical lens with a 60° half-intensity beam, delivering 3760 – 4720 mW of radiant output with concentrated and uniform irradiance.

The AlN ceramic substrate together with the gold-plated metallization provides ultra-low thermal resistance (4 °C/W typical, junction to board), allowing high current density operation with stable radiant power and a long service life. The 2P2S arrangement divides the drive current equally between two parallel branches and reduces the forward voltage stress of each die, giving a total forward voltage of about 6.85 V that is easy to match with constant-current drivers. The 405 nm output penetrates deeply into thick layers and matches 405 nm photoinitiator systems, making it the mainstream source for 3D printing and deep-layer curing.

2. Key Features

- Peak wavelength: typical 405.0 nm, full binning range 400.0 – 410.0 nm (long-wave UVA / violet-blue band)
- 6565 SMD aluminum nitride (AlN) ceramic package with thermal conductivity ≥ 170 W/m·K and thermal resistance of 4 °C/W (typical)
- φ5.50 mm high-purity quartz glass spherical lens, 60° half-intensity beam angle
- Four 45 × 45 mil chips in 2P2S configuration, radiant output power 3760 – 4720 mW at 1000 mA
- Deep penetration into thick resin layers and high compatibility with 405 nm photoinitiator systems
- Low radiant degradation under continuous high-current-density driving
- 100% electrical and optical inspection before shipment
- RoHS, CE and REACH compliant

3. Application Fields

- SLA / DLP / LCD 3D printing resin photopolymerization
- Deep-layer curing of thick adhesives, potting compounds and coatings
- Fluorescence excitation in biological imaging (GFP, DAPI, FITC and common probes)

- Nail gel curing and professional beauty equipment
- Dental composite resin curing and medical UV devices
- Thick-film coating curing in electronics and wood industries
- Food surface bacteriostatic treatment and fresh-keeping equipment

4. Absolute Maximum Ratings

(Test condition: Ambient temperature Ta = 25°C)

Parameter	Symbol	Rating	Unit
Forward Current	I_F	1400	mA
Peak Forward Current (10% duty cycle, 1ms pulse)	$I_{F(peak)}$	⩽3000	mA
Reverse Voltage	V_R	5.0	V
Operating Temperature Range	T_{opr}	-40 ~ +85	°C
Storage Temperature Range	T_{stg}	-40 ~ +100	°C
Maximum Junction Temperature	T_j	115	°C

5. Electro-Optical Characteristics

(Test condition: Ta = 25°C, Forward current I = 1000 mA) $_F$

Parameter	Symbol	Min.	Typ.	Max.	Unit
Peak Wavelength	λ_p	400.0	405.0	410.0	nm
Spectral Half-Width	$\Delta\lambda$	-	18	-	nm
Forward Voltage	V_F	5.8	-	7.6	V
Radiant Output Power	P_e	3760.0	4240.0	4720.0	mW
Viewing Angle (Half Intensity)	$2\theta_{1/2}$	-	60	-	deg

Reverse Leakage Current	I_R	-	-	2.0	μA
Thermal Resistance (Junction to Board)	$R_{th(j-b)}$	-	4	5	°C/W

6. Binning Specifications

(Test condition: Ta = 25°C, I_F = 1000 mA)

6.1 Forward Voltage Binning

Level	A01	A02	A03	A04	A05	A06
Min. (V)	5.8	6.1	6.4	6.7	7.0	7.3
Max. (V)	6.1	6.4	6.7	7.0	7.3	7.6

6.2 Radiometric Power Binning

Level	P376	P392	P408	P424	P440	P456
Min.(mW)	3760.0	3920.0	4080.0	4240.0	4400.0	4560.0
Max.(mW)	3920.0	4080.0	4240.0	4400.0	4560.0	4720.0

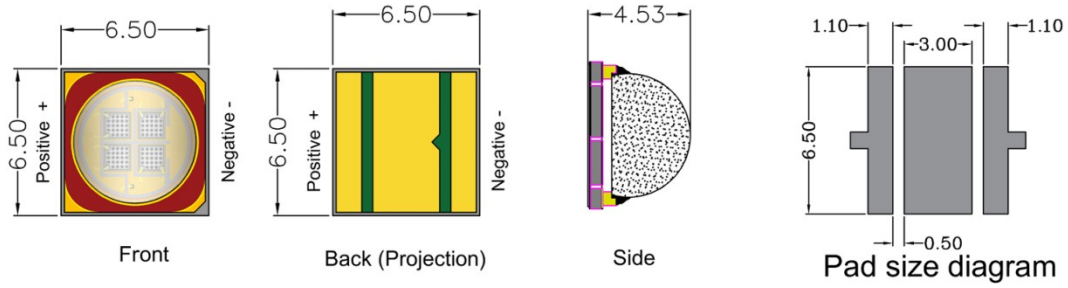
6.3 Peak Wavelength Binning

Level	400A	405B
Min.	400.0 nm	405.0 nm
Max.	405.0 nm	410.0 nm

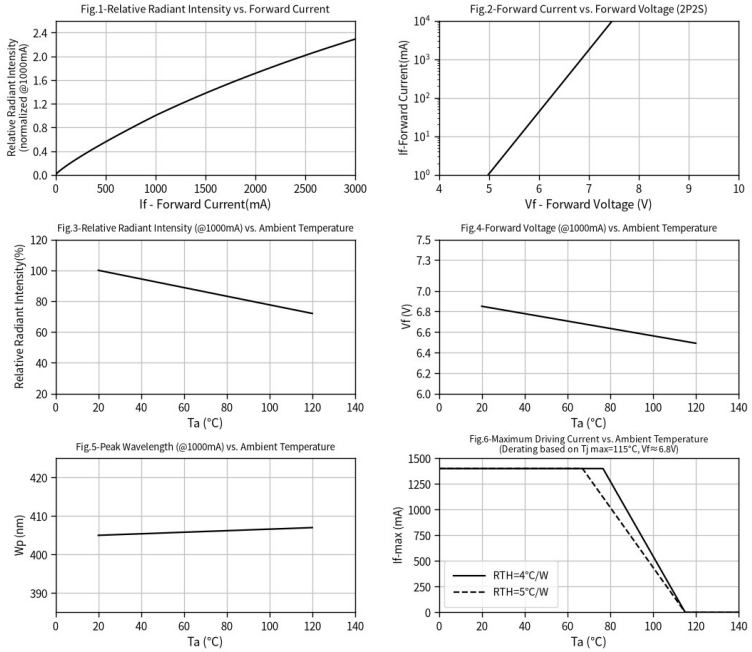
Default supply: 405B bin; 400A bin available upon custom request.

7. Outline Dimensions

- **Package Type: 6565 SMD Round Lens (AlN Ceramic Substrate)**
- **Overall Dimensions: 6.50 ± 0.10 mm (Length) × 6.50 ± 0.10 mm (Width) × 4.53 ± 0.10 mm (Height, including lens)**
- **Lens Diameter: φ5.50 mm high-purity quartz glass spherical lens, 60° half-intensity beam angle**
- **Chip Configuration: 4 × 45 × 45 mil GaN LED chips, 2 in parallel × 2 in series (2P2S)**
- **Pad Size: Central thermal pad 3.00 mm, side pads 1.10 mm, pad spacing 0.50 mm**
- **Polarity Marking: Anode (+) and Cathode (-) marked on the back of the package (mirror view)**



8. Characteristic Curve



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9. Packaging & Storage

9.1 Packaging

- Packaging form: Tape and reel
- Quantity per reel: 600 pieces
- Reel diameter: 178 mm (7 inch)
- Moisture Sensitivity Level: MSL 3

9.2 Storage Conditions

- Store in a dry environment at room temperature
- Recommended storage: 5°C ~ 30°C, 30% ~ 70% RH
- Avoid direct sunlight, corrosive gases and high humidity
- Reseal the moisture barrier bag properly after opening
- For MSL 3 devices, complete soldering within 168 hours after opening the bag under factory environment (≤ 30°C / 60% RH); bake before use if expired.

10. Notes & Precautions

- Peak wavelength measurement tolerance: ± 2.0 nm
- Radiant power measurement tolerance: ± 10%
- Forward voltage measurement tolerance: ± 10%
- All parameters are tested on finished devices under standard conditions (Ta = 25 °C, IF = 1000 mA) via an integrating sphere system.
- UVA LEDs emit high-energy ultraviolet radiation. Avoid direct exposure to eyes or skin during operation.
- This device is sensitive to electrostatic discharge (ESD). ESD withstand voltage: HBM ± 2000 V. Proper ESD protection is required during handling and assembly.
- Operating beyond absolute maximum ratings may cause permanent damage to the device.
- Proper thermal design is required to ensure junction temperature does not exceed 115 °C under continuous operation; a 6.50 × 6.50 mm MCPCB thermal pad is recommended.
- Chip-level maximum ratings (S-45EUPUT-A): DC forward current ≤ 1500 mA per chip, junction temperature ≤ 125 °C. This device integrates four chips in a 2P2S arrangement; the package-level ratings in Section 4 govern continuous operation.