



OVERVIEW OPTOELECTRONICS

eiPal Optoelectronics
2024

WÜRTH ELEKTRONIK MORE THAN YOU EXPECT

WHAT IS LIGHT?

Application Areas

UV	VIS	IR	FIR
UV 100-400nm • High energy • Curing, disinfection • Can damage skin and eyes	Visible light 400-780nm • Signaling, Illumination • Visible with eyes	Infrared 780nm – 1mm • Low energy • Transmit data or sense objects • Invisible to human eye	



OPTOELECTRONIC COMPONENTS

Overview

LEDs



IC LEDs

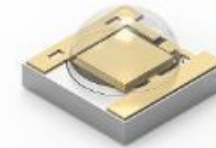


NEW

Infrared



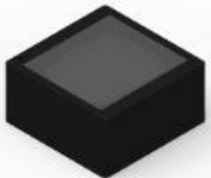
Ultraviolet



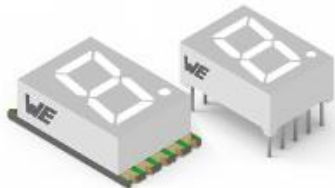
Optocoupler



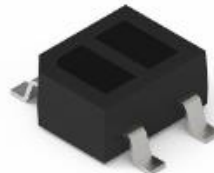
Laser



7 Segments Display



Optical Sensors



NEW

Development Kits



Evaluation Kits



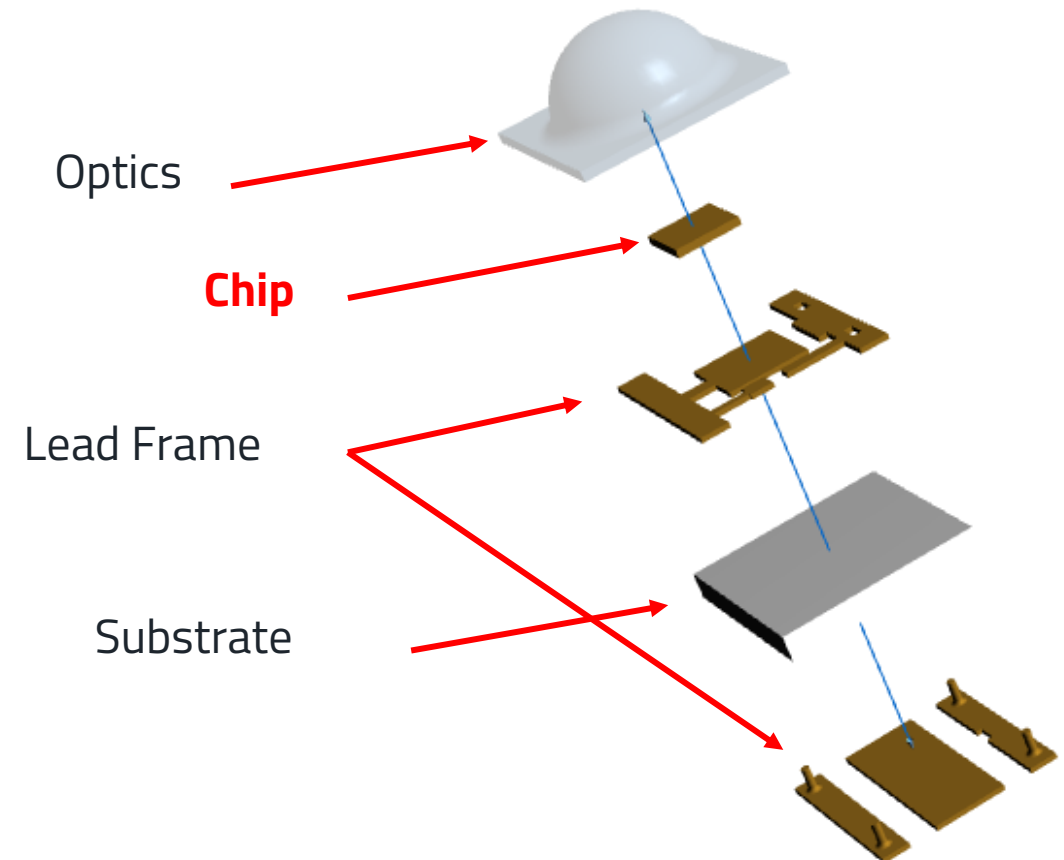
NEW

LED STRUCTURE

LED INTRODUCTION

Structure of an LED

- **Chip (Diode) Active element of the LED**
 - Typical materials – AlInGaN, GaAlInAs, GaAlInP
- **Lead frame**
 - Metal contacts - leading current to the active part
 - Copper – good heat conduction
 - Plating – Au, Ag, Sn for solderability
- **Substrate**
 - Ceramic, PCB, PLCC
- **Out coupling optics**
 - Defines emission characteristic
 - Epoxy or silicon



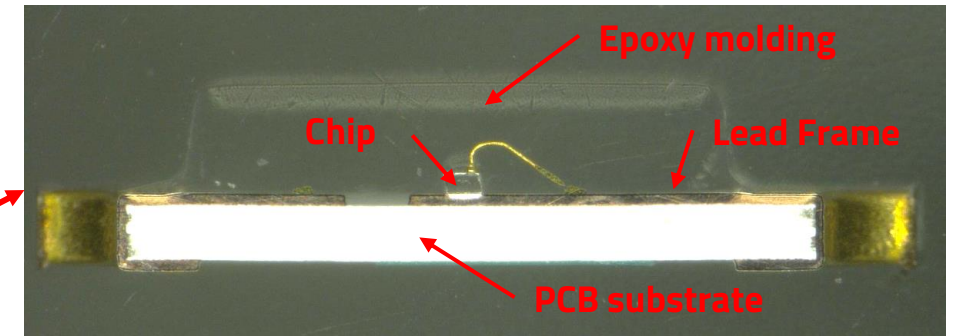
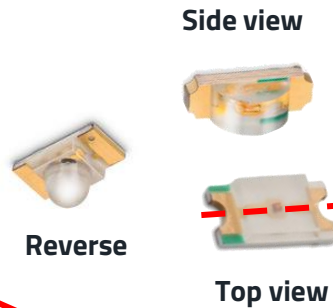
LED TYPES

Structure and characteristics

■ Chip LED

- Small size – signaling LED
- Standard sizes
 - 0402, 0603, 0805, 1206, 0606, 1210

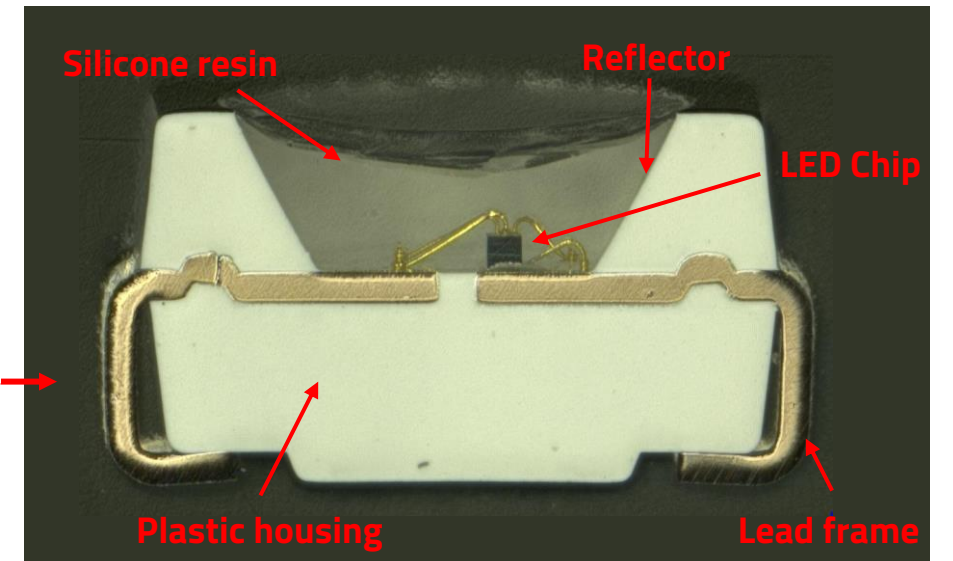
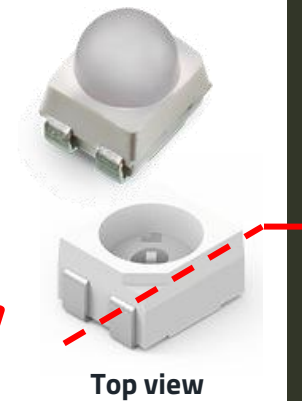
Sizes in
inch !



■ PLCC

- Substrate is a PLCC housing
- Silicone encapsulation of chip
- Standard sizes
 - 2214, 3528, 3535, 3014, 3022, 5050, 5630

Sizes in
mm !

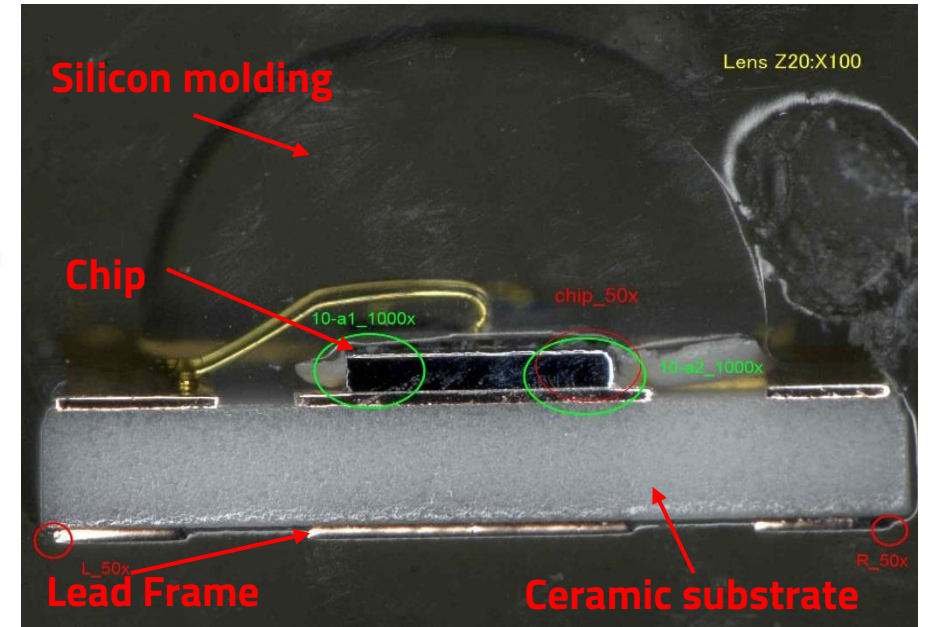
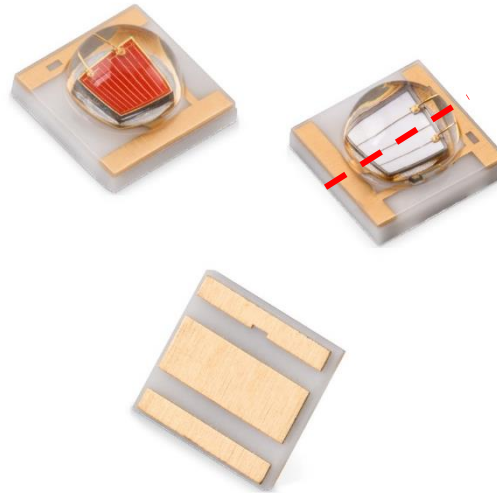


LED TYPES

Structure and characteristics

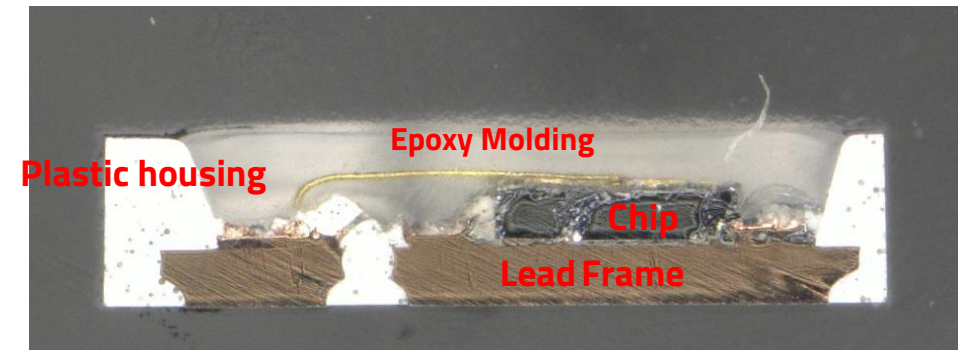
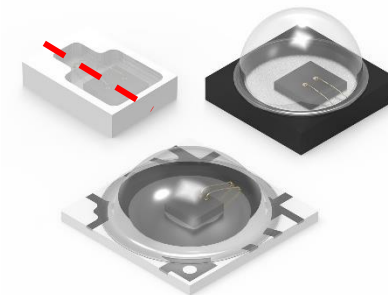
■ Ceramic

- Low thermal resistivity substrate
 - Ceramic substrate – Al_2O_3 , AlN
- Bigger chip size
- High power LEDs
 - Drive currents up to 1A
 - High light intensity



■ QFN EMC Package

- Lead Frame – mold in substrate
- Shorter smaller path over lead frame
- Good thermal characteristics



COMPARISON OF LED TYPES

Different LEDs – different characteristics

	Chip LED 	PLCC 	QFN EMC 	Ceramic 
Max. power dissipation	<100mW	200mW	1-3W	>3W
Optical output	<1500mcd	<3000mcd	<40 lm, <350mW	>40lm, >350mW
Thermal resistance	>100K/W	>100K/W	~10K/W	<10K/W
Application	Signal	Signal	Illumination	Illumination
Color	Single/multi color, visible, IR	Single/multi color, visible, IR	Horti, white, IR, UV	Horti, white, IR, UV
Typical size	0402, 0603, 0805, 1206, 0606, 1210	2214, 3528, 3535, 3014, 3022, 5050	2720, 2835, 3030, 3737, 5630	3535

OPTO-ELECTRONIC PARAMETERS

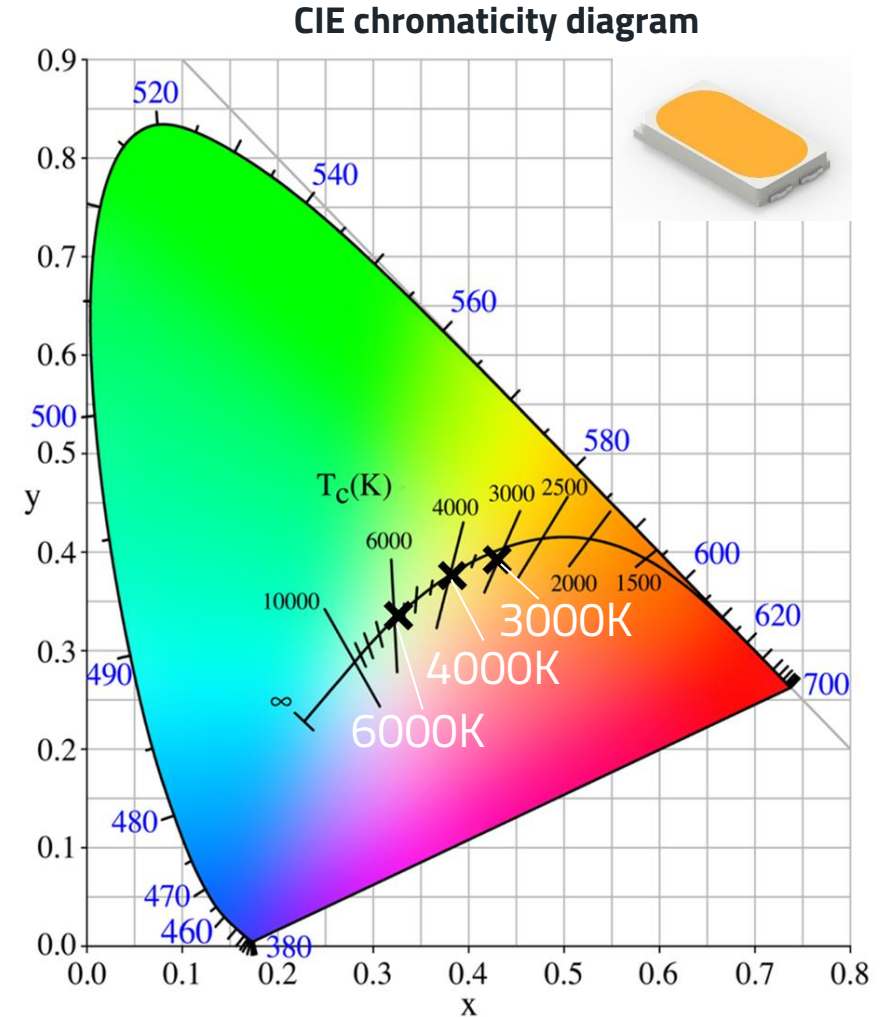
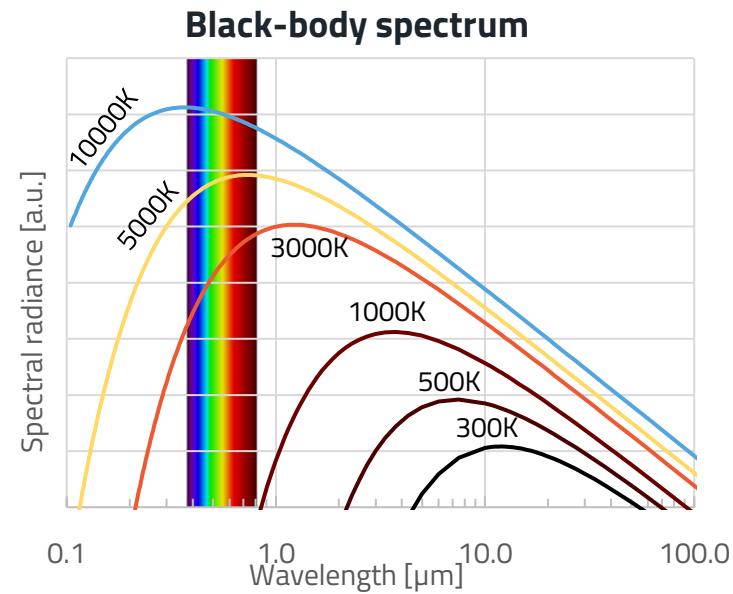
WHITE LEDS: X,Y AND CCT

Understanding datasheet parameters

- **X, Y chromaticity coordinates:**
 - Specifies color (position CIE chromaticity diagram)
- **Correlated color temperature CCT:**
 - Specifies corresponding color of black-body source
 - Warm white 2700K, cold white 6000K

Electrical & Optical Properties:

Properties		Te
Chromaticity Coordinate X	c_x	3%
Chromaticity Coordinate Y	c_y	3%
Correlated Color Temperature	CCT	3%

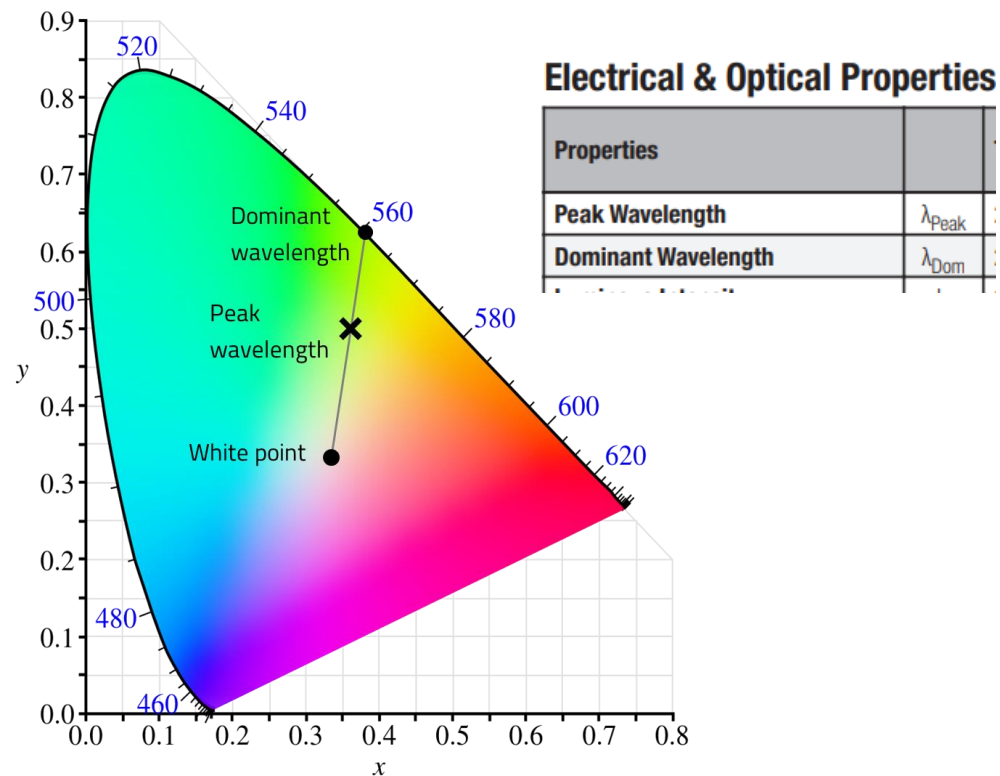


WAVELENGTH OF MONO COLOR LEDS

Understanding datasheet parameter

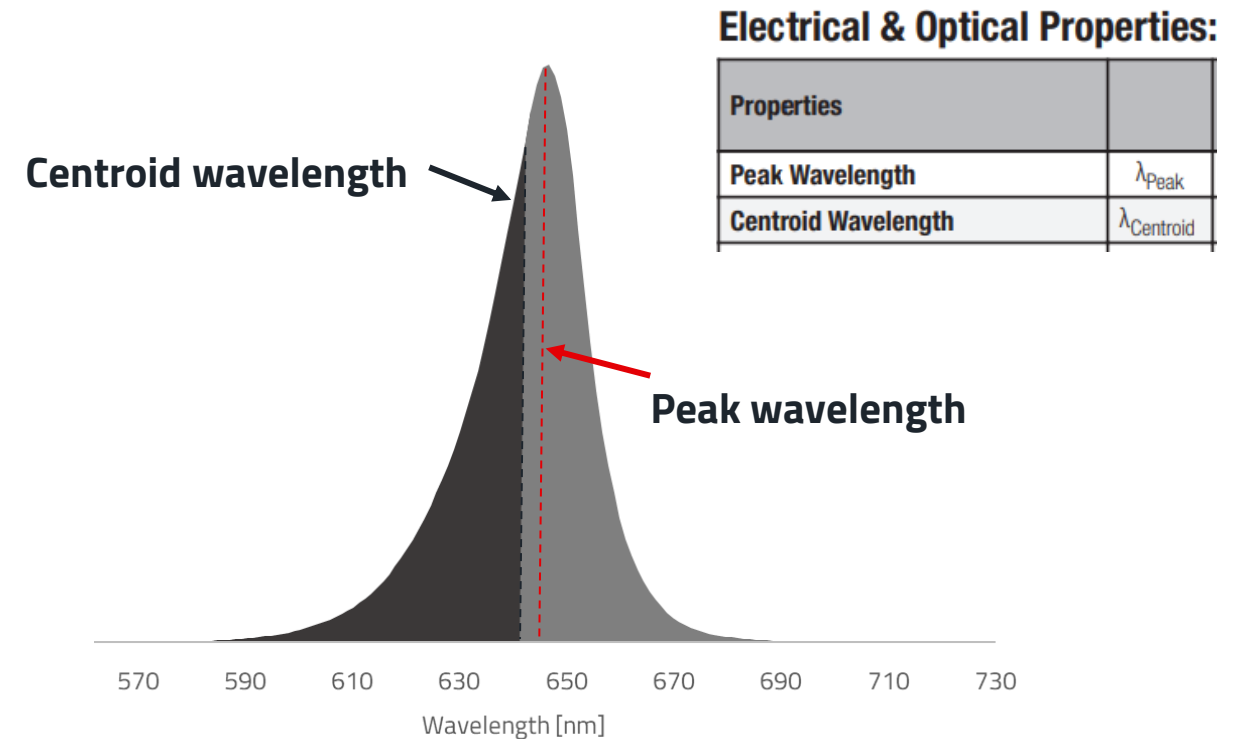
Visible LED

- Peak wavelength – Peak of spectrum
- Dominant wavelength – How perceived by the eye



IR/UV LED

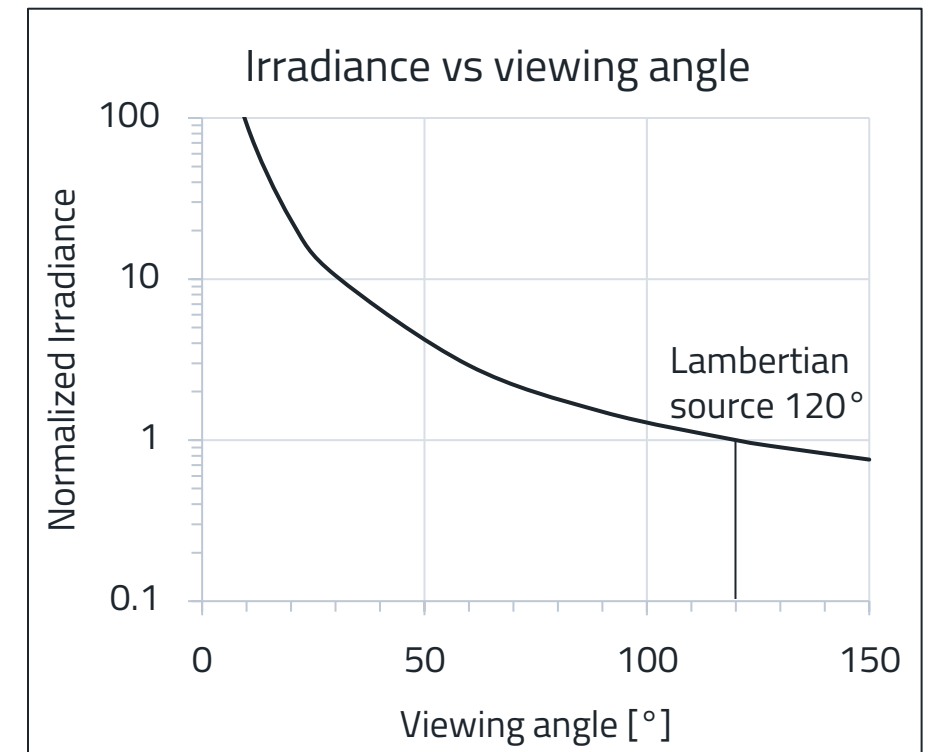
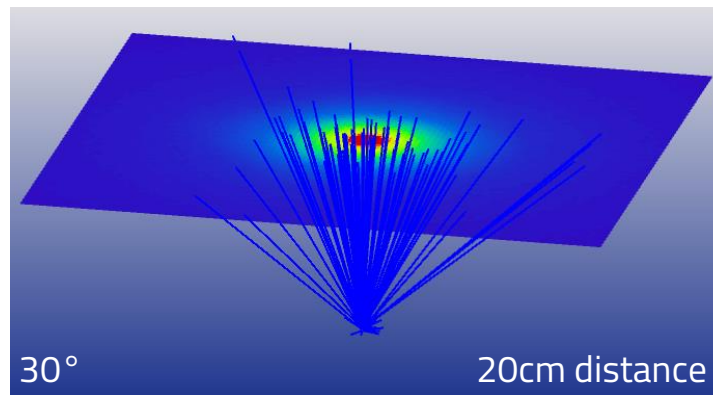
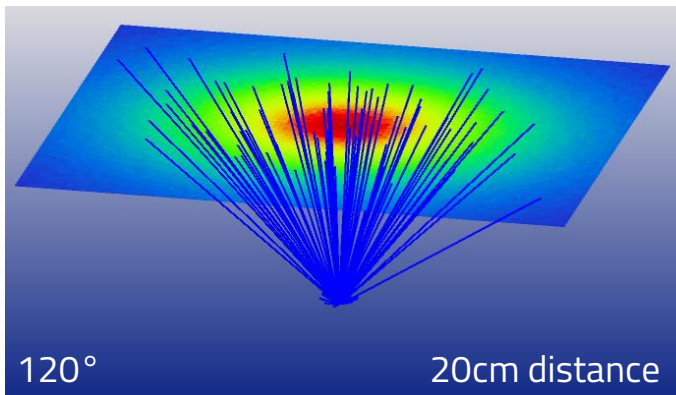
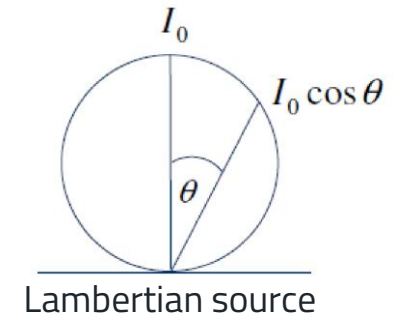
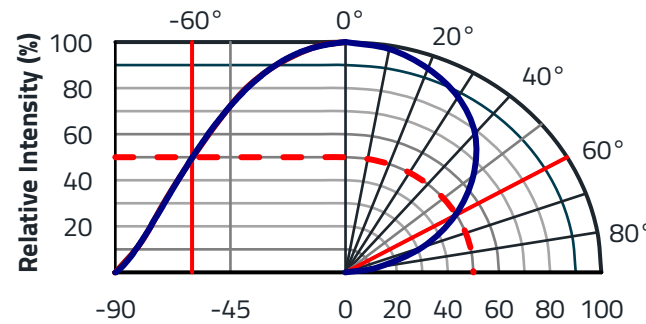
- Peak wavelength – Peak of spectrum
- Centroid wavelength – Spectral center of mass



VIEWING ANGLE

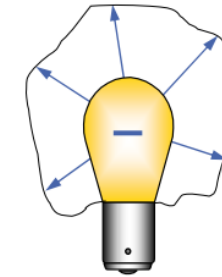
Understanding datasheet parameter

- Definition of viewing angle:
 - Full width angle of half maximum intensity
- Viewing angle determines emission characteristic:
 - Small viewing angle – focused emission
 - Large viewing angle – large area irradiation
- Lambertian source for ideal emitting surfaces – 120° viewing angle
- Smaller viewing angle can be achieved with optics



PHOTOMETRIC UNITS FOR VISIBLE LEDs

Understanding datasheet parameter

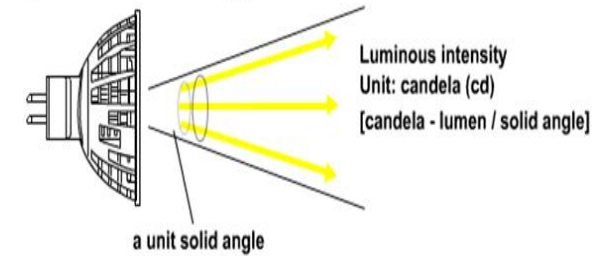


Lumen [lm]

Electrical & Optical Properties:

Properties		Te
Luminous Flux	Φ_V	
Luminous Intensity	I_V	

[candela = lumen / solid angle]



Candela [cd]

- **Luminous Flux** Φ_V Lumen = [lm]

According to CIE 127:2007 – measured in an Integrating sphere

- High power, White, UV LEDs

- **Luminous Intensity** I_V Candela (cd) = $\frac{\text{Luminous Flux}}{\text{solid angle}} = \left[\frac{\text{lm}}{\text{sr}} \right]$

According to CIE 127:2007 – $I_{\text{LED,B}}$ standard

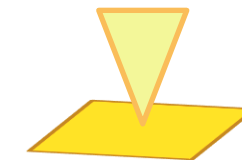
- Signal LEDs

- **Illuminance** E_V Lux (lx) = $\frac{\text{Luminous flux}}{\text{square meter}} = \left[\frac{\text{lm}}{\text{m}^2} \right]$

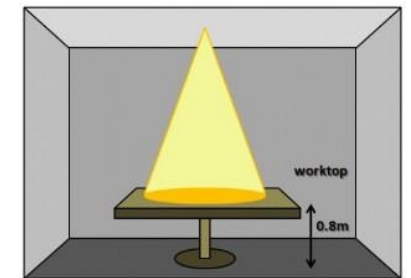
Not an LED parameter – used for General lighting

- **Luminance** L_V (cd/m²) = $\frac{\text{Luminous Flux}}{\text{solid angle} \cdot \text{square meter}} = \left[\frac{\text{lm}}{\text{sr m}^2} \right]$

Not an LED datasheet parameter – relevant for area emitters



Candela per square meter



Lux [lx]

VISIBLE VS. NON-VISIBLE VS. HORTICULTURE LEDS

Visible Light

**** Visible LEDs****

Photometric quantities

- Luminous Flux [lm]
- Luminous Intensity [cd= lm/sr]
- Illuminance [lx= lm/m²]
- Luminous efficacy [lm/W]

Non-Visible Light

**** IR and UV LEDs****

Radiometric quantities

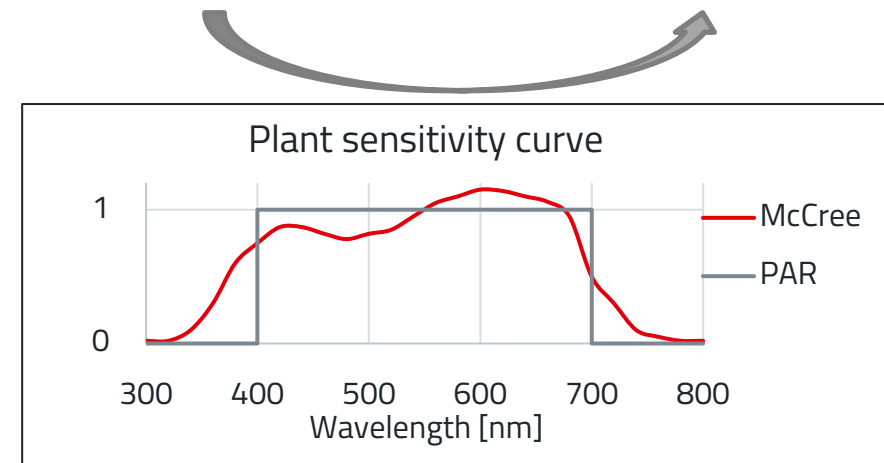
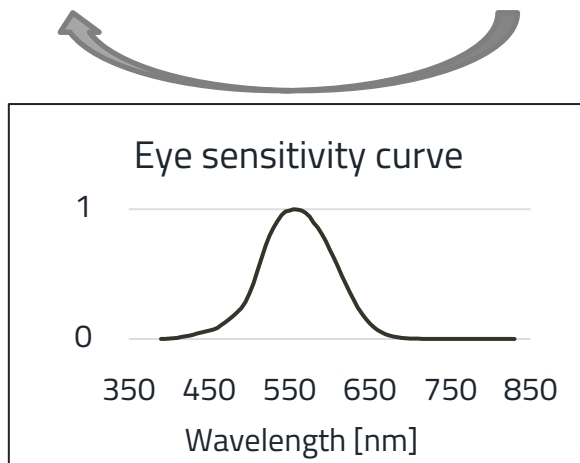
- Radiant Flux [W]
- Radiant Intensity [W/sr]
- Irradiance [W/m²]
- Radiant efficiency [$P_{\text{opt}}/P_{\text{el}}$ %]

Horticulture Light

**** Horticulture LEDs****

Horticulture quantities

- Photosynthetic Photon Flux (PPF) [$\mu\text{mol/s}$]
- Photosynthetic Photo Flux Density [$\mu\text{mol/s}\cdot\text{m}^2$]
- Photosynthetic Photon Efficacy [$\mu\text{mol/J}$]

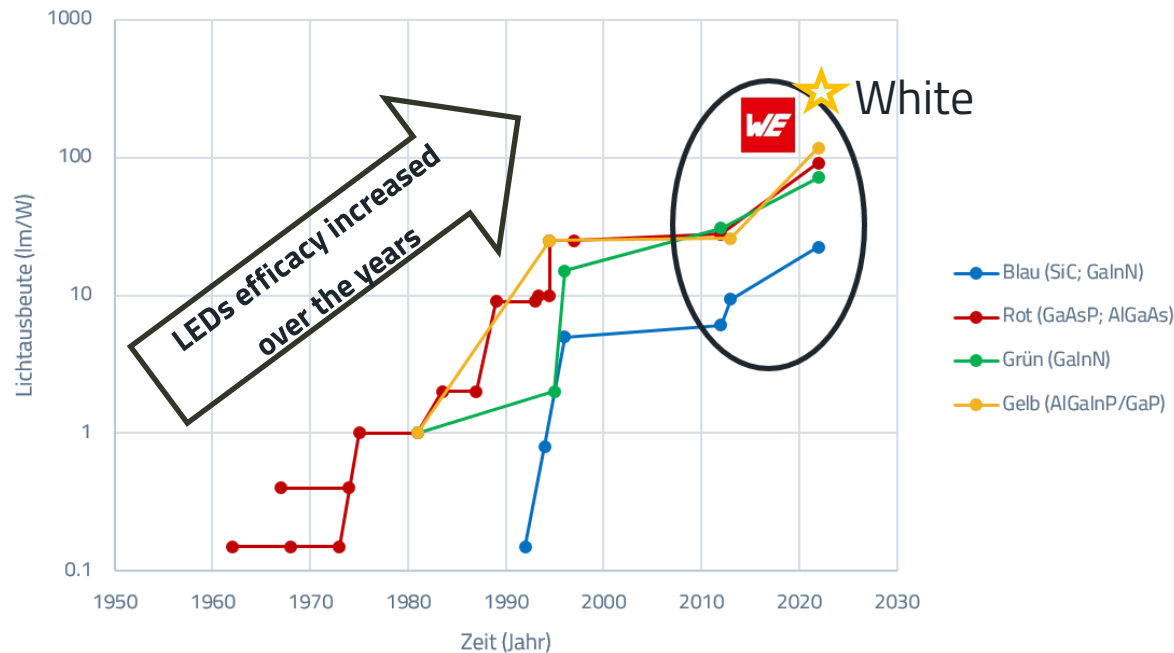


EFFICACY OF LEDS

Conversion of electrical power into light

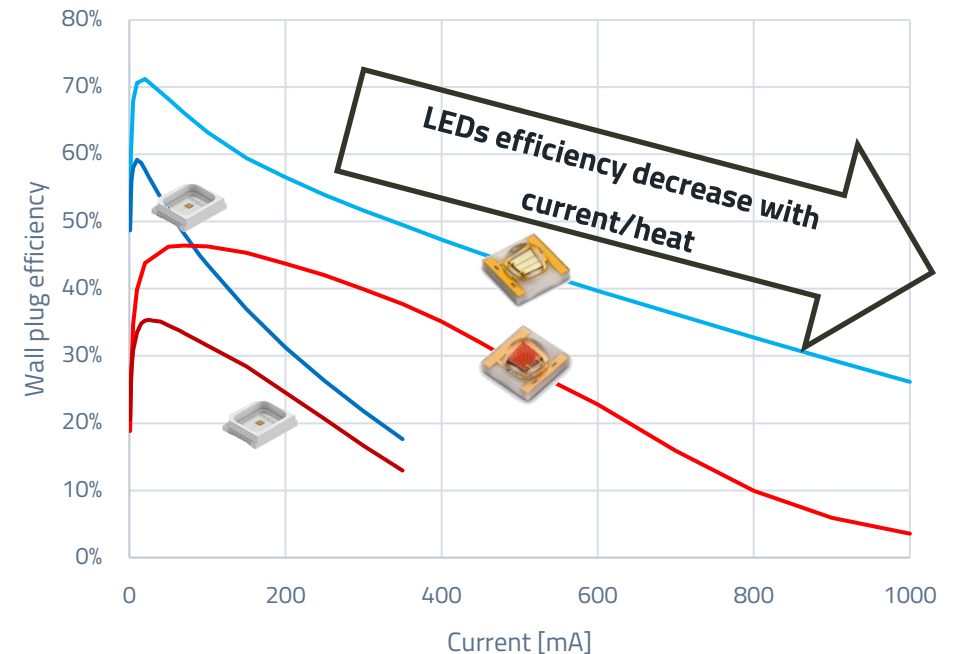
- Efficacy: Optical output per electrical input
- LEDs efficacy increased with technology maturity
- Wall plug efficiency highly dependent on driving conditions

$$\text{Luminous efficacy} = \frac{\Phi_v}{P_{\text{in}}} = \frac{\text{Luminous flux}}{V * I}$$



Wall plug efficiency/Radiant efficiency:

$$\eta = \frac{P_{\text{out}}}{P_{\text{in}}} = \frac{\text{Optical output}}{V * I}$$



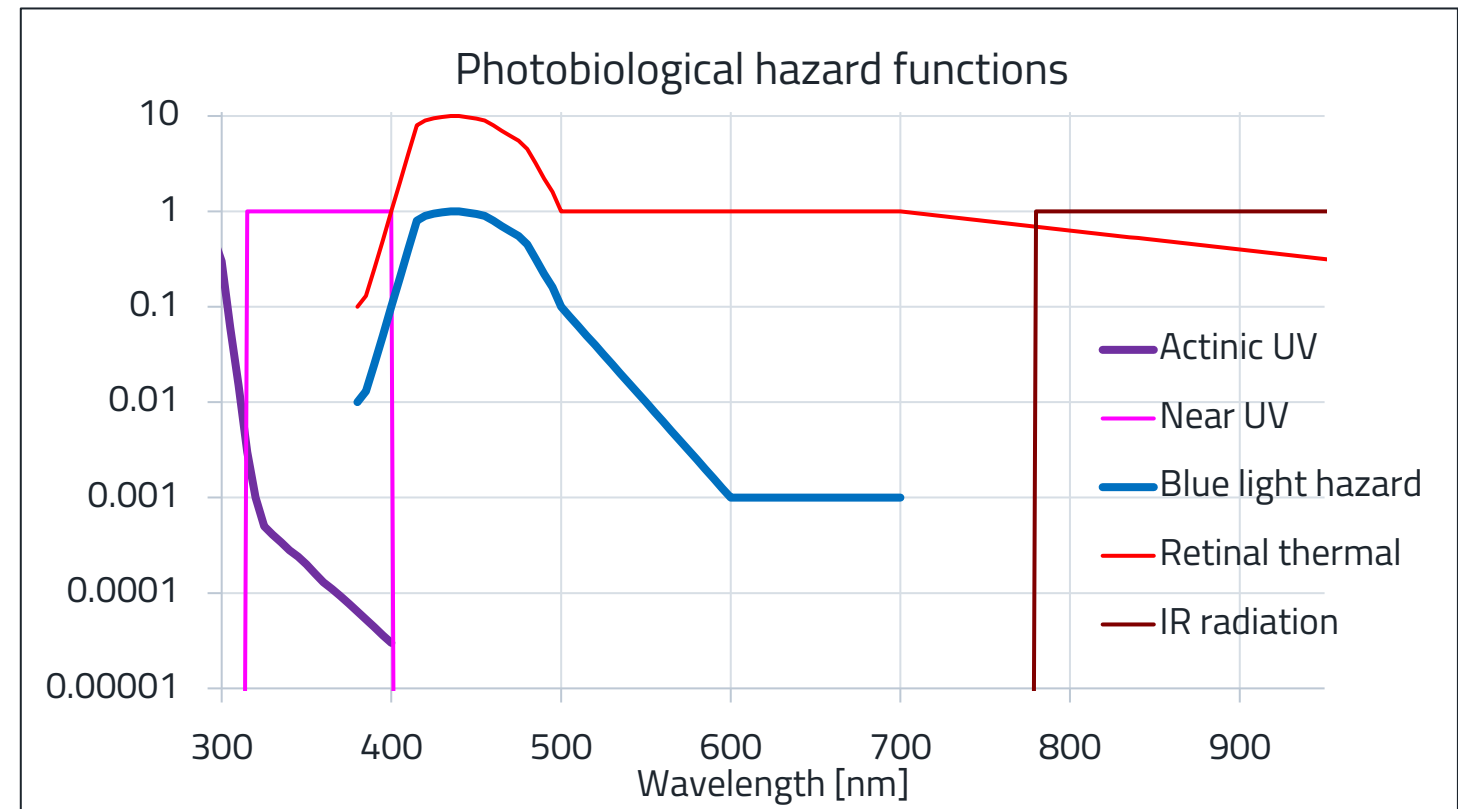
PHOTOBIOLOGICAL SAFETY

DIN EN 62471, EU Directive 2006/25/EC



Photobiological hazard mechanisms:

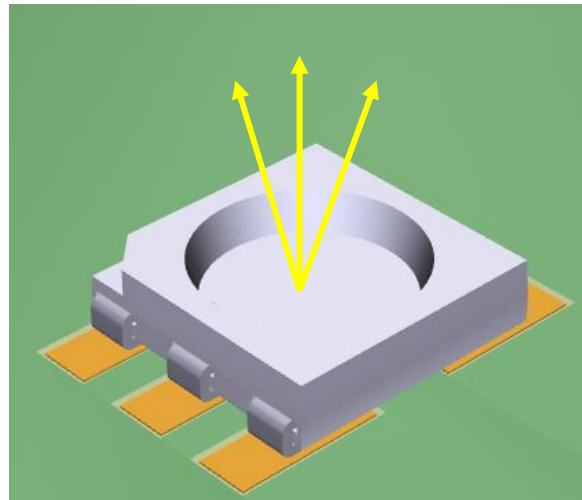
- **Actinic UV**
 - Eye, skin – photokeratitis, skin cancer
- **Near UV**
 - Eye – cataractogenesis
- **Blue light**
 - Eye – photoreinitis
- **Retinal thermal**
 - Eye – retinal burn
- **IR radiation**
 - Eye, skin – corneal burn, skin burn



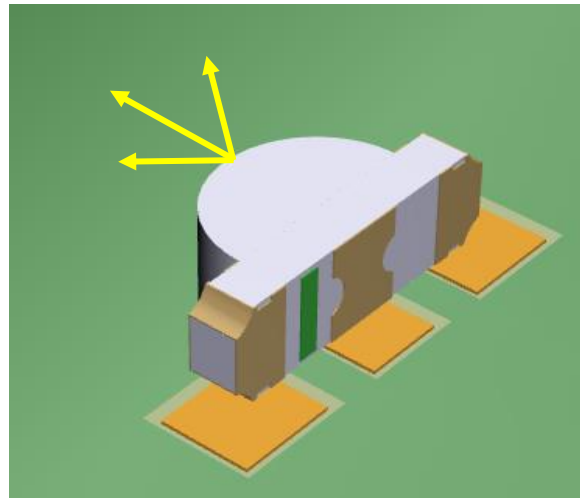
VISIBLE LEDS

LED MOUNTING OPTIONS

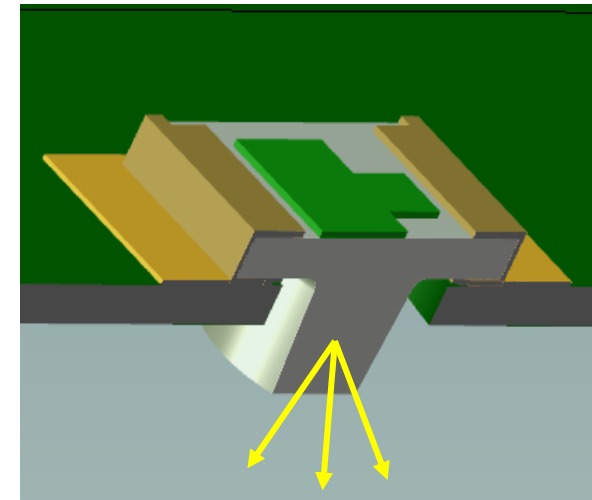
Topview



Sideview

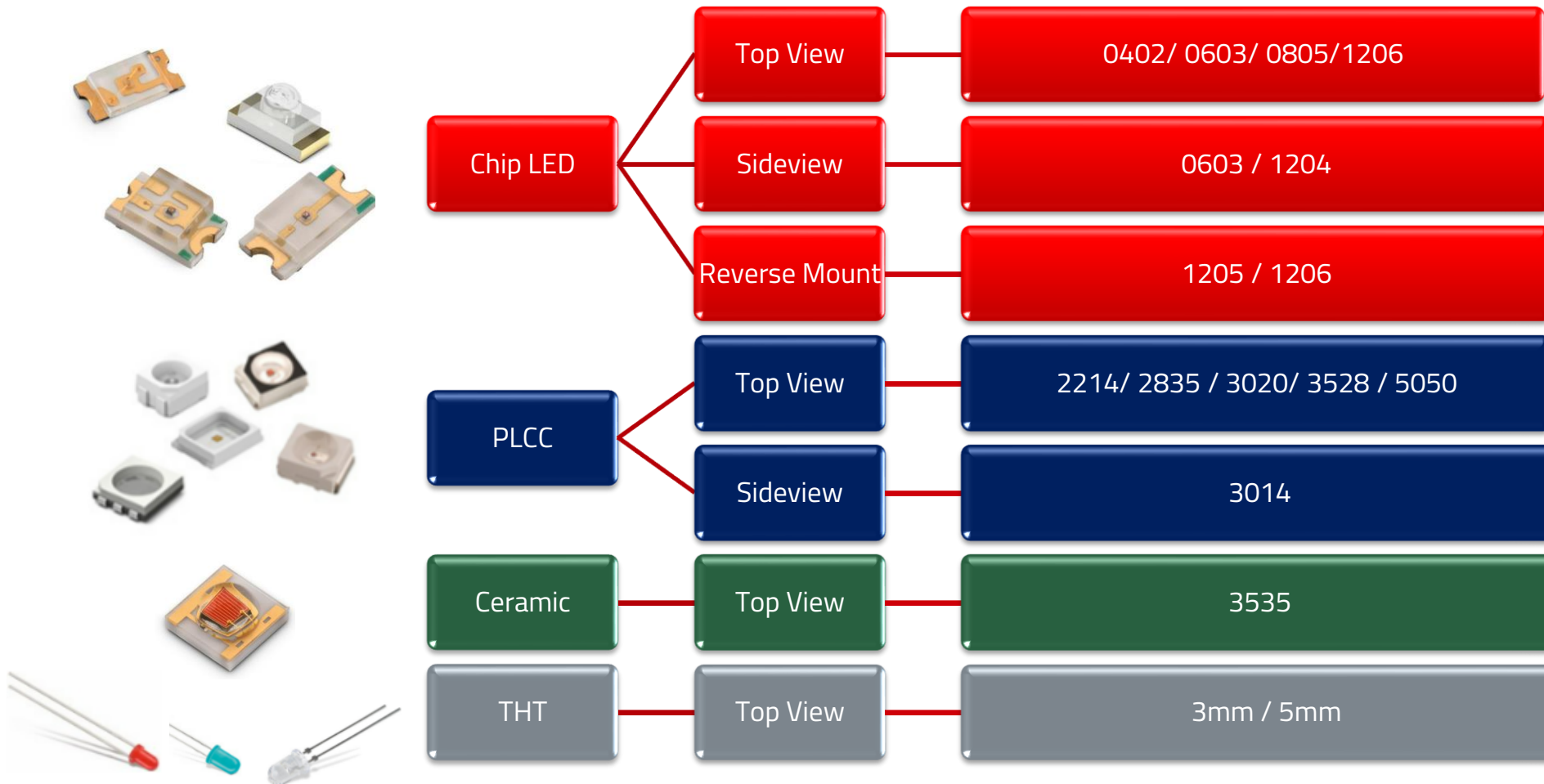


Reverse mount



MONO-COLOR LEDs

WL-SMxx

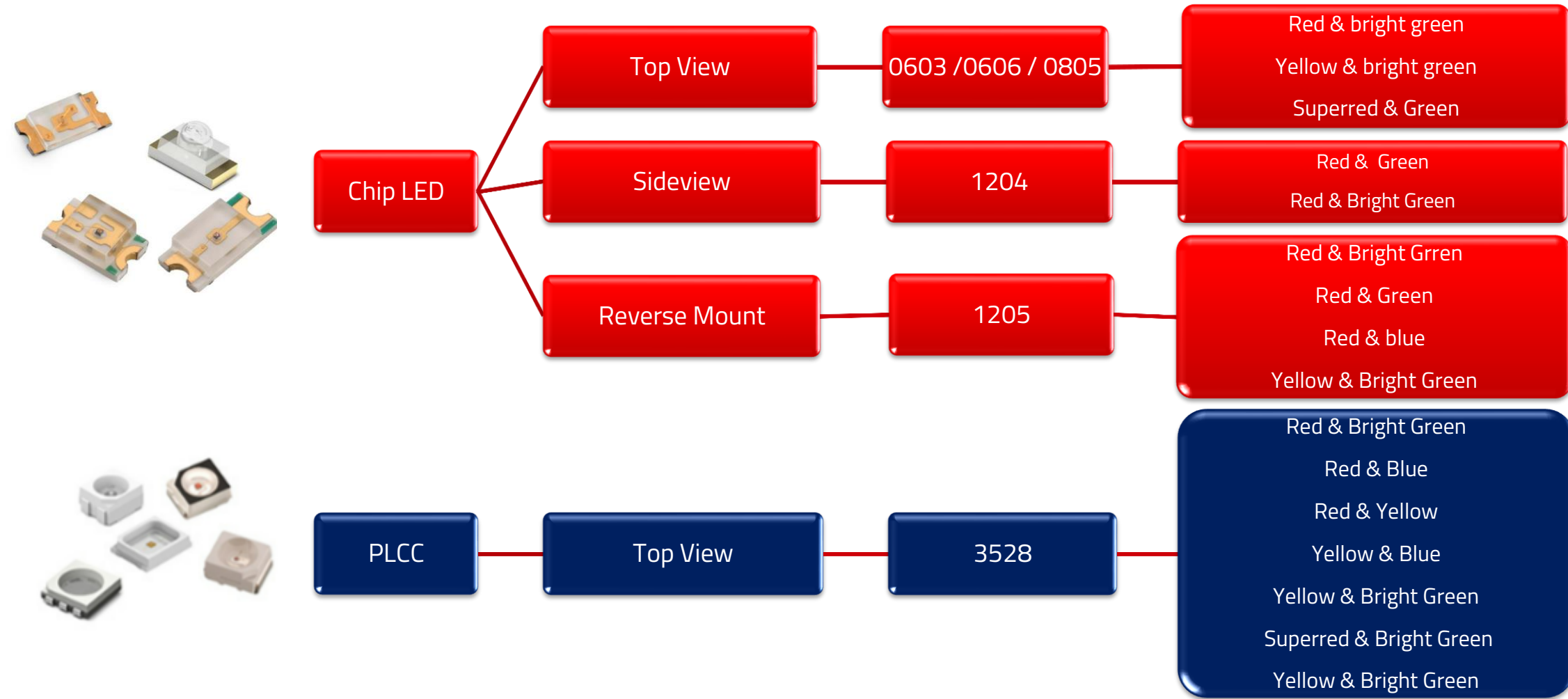


Different colors available

Superred
Red
Amber
Yellow
Bright Green
Green
Blue

BI-COLOR LEDS

WL-SBxx



RGB- FULL COLOR LEDs

WL-SFxx

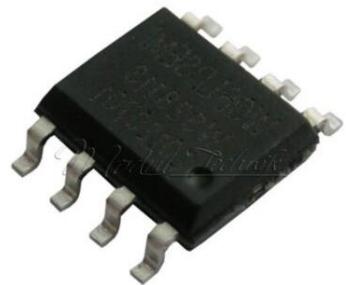
Portfolio Visible RGB LEDs						
Chip					PLCC	
Reverse mount	Side view	Top view			Top view	
Waterclear Lens	Waterclear Lens	Waterclear Lens	Diffused Lens	compact	Waterclear Lens	Diffused Lens
						
WL-SFRW	WL-SFSW	WL-SFCW	WL-SFCD	WL-SFCC	WL-SFTW	WL-SFTD
1205 / 1206	1204	0606 / 0805 1206 / 1210	0606 / 0805 1210	0404	PLCC 4 3528 PLCC 6 3528 PLCC6 5050	PLCC4 1616 PLCC4 2020 PLCC6 2828 PLCC6 3535

VISIBLE LEDS THE NEXT GENERATION

THE NEXT GENERATION

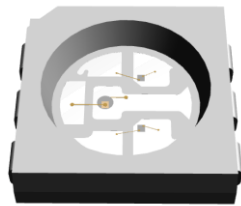
IC LEDs

Before



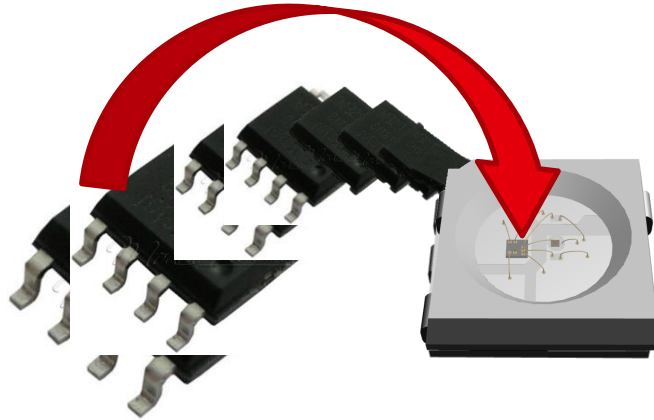
IC

+

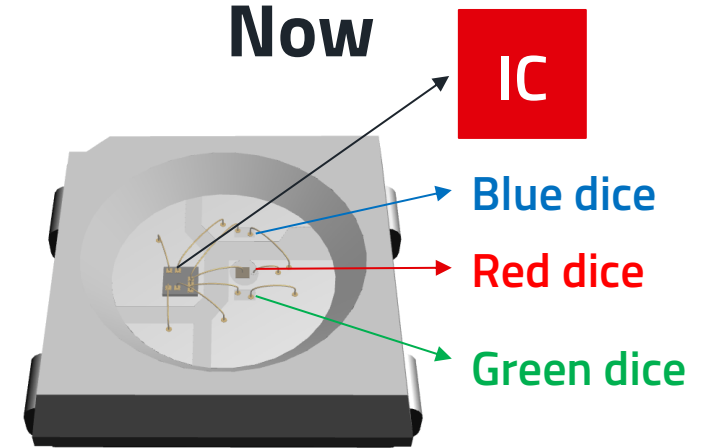


RGB LED

Solution



Now



IC

Blue dice

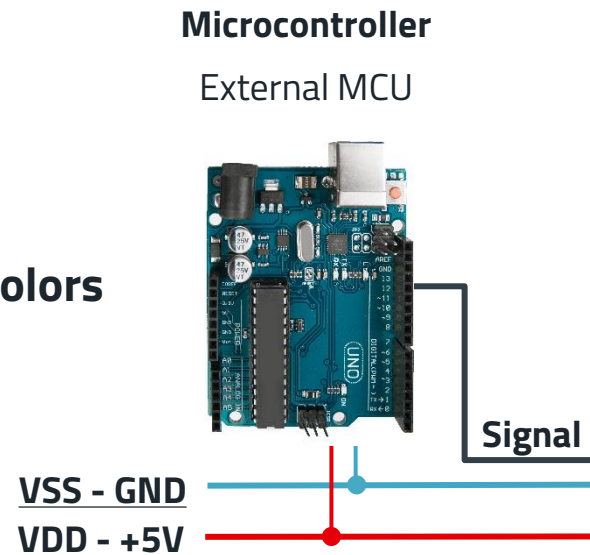
Red dice

Green dice

RGB LED with IC

WORKING PRINCIPLE

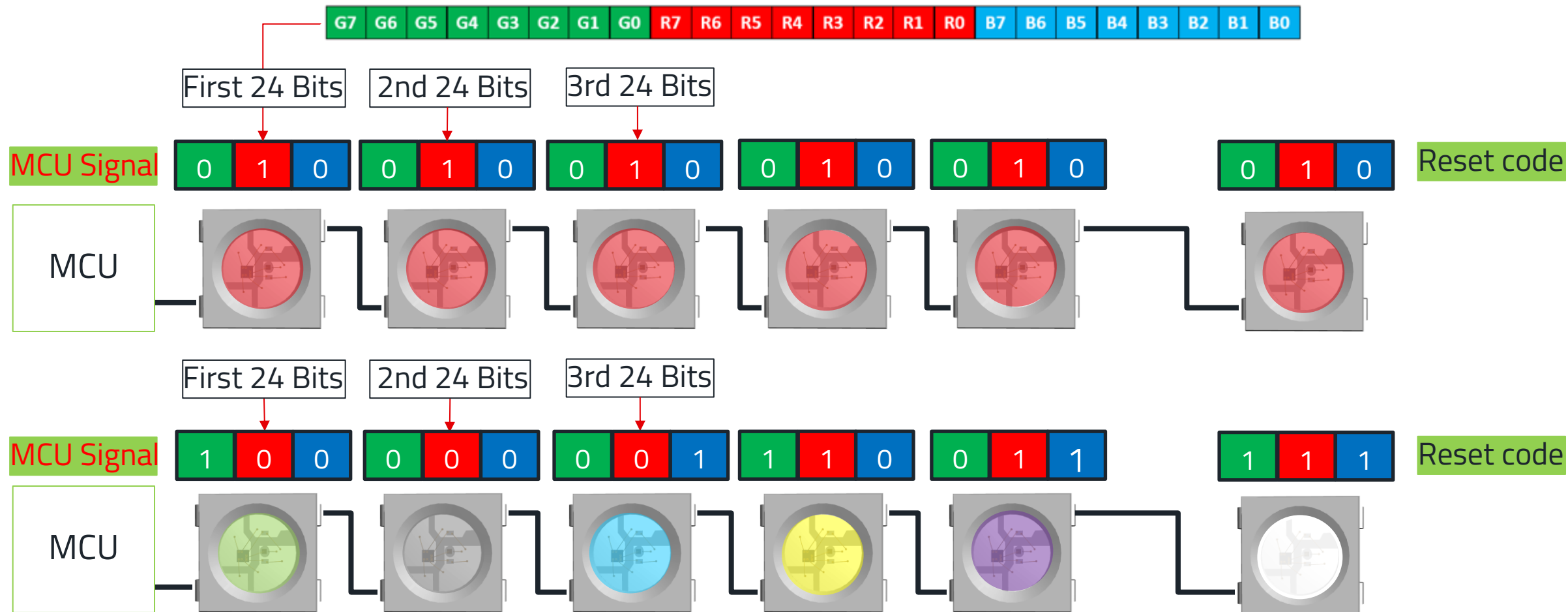
- The LEDs are supplied with voltage (5V)
- The MCU is connected to the first LED
- The MCU sends a control signal
- Each LED can show up to **16 million different colors**



WORKING PRINCIPLE

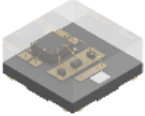
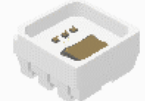
Data transmission method

24bit data composition



PRODUCT PORTFOLIO

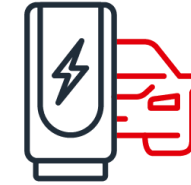
Matchcode: WL-ICLED

Matchcode	Picture	Size	WE Part Number	Packaging	Mounting technology
WI-ICLED		2020	1312020030000	Chip LED compact	SMT
		3210	1313210530000	Chip LED Side View	SMT
		2121	1312121320437	PLCC6 with bypass IPx7	SMT
		5050	1315050930002	PLCC4	SMT

APPLICATIONS



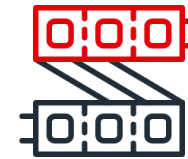
Home appliances



E-mobility



Full color LED Matrix



Decorative lighting



Smart lighting



Gaming peripherals



Wearables



Traffic displays



Industrial control systems

WL-ICLED PORTFOLIO

Digital LED / RGB LED with IC

Chip LED

Top View

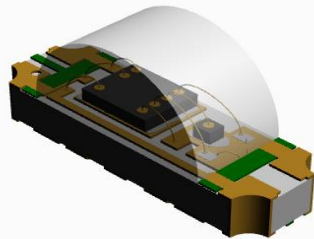
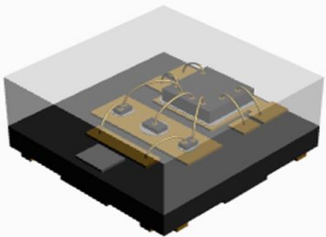
Side View

Single wire

Single wire

2020 Chip LED compact 4 pins

3210 Chip LED Round



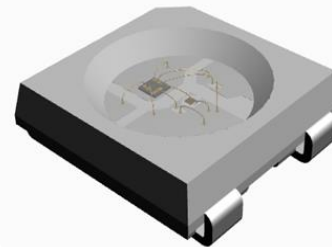
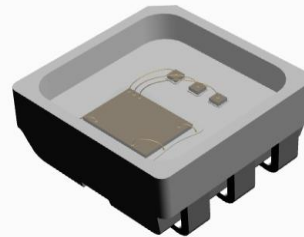
PLCC

Top view

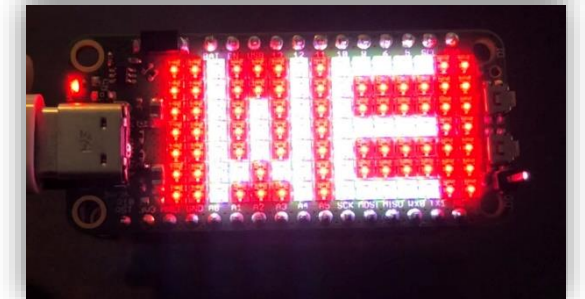
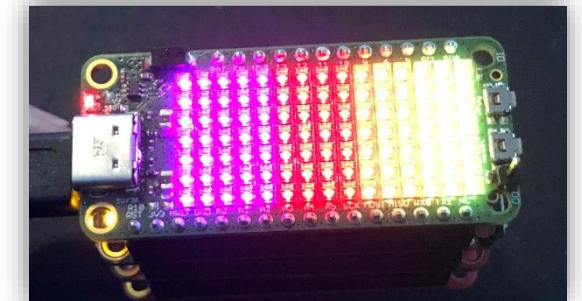
Single wire

2121 PLCC6

5050 PLCC 4



Featherwing



HORTICULTURE

ADVANTAGES OF HORTICULTURE LED LIGHTING

BIOLOGICAL ADVANTAGES

More yield

- Year round cultivation
- Increase of plant quality parameters
- High harvest efficiency

ENVIRONMENTAL ADVANTAGES

Fast return on investment and more profit for the grower

- Resource gentle
- Space savings
- Harvest on demand

ELECTRICAL ADVANTAGES

Less energy costs

- High lifetime & efficacy of LEDs
- Lower maintenance costs
- Lower operating costs

We are faced with more and more challenges. Climate change, growing world population, loss of farmland and the need for a better use of resources.

To solve these challenges, Würth Elektronik is actively accelerating the green revolution by supporting the development of the farm of tomorrow to ensure sustainable food production.

#LEDITGROW

BENEFITS & SERVICES



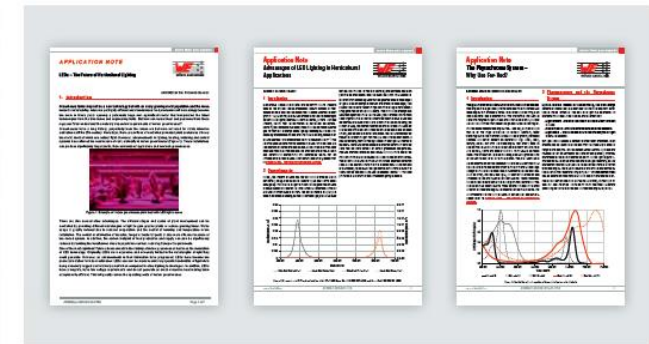
PERFECT QUALITY – VERY HIGH EFFICACY



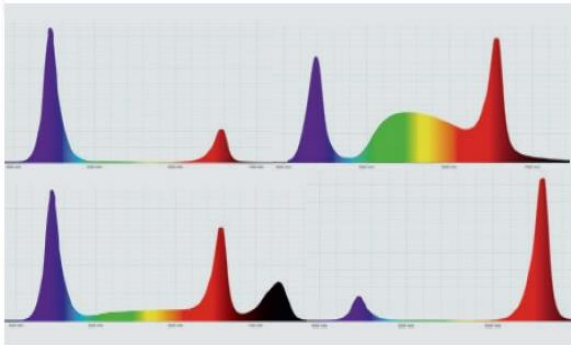
OWN PLANT SCIENTISTS



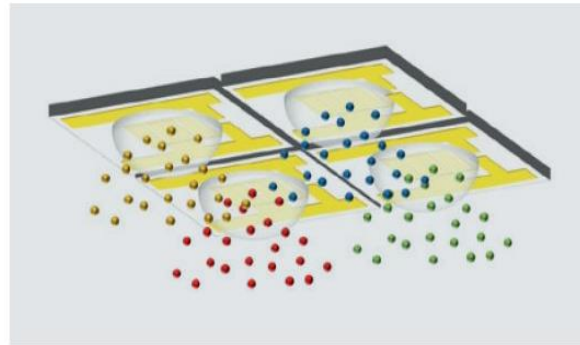
WE DELIVER THE WHOLE NECESSARY SPECTRUM



HORTICULTURE APPLICATION NOTES



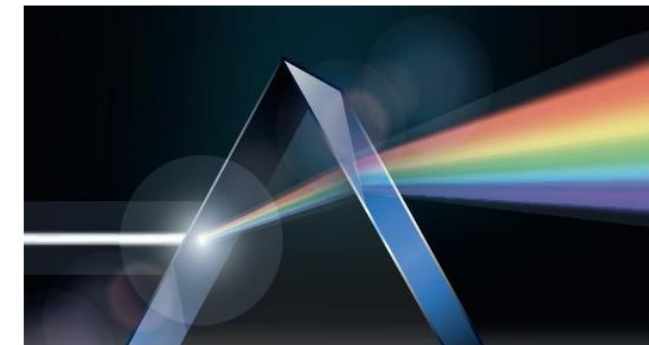
DIFFERENT LIGHTSPECTRA FOR MANY
PLANT QUALITY PARAMETERS



OUTPUT CALCULATIONS



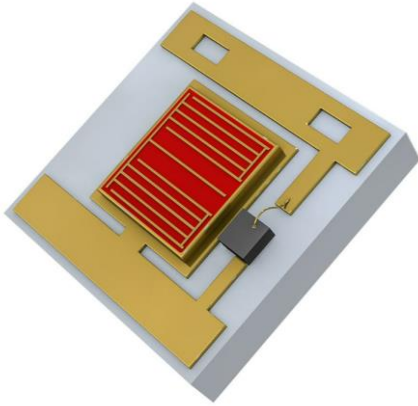
SPECTRUM DESIGN TOOL – HORTICULATOR



LIGHT LABORATORY

PRODUCT BENEFITS

Innovative Structure



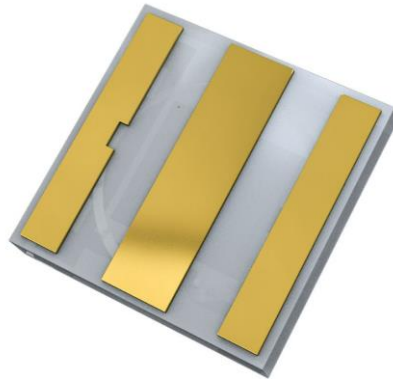
Zener diode for ESD protection



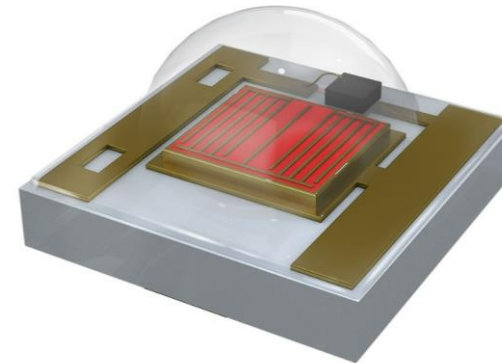
Ceramic substrate for low thermal resistance



Nonabsorbent material- MSL 2

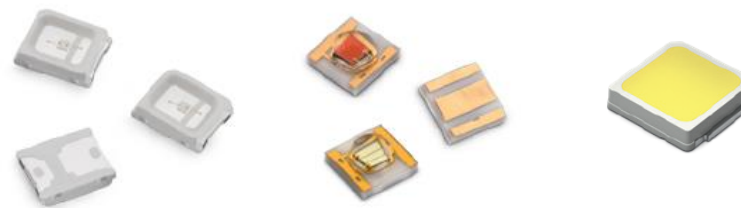


Gold contacts- low corrosion, perfect solderability



Small footprint – High emission power

PRODUCTS



Mid Power – Horticulture LEDs Size 2835			@ 150 mA	
Order Code	Emitting Color	$\lambda_{\text{peak typ. (nm)}}$	typ PPF*	typ PPE*
150283DS73103	Deep Blue	450	0.94 $\mu\text{mol/s}$	1.96 $\mu\text{mol/J}$
150283HS73103	Hyper Red	660	0.66 $\mu\text{mol/s}$	2.00 $\mu\text{mol/J}$
150283FS73103	Far Red	730	0.67 $\mu\text{mol/s}^{**}$	2.03 $\mu\text{mol/J}^{**}$
150283BS73103	Blue	463	0.66 $\mu\text{mol/s}$	1.41 $\mu\text{mol/J}$
150283GS73103	Green	517	0.37 $\mu\text{mol/s}$	0.78 $\mu\text{mol/J}$
150283RS73103	Red	629	0.50 $\mu\text{mol/s}$	1.56 $\mu\text{mol/J}$

Mid Power – Fullcolor LEDs Size 3030			@ 65 mA	
Order Code	Emitting Color	CCT	typ PPF*	typ PPE*
158303227A	Sunrise	2700	0.50 $\mu\text{mol/s}$	2.77 $\mu\text{mol/J}$
158303230A	Warm White	3000	0.50 $\mu\text{mol/s}$	2.77 $\mu\text{mol/J}$
158303240A	Moonlight	4000	0.51 $\mu\text{mol/s}$	2.80 $\mu\text{mol/J}$
158303250A	Daylight	5000	0.51 $\mu\text{mol/s}$	2.80 $\mu\text{mol/J}$
158303260A	Cool White	6000	0.51 $\mu\text{mol/s}$	2.80 $\mu\text{mol/J}$

High Power – Horticulture LEDs Size 3535			@ 350 mA	
Order Code	Emitting Color	$\lambda_{\text{peak typ. (nm)}}$	typ PPF*	typ PPE*
150353DS74500	Deep Blue	450	2.32 $\mu\text{mol/s}$	2.07 $\mu\text{mol/J}$
150353HS74500	Hyper Red	660	2.42 $\mu\text{mol/s}$	3.33 $\mu\text{mol/J}$
150353FS74500	Far Red	730	1.94 $\mu\text{mol/s}^{**}$	3.08 $\mu\text{mol/J}^{**}$
150353BS74500	Blue	460	1.98 $\mu\text{mol/s}$	1.77 $\mu\text{mol/J}$
150353GS74500	Green	520	0.96 $\mu\text{mol/s}$	0.80 $\mu\text{mol/J}$
150353RS74500	Red	635	1.41 $\mu\text{mol/s}$	1.84 $\mu\text{mol/J}$

To increase secondary plant metabolites use UVA

High Power – Ultraviolet LEDs Size 3535			@ 350 mA	
Order Code	Emitting Color	$\lambda_{\text{peak typ. (nm)}}$	typ PPF**	typ PPE**
15335337AA350	Ultraviolet	365	1.68 $\mu\text{mol/J}$	1.39 $\mu\text{mol/J}$
15335338AA350	Ultraviolet	385	1.68 $\mu\text{mol/J}$	1.47 $\mu\text{mol/J}$
15335339AA350	Ultraviolet	395	1.68 $\mu\text{mol/J}$	1.50 $\mu\text{mol/J}$
15335340AA350	Ultraviolet	405	1.68 $\mu\text{mol/J}$	1.51 $\mu\text{mol/J}$

UV PRODUCTS

PRODUCT OVERVIEW

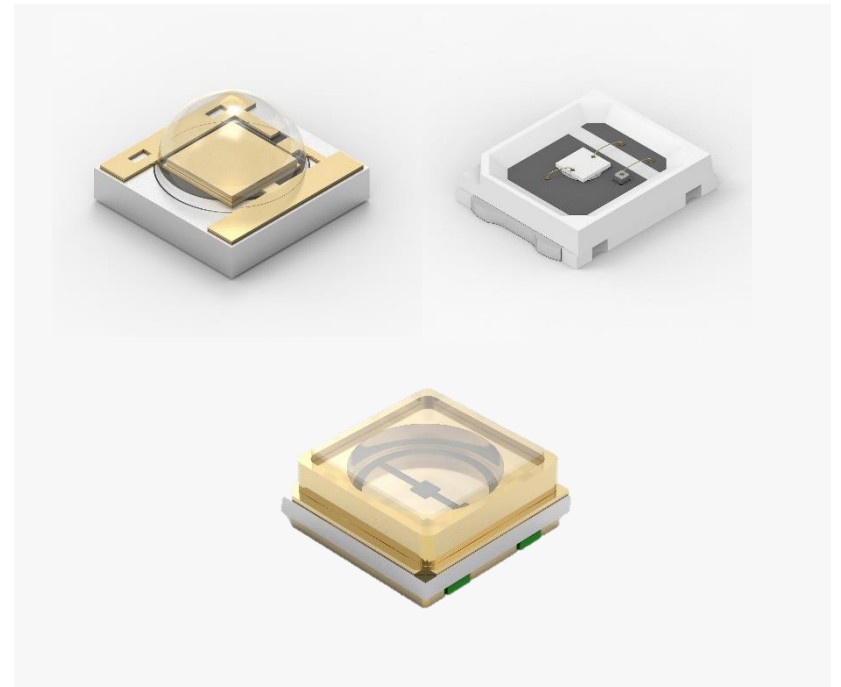
Matchcode WL-SUMW and WL-SUTW

UV-A:

Order Code	λ_p	Radiant flux
153353xxAA350	365-405 nm	700-1100 mW
153283xx7A212	365-405 nm	30-190mW

UV-C:

Order Code	λ_p	Radiant flux
15335327BA250	275 nm	3 mW
15335327BA252	275 nm	15 mW
15335327CA452	275 nm	20 mW
15335327CA554	275 nm	50 mW



UV APPLICATIONS

UV-A & UV-C

- Horticulture
- Security & counterfeit detection
- Curing applications



UV-A



- Surface & water disinfection
- Food industry
- Air purification

UV-C

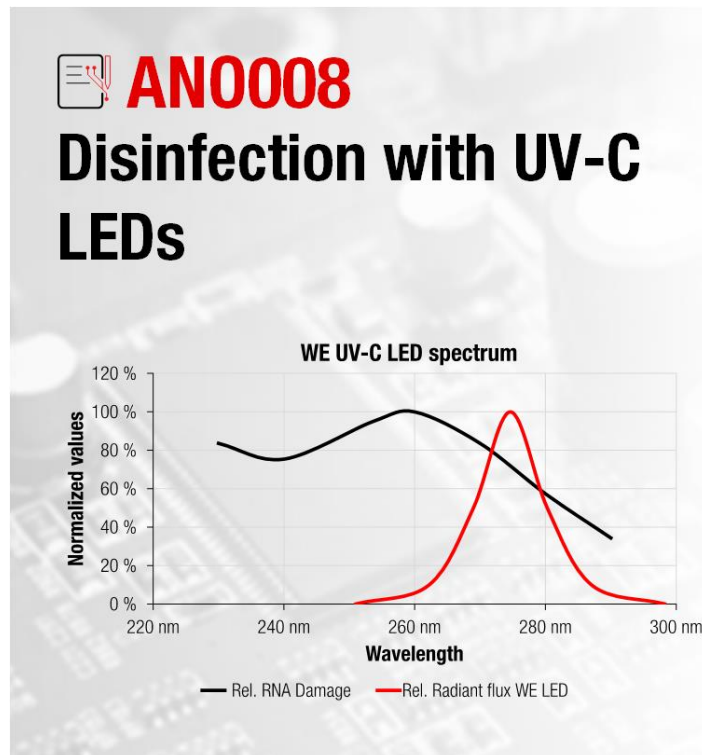


FURTHER INFORMATION

Application Note: Disinfection with UV-C LEDs

DE: www.we-online.de/AN0008

EN: www.we-online.com/AN0008



Application Note

Disinfection with UV-C LEDs

more than you expect



AN0008 // Dominik Koeck

1 Introduction

This application note gives you an overview how disinfection with UV-C light works, the benefits of UV-C LEDs and safety issues that need to be considered when using UV-C LEDs in applications.

Due to the recent COVID-19 pandemic the need for disinfection technologies has skyrocketed. One of these technologies is disinfection using UV-C LEDs. Ultraviolet (UV) light radiation is more energetic than visible light. It is classified by its wavelength into three subgroups:

- **UV-A** (315-400 nm)
Mainly used for material curing applications and horticulture **WL-SUMW**
- **UV-B** (280-315 nm)
Mainly used for phototherapy and horticulture
- **UV-C** (100-280 nm)
Used for disinfection purposes **WL-SUMW**

The disinfection capability of UV light has been known since 1877^[1] and already gained great interest in the fight against diseases such as preventing the spread of tuberculosis^[4, 5]. In the past, low-pressure mercury-vapor discharge lamps were used for disinfection as they emit at the germicidal wavelength of 254 nm and have relatively large radiant powers. To date, they are often the most economic solution for large scale disinfection.

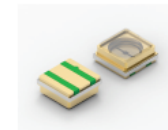


Figure 1 Würth Elektronik eSos WL-SUMW UV-C LED with 275 nm wavelength. The 15335327BA250 LED is suitable for small disinfection targets while the 15335327BA252 product has a higher power for disinfection on a larger scale.

However, UV-C LEDs do have significant advantages. They do not contain hazardous materials such as Mercury (Hg), they do not need long warm up times i.e. they turn on immediately and are suited for frequent on/off switching. Additionally they are not vibration/shock sensitive and are relatively small compared to gas discharge lamps which makes them suitable for a variety of applications.

In recent years, research developed commercially available UV-C emitting LEDs. Even though, the initial UV-C LEDs had lower output, the year 2020 - boosted by the COVID-19 pandemic - has seen a huge increase in

radiant power and drop of production price making them a more viable solution for widespread disinfection application.

The following will show the working mechanism of disinfection by UV-C LEDs, discuss the disinfection efficacy at different wavelengths, show an example of disinfection and give a few hints on safety aspects.

2 Work mechanism of UV-C disinfection

2.1 Principle of UV disinfection

Disinfection with UV-C is based on the fact that UV-C radiation can damage the DNA or RNA. This high energetic UV light can induce formation of pyrimidine dimers^[2] and other damages to the DNA which can inhibit multiplication of cells such as bacterial, fungal, plant and animal cells. Similarly the UV light can damage the RNA of viruses leading to their inactivation.

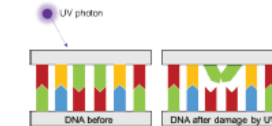


Figure 2 Schematic of DNA damage induced by UV light

2.2 Germicidal wavelength

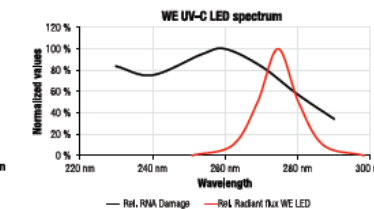


Figure 3 Wavelength dependence of RNA damage and radiant flux of Würth Elektronik eSos LEDs.

In Figure 3, the wavelength dependent RNA damage^[3] is shown. The more damage that is done to the RNA, the less capable is the virus of infecting other organisms. It is important to note that for a good sterilization result, a combination of the correct wavelength and a high amount of radiation is required. For the best sterilization result, the wavelength as well as the radiant power need to be considered. As the ratio of the optical power over the electrical power, the Wall-Plug-Efficiency (WPE) is a parameter showing how efficiently the LED can

INFRARED COMPONENTS

INFRARED COMPONENTS

Working principle & products

Infrared LED *Emitter*

Sends the light to detector

Series	Size	Radiant Intensity (mW/sr)	Viewing Angle
WL-SIQW	2720/3535/3737	150-800 @ 1A	90°-150°
WL-SICW	0402/0603/0805/1206	1-6 @ 20mA	90°-140°
WL-SISW	0402/1002/1104/1106/1206	1-11 @ 20mA	45°-150°
WL-SIRW	1206	5-20 @ 20mA	30°
WL-SITW	3528	8-9 @ 50mA	120°
WL-SIMW	3535	220-350 @ 1mA	90°-130°
WL-TIRW	THT 3mm / 5mm	30-85 @ 50mA	35°
WL-TIRC	THT 3mm / 5mm	30-85 @ 50mA	30°

Invisible
Light

Datatransfer

Photodiode *Detector*

Photocurrent is generated by light. Output in μA

☺ Linear output signal, Fast switching times

Series	Size	Photocurrent	Viewing Angle
WL-SDCB	0805/ 1206	1.8 μA	140°
WL-SDSB	1002/ 1104	2.5 μA	150°
WL-TDRW	THT 3mm / 5mm	28 μA	35°
WL-TDRB	THT 3mm / 5mm	31 μA	35°

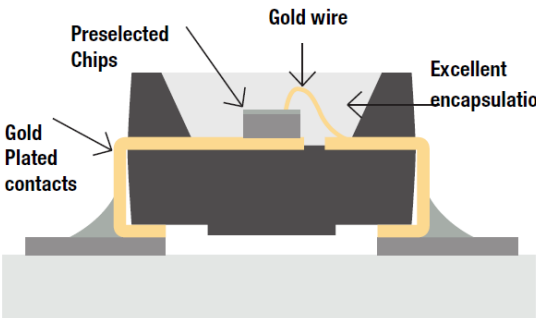
Phototransistor *Detector*

Amplified photodiode. Output in mA .

☺ Higher current, Higher gain

Series	Size	Collector Current	Viewing Angle
WL-STCW	0603/0805/1206	1.6 mA	130°-150°
WL-STCB	0603/1206	1.8 mA	120°-140°
WL-STSW	1002/1104	2.5 mA	110°-150°
WL-STRB	1206 dome	1.8 mA	30°
WL-STTW	3535	3.1 mA	120°
WL-STTB	3535	2.8 mA	120°
WL-TTRW	THT 3mm / 5mm	15 mA	30°
WL-TTRB	THT 3mm / 5mm	7 mA	25°-60°

BENEFITS AND USP



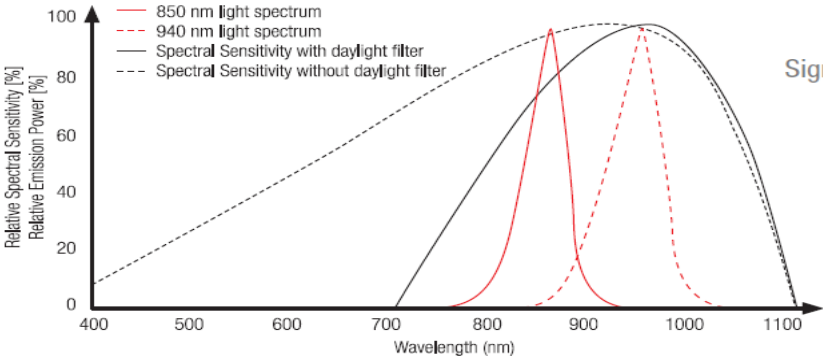
A gold wire was used for all parts for an excellent output



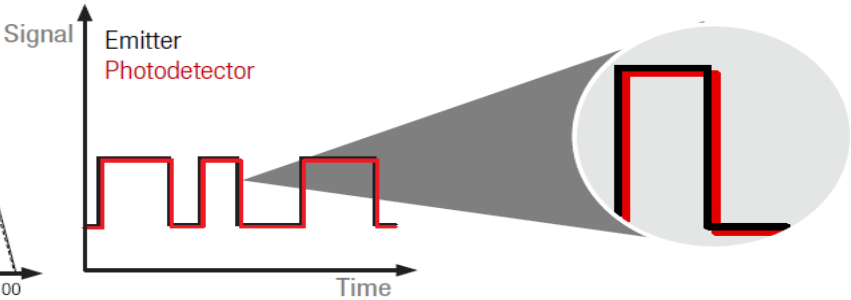
Available with or without daylight filter
Special features: High photosensitivity and linearity



Perfect optical emitter-detector coupling. One package for emitter and detector.



Maximum sensitivity of the photodetectors perfectly matches the emitter spectrum

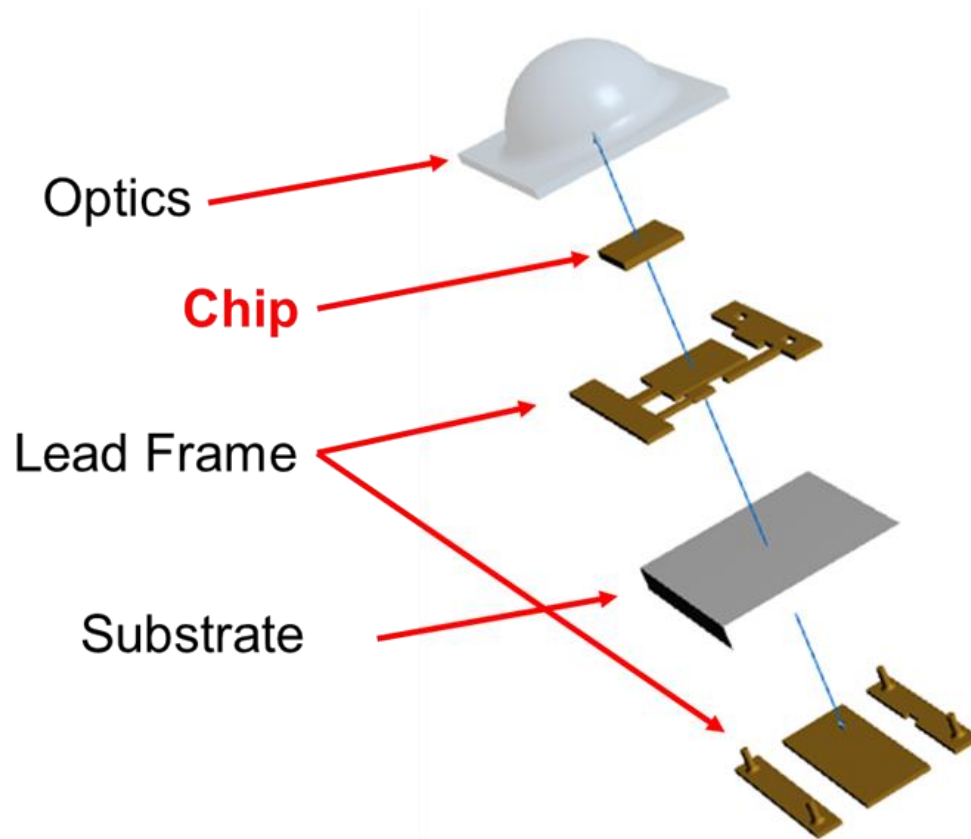


Switching Time up to 100 MHz. Fast switching time of few nanoseconds for high data transfer rates

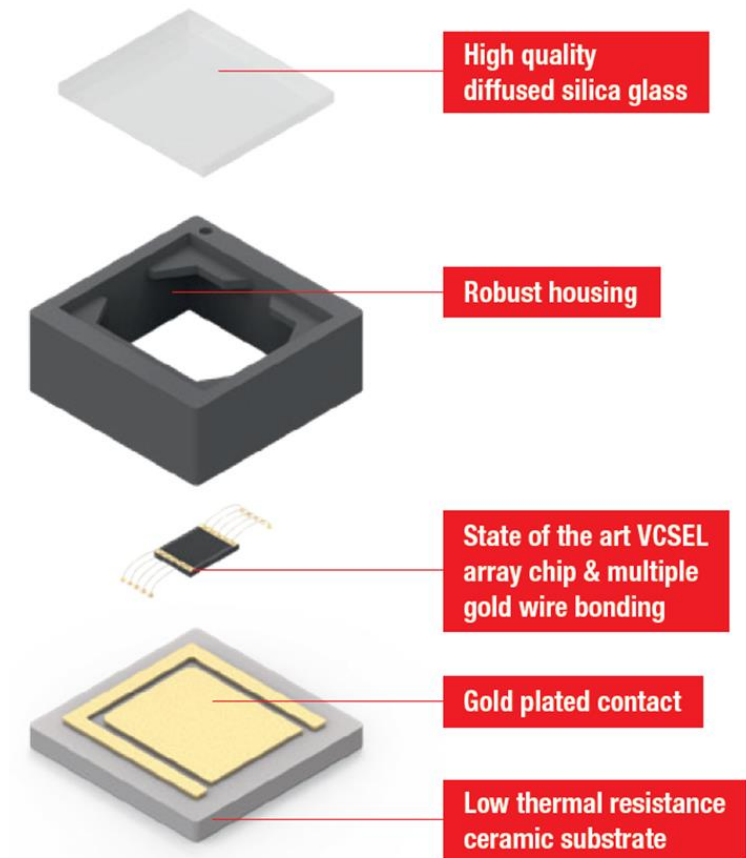
VCSEL AND LED

Structure

■ IR LEDs Structure Design



■ VCSEL Structure Design



APPLICATIONS

Applications



Security systems

- e.g. smoke detector, camera



Light barriers

- e.g. security areas, counter and encoder, optoelectronic sensors, data transmission



Automatic switches

- e.g. touchless water syphons, toilet systems, hygiene applications, water saving systems



Screens

- e.g. touch & touchless



Biometric identification

- e.g. iris recognition, face recognition, vein recognition



Biometrics & health monitoring

- e.g. heart rate monitoring, pulse oximetry, blood pressure



Home appliances

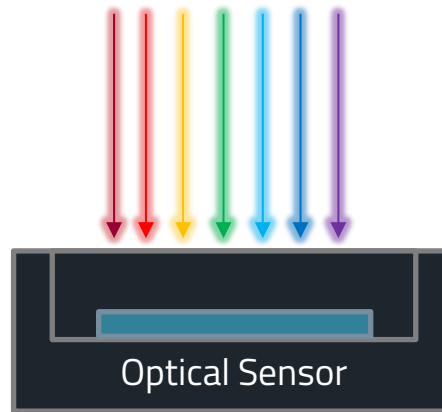
- e.g. remote control, cleaning robot

OPTICAL SENSORS

PRINCIPLES OF OPTICAL SENSING

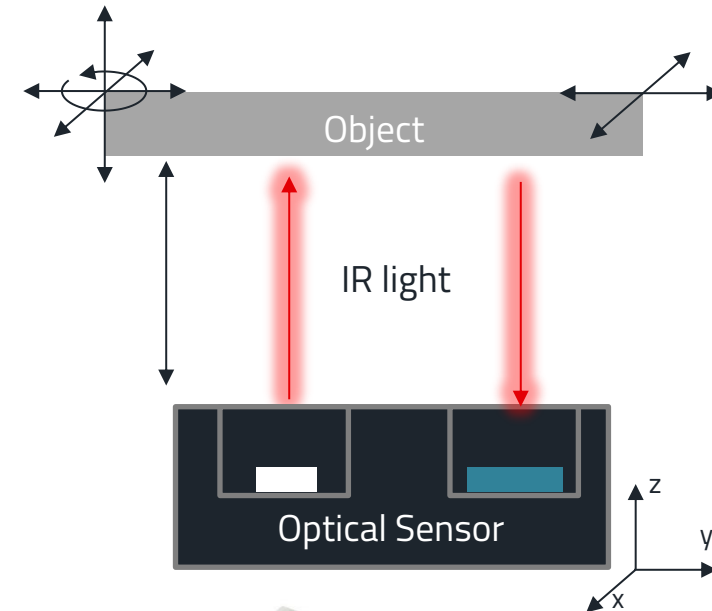
Light or Object Detection

Light detection



Würth Elektronik
Photodiodes and
Phototransistors

Object detection with light



Würth Elektronik
Infrared LEDs

2 in 1 packages



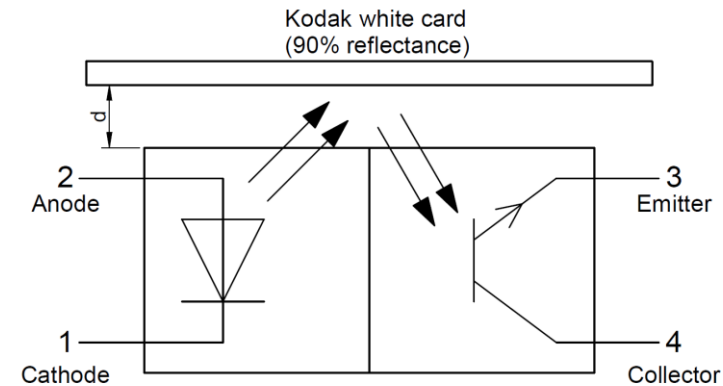
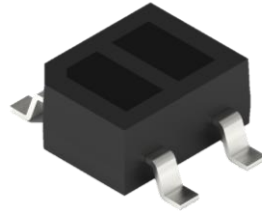
Würth Elektronik
Photodiodes and
Phototransistors

FIRST FOCUS PRODUCTS

WL-OSEN Optical Sensor – Reflective

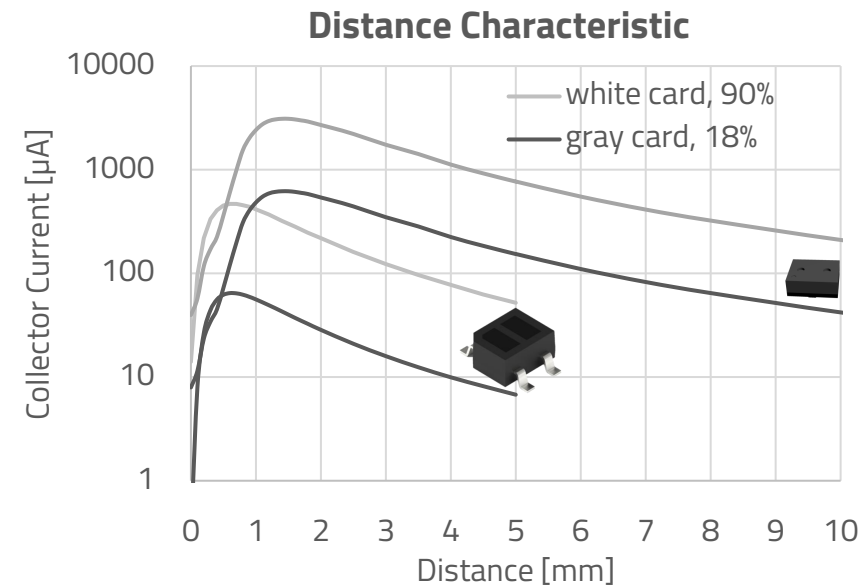
■ **NEW! PN: 1642730961200**

- Standard Gullwing Package
- 0.2-5mm Distance
- 120/110° Viewing Angle



■ **NEW! PN: 1692010961200**

- Miniature 2016 Package
- 0.5-10mm Distance
- 10/70° Viewing Angle



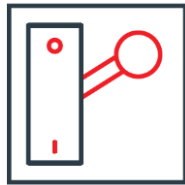
APPLICATIONS

Object detection

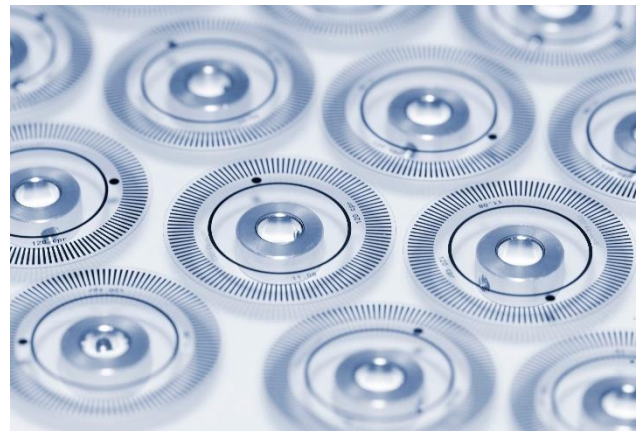
- Optical switch
 - ATMs, Ticketing



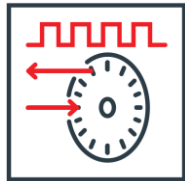
- Optical interlock
 - Door Sensor
 - Opening detection



- Touch
 - Touch on glass
 - Touchless possible



- Rotary encoder
 - Motor control

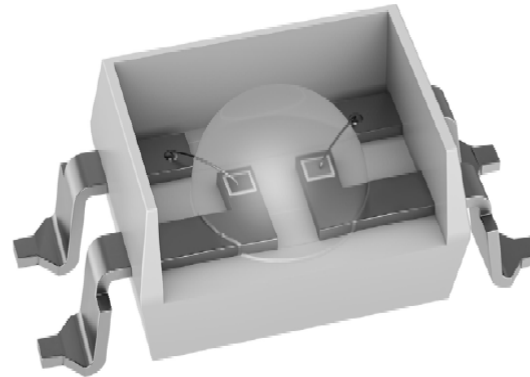
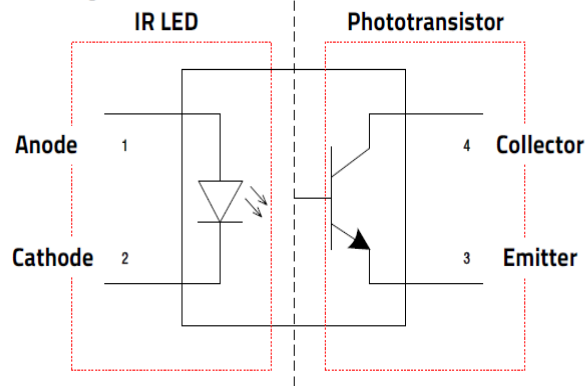


OPTOCOUPLER

BASIC INFORMATION

Optocouplers - What's that?

- Transfers analogue /digital signals between two isolated circuits by using light transmission
- Optoelectronic package with infrared LED & detector
- The optical transmission takes place with an infrared light beam



Why Optocouplers?

- Separation of low power control circuits from high power circuits (galvanic isolation)
- Optocouplers protect your application against overvoltages
- Safety Isolation: for circuits and persons from dangerous electrical installations

Applications:

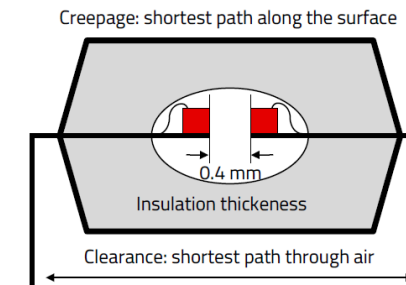
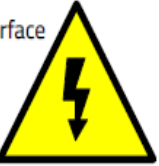


Advantages of Coplanar Optocoupler

- Fixed Isolation Gap
- Special inner mold design to improve current transfer ratio
- Copper leadframe for high reliability
- Excellent isolation
- Compact size
- High stability of CTR in different temperature ranges

Isolation characteristics

- Creepage: shortest path along the surface
- Clearance: shortest path through air
- Insulation thickness
- Maximum Isolation Voltage: 5 kV



Certification



DIN EN 60747-5-5



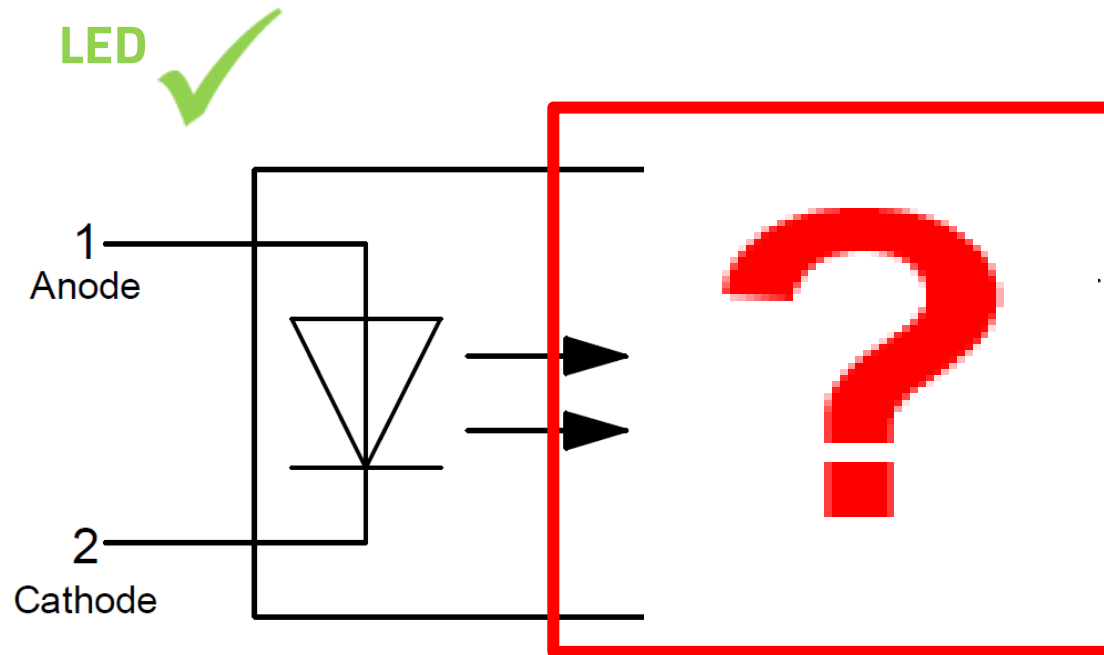
UL 1577



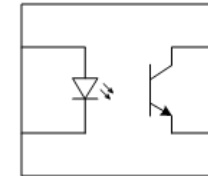
GB4943.1-2001; GB8898-2011

OPTOKOPPLER TYPES

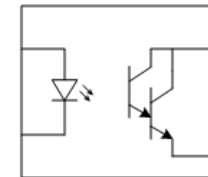
Phototransistor, Darlington, Triac



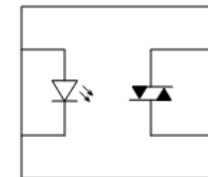
- Phototransistor



- Darlington



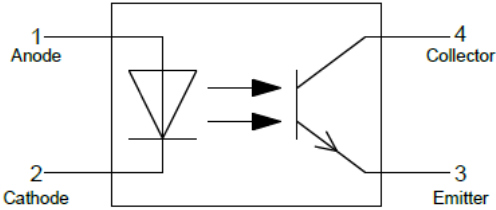
- Triac



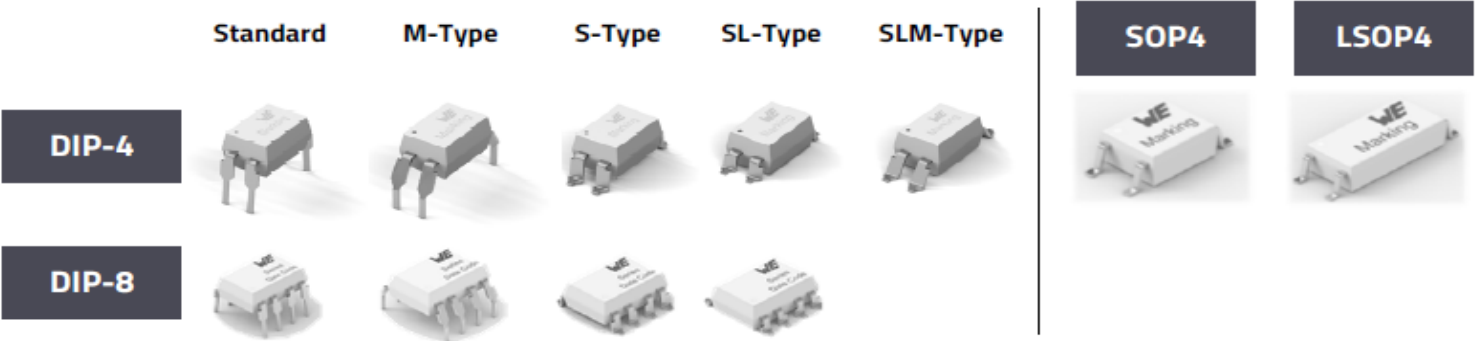
- ...

PRODUCT OVERVIEW

Phototransistor optocoupler WL-OCPT

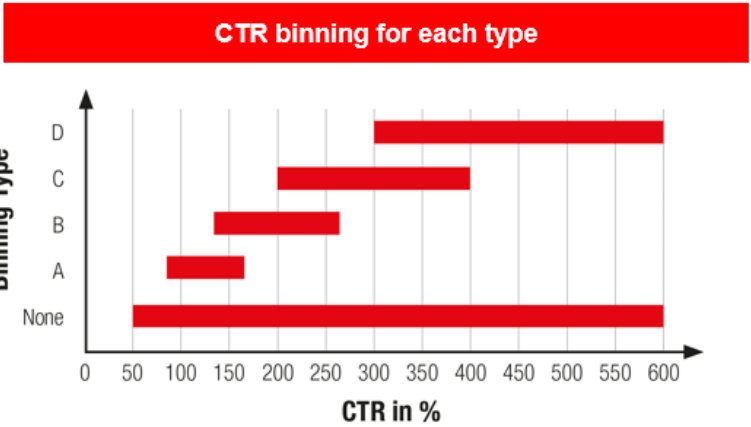


Choose your package and Assembly technology



Available Products:

- **Different CTR** binnings available – for all size and form
- Isolation Voltage depends on Clearance and Creepage
- Different Isolation voltage – depending on package size
- Range of max Collector-Emitter Voltage

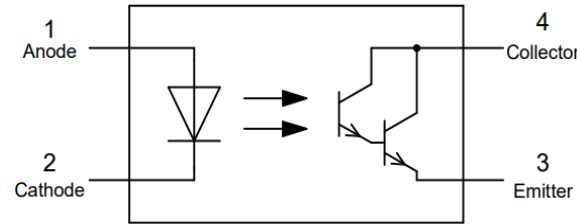


Part Number:	14081614xx	14081714xx	14081424xx	14035614xx	14035714xx	14035424xx	14010xx	140827xx
Series:	816 (DC)	817 (DC)	814 (AC)	356 (DC)	357(DC)	354 (AC)	10x (DC)	827 (DC)
V _{CEmax} :	80 V	35 V	80 V	80 V	35 V	80 V	80 V	80V
Package:	DIP 4 Dual in Line Package			SOP 4 Small Outline Package			LSOP 4 Long Small Outline Package	DIP 8 Dual in Line Package
V _{iso}	5kV			3,75 kV			5 kV	5 kV



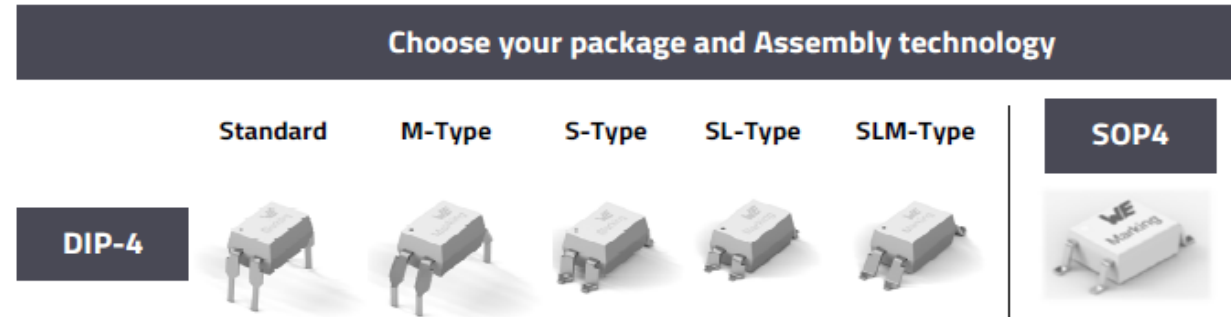
PRODUCT OVERVIEW

Darlington optocoupler WL-OCDA



Available Products:

- Isolation Voltage depends on Clearance and Creepage
- Different Isolation voltage – depending on package size
- Range of max Collector-Emitter Voltage



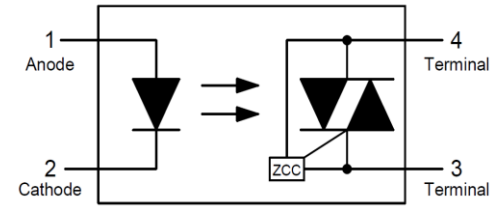
Part Number:	14181514xx	14135514xx	14135214xx
Series:	815 (DC)	355 (DC)	352 (DC)
V_{CEmax} :	40 V	40 V	350 V
Package:	DIP 4 Dual in Line Package	SOP 4 Small Outline Package	
V _{iso}	5kV	3,75 kV	

PRODUCT OVERVIEW

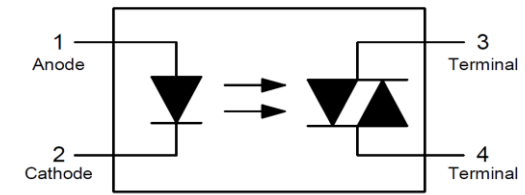
Triac optocoupler WL-OCTR

Available Products:

- Isolation Voltage depends on Clearance and Creepage
- Different Isolation voltage – depending on package size
- Range of different trigger currents and peak off state voltage



Triac- Zero Cross



Triac- Non Zero Cross | Random Phase

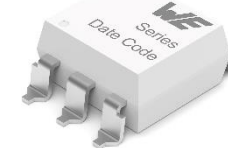
SOP4



DIP4



DIP6



Part Number	14230xx4xxx	14230xx6xxx	1423xx45xx
Size	DIP 4 Standard, M-type, SL- Type	DIP 6 Standard, M-Type, SL-Type	SOP4
Output type	Random Phase or Zero Cross		
Peak off-state voltage	400 V, 600 V	250 V, 400 V, 600 V	
Trigger current	5 mA,10 mA, 15 mA		

APPLICATIONS

Optocouplers

Applications which need galvanic isolation

- Power supply
- Regulation in control circuits
- Smart Meter
- White goods
- Industrial controls
- AC motor drivers



FURTHER INFORMATION

- Check out our Website!
- Application Notes and Webinars on the product pages
- Product information and simulation tools on REDEXPERT
- Further information and webinars in the links below



QUESTIONS?