

**興華電子工業股份有限公司**  
**CHINA SEMICONDUCTOR CORP.**

**VEGA Power Plant growth light**

**Date:2009/09/30**



## **LED Special Application**

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**LED is low temperature light source with high luminous, high efficiency, High color saturation, compact size, and which spectrum can be determined by demand. It can be widely used for refrigeration lighting, medical usage, agriculture, fishery and husbandry, etc.**

**Highly saturation with vivid color desire customer to purchase merchandise. Blue color lighting can accelerate the photosynthesis activity. Modulated red spectrum can control growth of germination or flowering.**

**Green can grow chick faster, Red stimulates sex hormone, help the egg's productivity and quality. Blue color let you feel more relax, by contrast red let you feel more vigilance.**



## **LED for agriculture, fishery and husbandry**

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**Different spectrum benefit the plant with various application. Ultraviolet ray (UV) can curb the stem growth. Blue benefit the photosynthesis. Modulation of red spectrum can control growth of germination or flowering.**

**LED Chips emit variant wavelength. By modifying ingredients of phosphor determine spectrum by demand. Driving current can control the light intensity. Hence LED can be widely used for the plant lighting with higher efficiency and optimal yield, while Tradition light source waste the spectrum, and therefore consume more energy.**

**In additions, some of products with high economy value like orchids in warm or cold room. Traditional lighting will generate excess radiation heating hence will burden electricity bill by temperature conditionings . By contrast LED is cold light sources which can minimize the heat by lighting.**



## **LED for agriculture, fishery and husbandry**

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**As for the aquatic beings. Like weeds, algae, photo-synthetic bacteria , which need specific wavelength to activate photosynthesis, and some of them are farmed in deep marine environments where lack of sunlight. LED is much durable and safe way for the lighting. LED light can employ optimal programming spectrum to specifically fit for those aquatic being's life cycle and inhibit unwanted .**



## The correction between wavelength and plant growth

Spectrum	Influence of plant growth
280-315nm	Low influence on Physiology
315-400nm	Less chlorophyll absorbed , curb on stem growth.
400-520nm(Blue)	Highly influence on chlorophyll and beta carotene , significant for photosynthesis and photoperiodism.
520-610nm	Less influence.
610-720nm(Red)	Less influence on chlorophyll absorb , significant for photosynthesis and photoperiodism.
720-1000nm	Low absorbability , stimulate the cell to be extend, affect germinate and flowering.
>1000nm	Turn to thermal energy

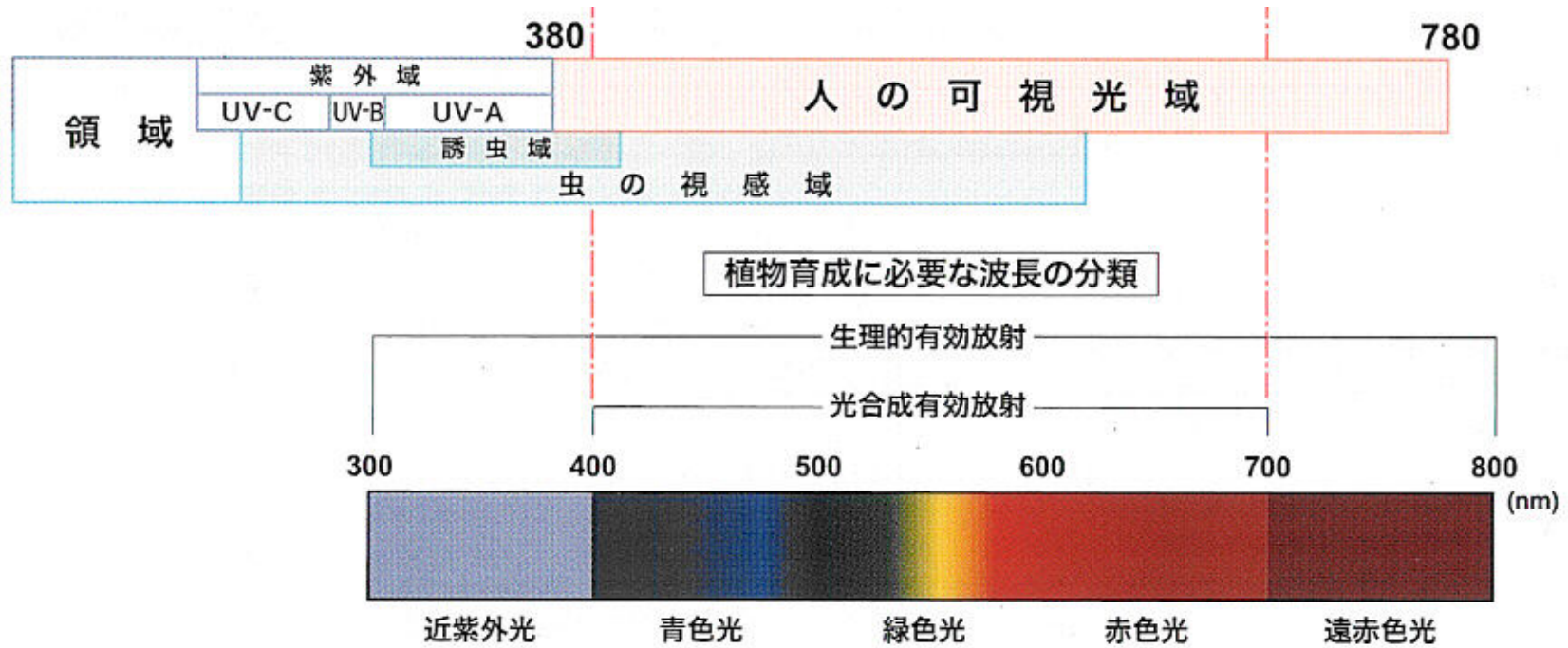


## Photo-synthetic bacteria , water weeds 、 Red / Green alga applications.

	photo-synthetic bacteria	Water weeds	Red alga	Green alga
Application	<p>1.Improve the quality of water 、 accelerate the metabolism of organism, Can be the feed and additive for aquatic beings..</p> <p>2.Breed prawn, shrimp, crab 、 fry, appreciate fish and fish eggs etc</p>	<p>Photosynthesis can generate the oxygen.</p> <p>Provide the harbor for the aquatic animals.</p>	<p>With rich Astaxanthin can make to Natural food..</p>	<p>With rich chlorophyll can accelerate the metabolism.</p>
wavelength	715-1050nm and 450-550 nm	435nm and 610nm wavelength to for photosynthesis.	Phycoerythrin and beta carat can absorb green blue light.	Similar with land plant.

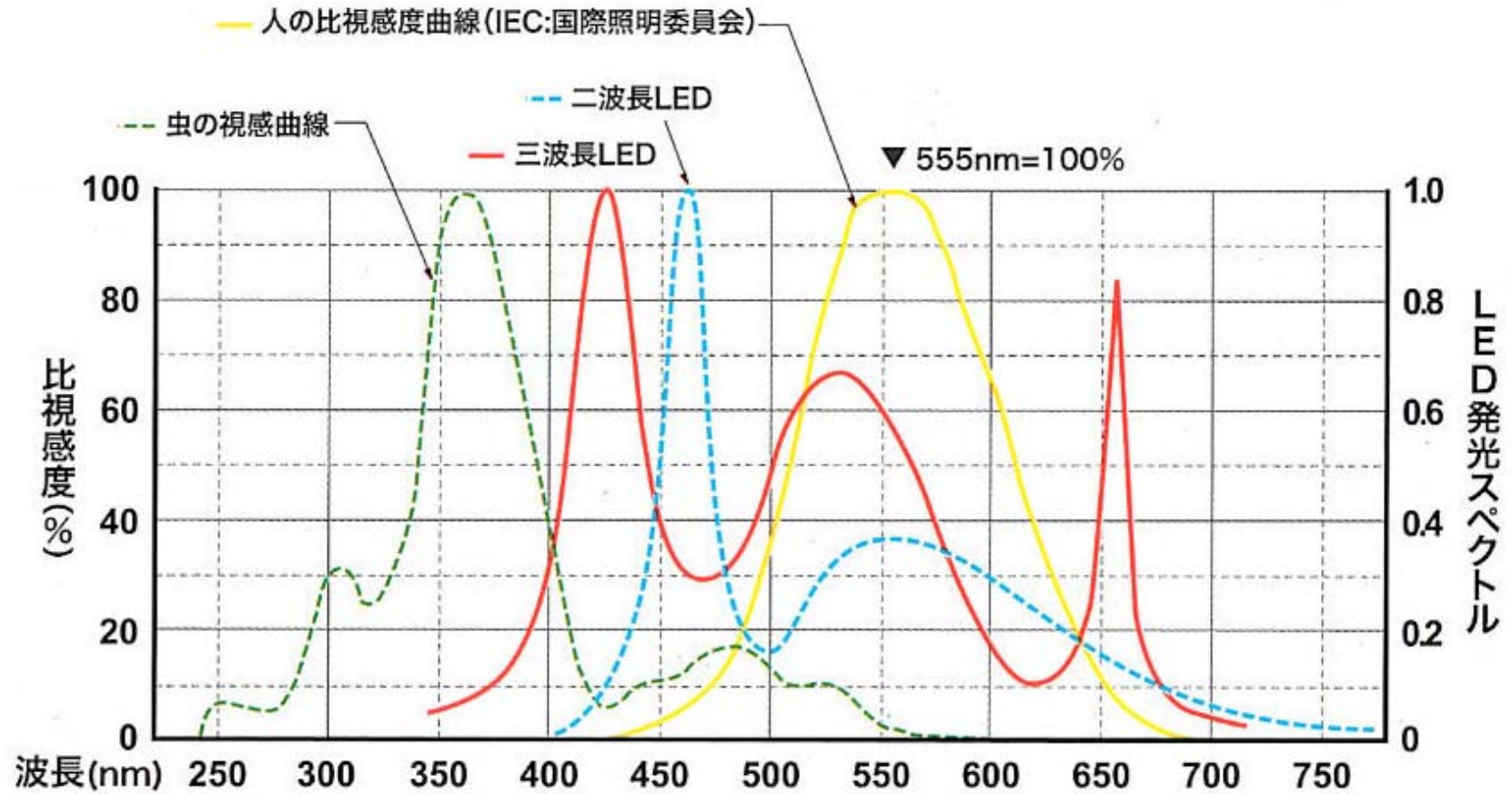


# LED vegetable growth



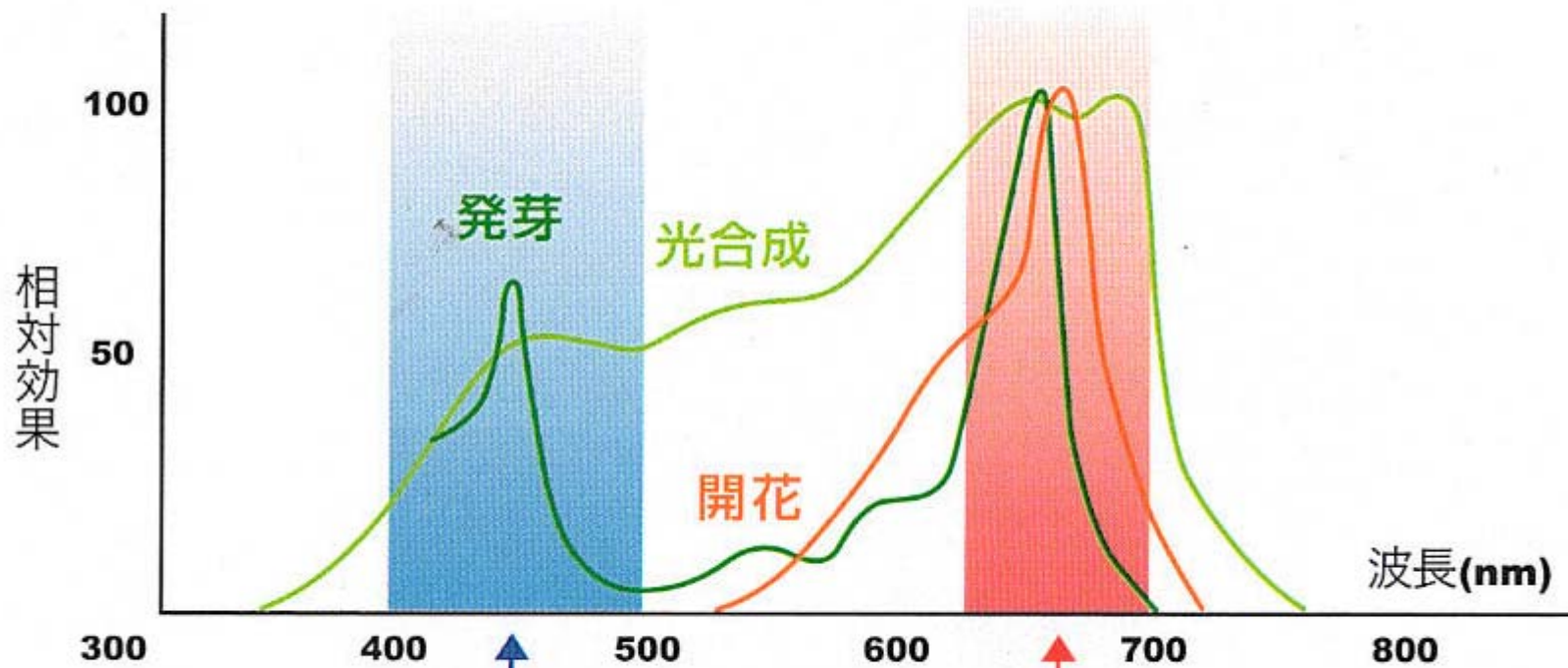
# LED vegetable growth

## 人・虫・植物とLEDの波長



# LED vegetable growth

## LED波長の相対効果








450nm前後の青色LEDが  
発芽を促進する

660nm前後の赤色LEDが  
光合成、発芽、開花を促進する

# LED application for vegetable



					
LED-1	LED-2	LED-3	LED-4	白色蛍光灯	
全光量 80	100	100	100	50	
赤色/青色光 72/8	95/5	92/8	90/10		
試験区	LED-1	LED-2	LED-3	LED-4	白色蛍光灯
地上部新鮮重 (g/株)	31.1 ± 6.2	61.8 ± 12.5	80.9 ± 14.4	82.7 ± 16.9	35.7 ± 8.4
地上部乾重 (g/株)	0.9 ± 0.2	1.8 ± 0.4	2.4 ± 0.4	2.5 ± 0.5	1.2 ± 0.3
草丈 (cm)	32 ± 3	29 ± 2	25 ± 1	24 ± 3	30 ± 2
根部乾重 (mg/株)	188 ± 20	244 ± 49	298 ± 48	342 ± 68	211 ± 42

※栽培日数34日、値は22株の平均値±標準偏差。

# Plant growth light



## Lack of blue light-Stem and leaf are slim

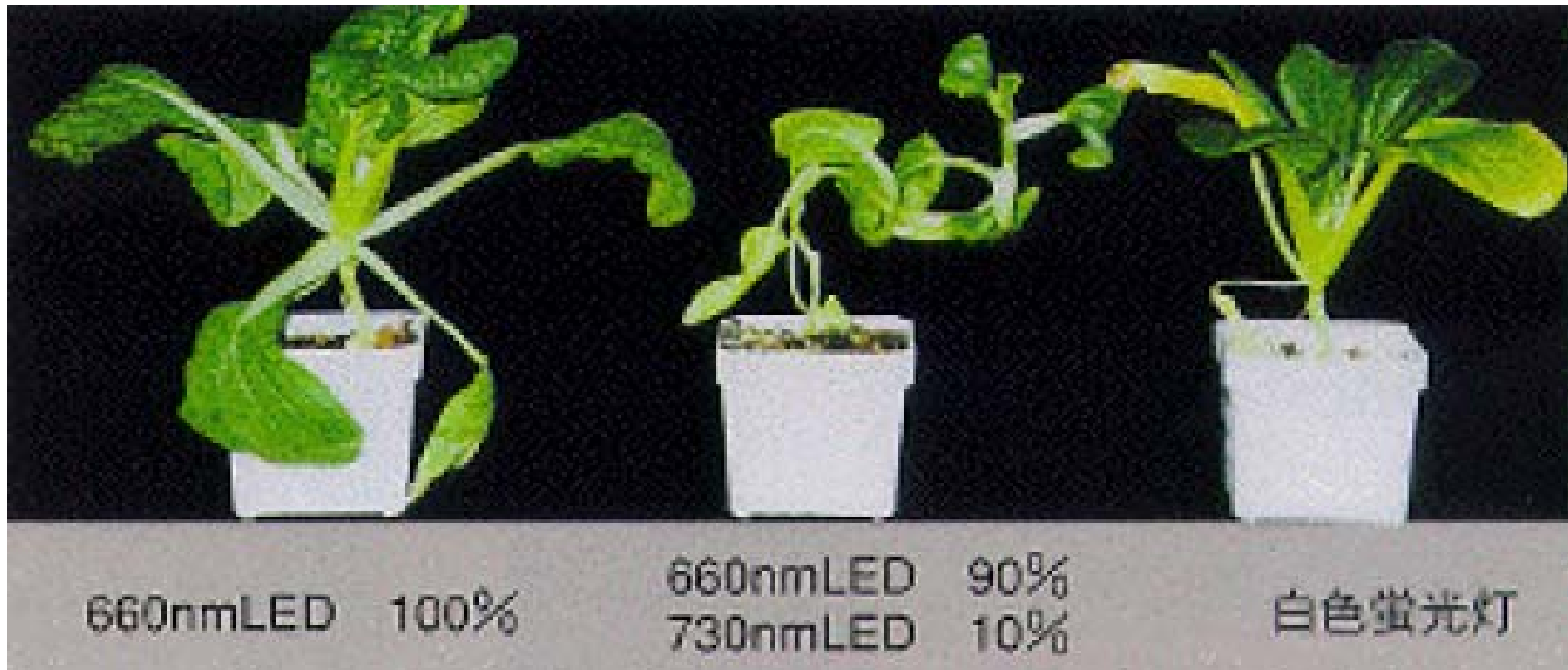


660nmLED 90%  
730nmLED 10%

660nmLED 100%

660nmLED 90%  
450nmLED 10%

## Lack of blue light-Leaf is slim



## Lack of blue light-With red light leaf is slim





# Specification

Part No.	Chip		LED Lens
	Material	Emitted Color	
CSHV-NL60PBG4-A0	InGaN/Sapphire	Purple Blue	Water Transparent
CSHV-UL60DRG4-A0	AllnGaP/Si	Deep Red	

Dominant Wavelength Part No.	445-450	450-455	455-460	460-465	465-470	470-475
CSHV-NL60PBG4-A0	B2	B3				

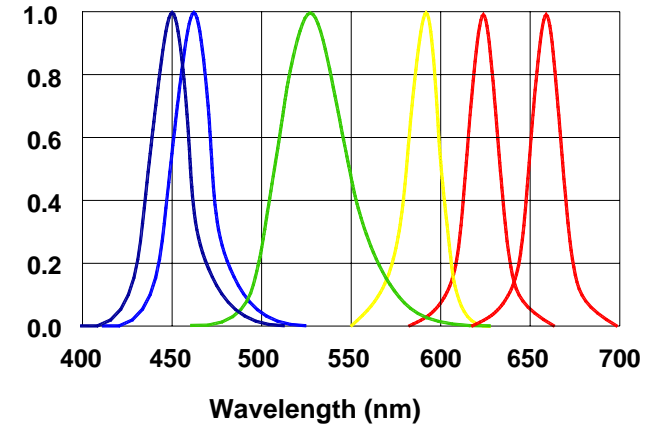
Peak Wavelength Part No.	650-660	660-670		
CSHV-UL60DRG4-A0	DR1	DR2		



# Specification

Luminous Flux Part No.	7-9	9-12	12-16	16-21
CSHV-NL60PBG4-A0	B	C	D	

Luminous Flux Part No.	12-16	16-21	21-27	
CSHV-UL60DRG4-A0	D	E	F	



**B:10% R:90%**

**B:10 lm ; R:18 lm**

**B\*1pcs : R\*5pcs = 10 lm : 90 lm = 10% : 90%**