New LED Technology - WICOP

LED EVENT 2016

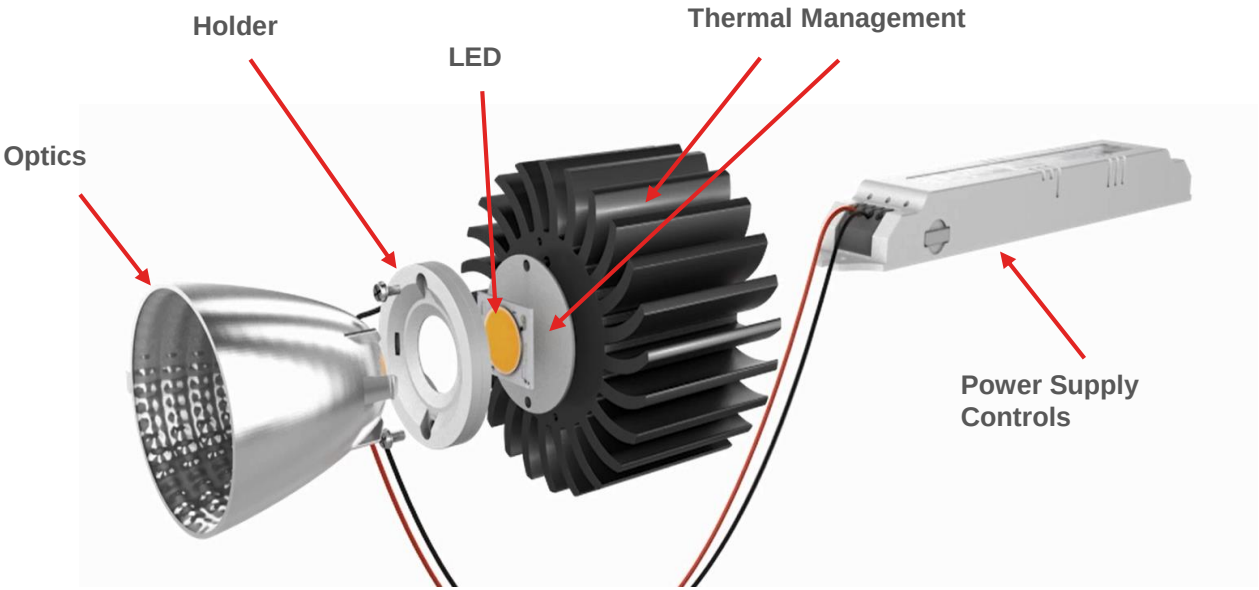
Design en engineering trends voor LED-applicaties

CONGRESCENTRUM 1931
BRABANTHALLEN, DEN BOSCH

DONDERDAG 1 DECEMBER 2016

Complexity simplified.

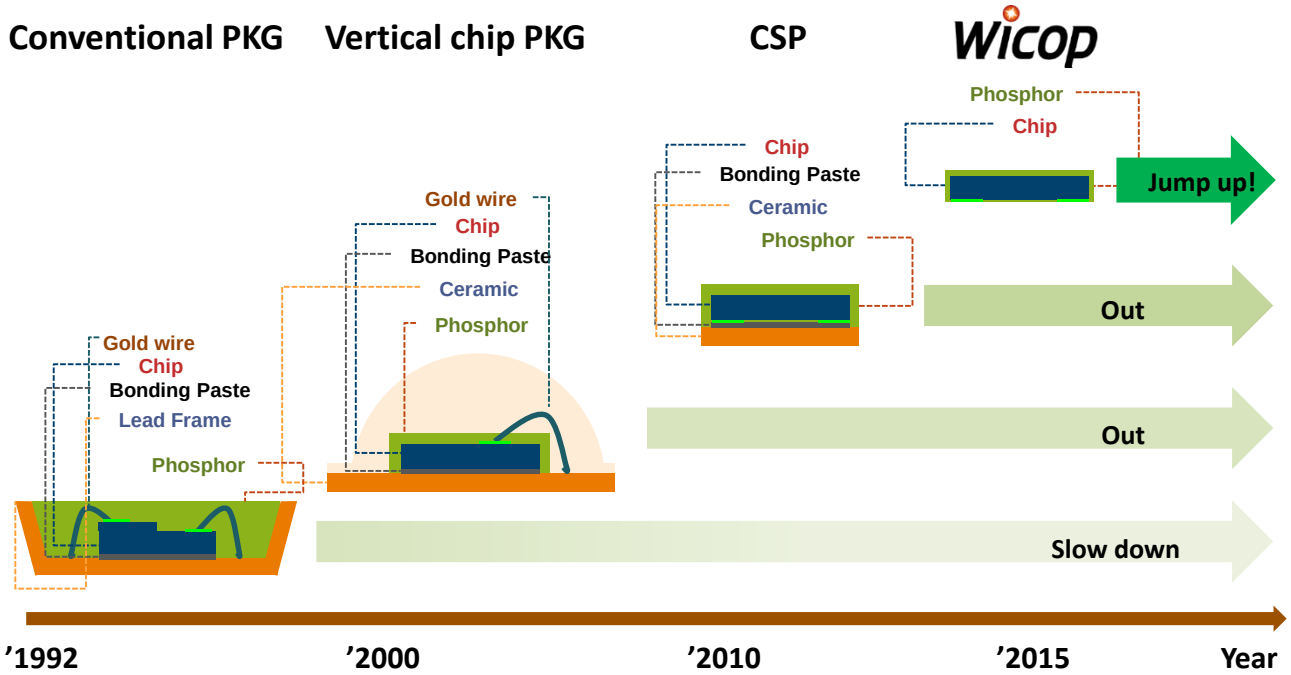
Lighting Eco System



All lighting customer needs can be addressed by one competent partner.

Package Technology Trend

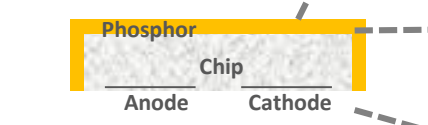
Most Advanced LED technology, WICOP

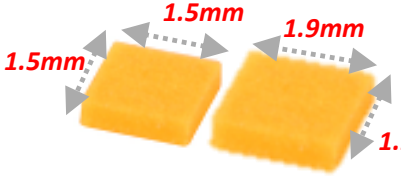


Wicop Introduction

Wicop will dominate in High Power and Mid Power

Schematic	Characteristics





1. **No Wire Bonding** for **higher reliability**
2. **Phosphor** directly attached to the chip. Less phosphor for **better color control**
3. **Direct SMT of Chip** – no package for higher **lm/$**
4. ***Wicop* Technology** enables **cost saving on system level**

AVNET Silica

Benefit of WICOP

Attractive benefits from being simple

Minimized Size

Comparison	Conventional High Power PKG	WICOP Z8 Y15
Dimension (mm)	3.5 × 3.5 × 2.0	1.5 × 1.5 × 0.4
Foot print (mm^2)	12.3	2.2
%	100%	**18%**

Thermal Feature

Thermal Conductivity (W/mK)	Conventional High Power PKG	WICOP Z8 Y15
Chip (Al_2O_3)	24~35	24~35
Bonding Paste	57	X
Ceramic	20	X

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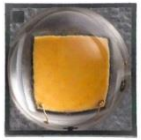
Optical Uniformity

Optical Uniformity with Wide View Angle

High Power

- Complex manufacturing
- Color variation



WICOP

- Simple Optics
- Small Color variation(u'-v')

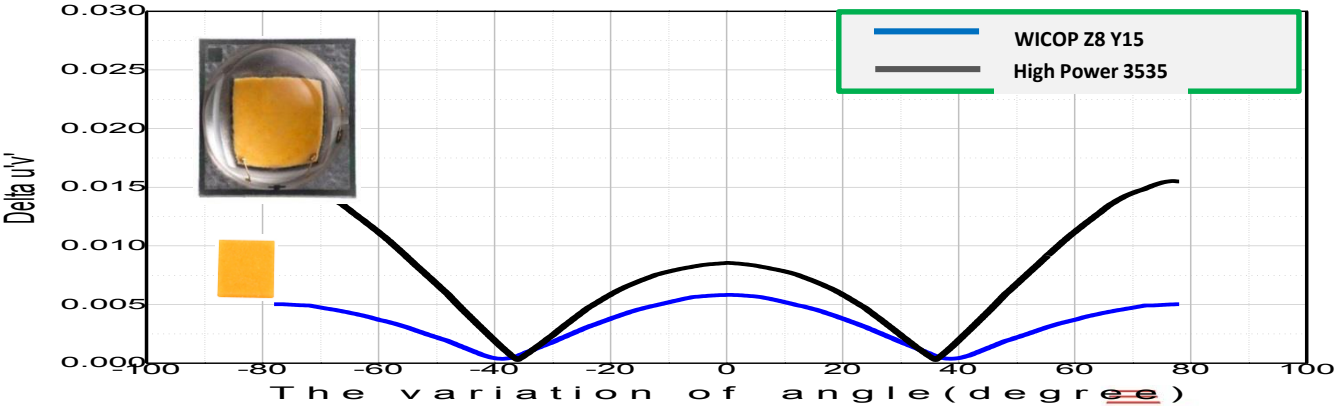


Fig) Delta u'v' graph through the variation of angle

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Better performance against H_2S Gas

WICOP = No silver plating → robust vs H_2S Gas (sulfur)

- Test condition: 40℃ / 80% / 15ppm
  - *Wicop* / 5000K / CRI70
  - Competitor product / 5000K / CRI70

Product	Competitor's High Power PKG	Wicop	Remark
Relative variation of Flux	92%	99%	7% gap

Initial

After 336 hours

Color Change and efficiency drop

C-company (USA)

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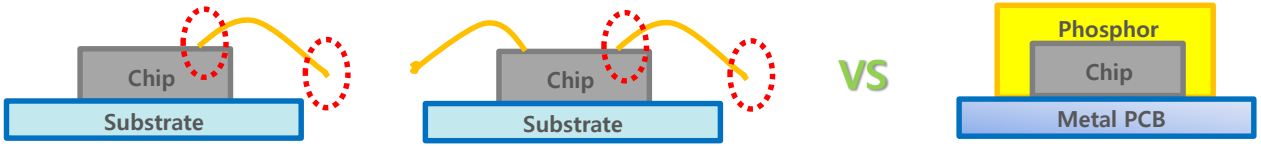
No Wire = No Wire Broken

WICOP = No wire bonding → No broken wires

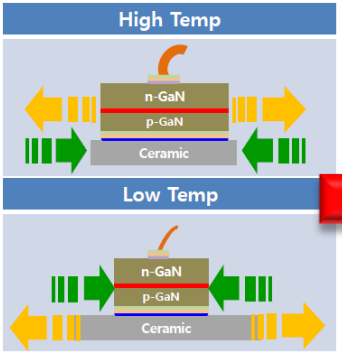
- ✓ faulty from external force or manufacturing process
- ✓ Faulty from Thermal Mismatch

Have a chance of occurring wire open through thermal shock

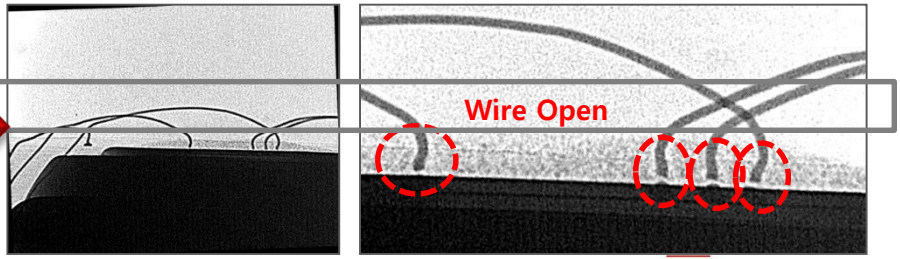
No Wire Bonding



(Vertical Chip) (Lateral Chip) (*Wicop*)



Thermal shock (-40~120℃ / 500Hr)



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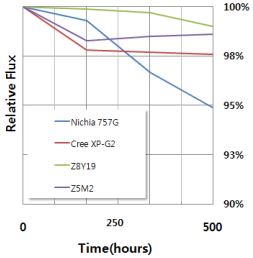
Values

High reliability

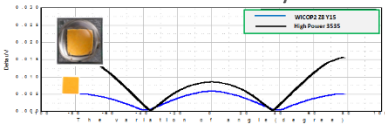


High Performance

- Up to 170 lm/W
- Improved droop rate (5%↑ ; 350mA->1A)

Thermal Feature

Color uniformity



Wicop

Outstanding Reliability

- Long Lifetime of LM80
- Over 300 Patents

High Lumen Density

- Small form factor
- Over X3 Lumen density than HP LED

Minimized Size

Long product experience

2012 Initial Promotion of Wicop

AVNET Silica

WICOP – Overview

Advantages & Benefits

- Phosphor film directly attached to chip surface
- Enhanced High Luminous Flux
- Competitive Cent/lm
- Perfect color uniformity
- Optimized Application: Indoor/Outdoor area, Bulb, Down light
- Compact footprint enables system level cost saving

Y11

1.14 x 1.14

Y11 3V

LM80

- LM80 6000hrs : 7/30 (4Khr finished)

● **Electrical Optical Characteristics**

CCT	4000K	2700K
Power [W]	0.18	0.18
Current [mA]	65	65
FLUX [lm]	34	31
VF [V]	2.9	2.9
Efficacy [lm/W]	181	165
CRI	Min 80	Min 80

Y15

1.5 x 1.5

Y15

LM80

- 6000hrs : 7/30 (4Khr finished)

● **Electrical Optical Characteristics**

CCT	4000K	2700K
Power [W]	1.0	1.0
Current [mA]	350	350
FLUX [lm]	140	133
VF [V]	2.95	2.95
Efficacy [lm/W]	136	129
CRI	Min 80	Min 80

Y19

1.9 x 1.9

Y19

LM80

- 6000hrs :

● **Electrical Optical Characteristics**

CCT	4000K	2700K
Power [W]	1.0	1.0
Current [mA]	350	350
FLUX [lm]	150	143
VF [V]	2.95	2.95
Efficacy [lm/W]	145	138
CRI	Min 80	Min 80

Y22

2.2 x 2.2

Y22

LM80

- 6000hrs : 7/30 (4Khr finished)

● **Electrical Optical Characteristics**

CCT	4000K	2700K
Power [W]	2.0	2.0
Current [mA]	700	700
FLUX [lm]	339	289
VF [V]	2.91	2.91
Efficacy [lm/W]	167	142
CRI	Min 70	Min 80

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WICOP – Z8Y11

NEW

Size : 1.14mm x 1.14mm

Advantages & Benefits

- Phosphor film directly attached to chip surface
- Enhanced High Luminous Flux
- Competitive Cent/lm
- Compact size package : 1.14x 1.14mm
- Perfect color uniformity
- **Optimized Application: Indoor/Outdoor area, Bulb, Downlight**

Schedule

- LM80 6000hrs : 7/30 (4Khr finished)
- Mass Production : 6/1

Electrical Optical Characteristics

P/N	Y11	
CCT	5000K	2700K
Power[W]	0.18	0.18
Current[mA]	65	65
FLUX [lm]	34.5	31
VF [V]	2.8	2.8
Efficacy[lm/W]	190	169
CRI	Min 80	Min 80

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WICOP – Z8Y15

Advantages & Benefits

Size(mm)	1.5 x 1.5mm
Flux Output	Typ. 163lm @350mA Tj=25℃, 5000K – Max4.7W
Key Points	Phosphor film directly attached to chip surface
	Market leading color uniformity
	High Lumen Density
	Compact footprint enables system level cost saving

@ Tj=25 ℃

Part No.	Color	Power	VF	IF	If	Flux	Efficacy	CCT	CRI	2θ½
	-	W	V	mA [Typ]	mA [Max]	lm	lm/W	K	Min	°
SZ8-Y15-W0-C7	Cool	Max.4.7	2.95	350	1,200	163	158	5000	70	140
SZ8-Y15-WN-C7	Neutral	Max.4.7	2.95	350	1,200	160	155	4000	70	140
SZ8-Y15-WW-C8	Warm	Max.4.7	2.95	350	1,200	134	130	3000	80	140
SZ8-Y15-W0-C7	Cool	Max.4.7	3.22	700	1,200	293	130	5000	70	140
SZ8-Y15-WN-C7	Neutral	Max.4.7	3.22	700	1,200	287	127	4000	70	140
SZ8-Y15-WW-C8	Warm	Max.4.7	3.22	700	1,200	239	106	3000	80	140

※ Tj=25℃→Tj=85℃(700mA) : Vf 0.23v drop, Flux 12% drop

■ **Model Name : Z8Y15**

[I_F=700mA, 85℃]

Y15	CRI 70	CRI 80	CRI 90
A	W2	V3 / W1	V1
B	W2	V3 / W1	V1
C	W2	V3 / W1	V1
D	W2	V3 / W1	V1
E	W2	V3 / W1	V1
F	V3	V1 / V2	U2
G	V3	V1 / V2	U2
H	V3	V1 / V2	U2

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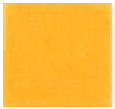
WICOP – Z8Y19



Advantages & Benefits

Size(mm)	1.9 x 1.9mm
Flux Output	**Typ. 175lm @350mA Tj=25℃, 5000K – Max7.8W**
Key Points	**Phosphor film directly attached to chip surface**
	Market leading color uniformity
	High Lumen Density
	Compact footprint enables system level cost saving

@ Tj=25 ℃

Part No.	Color	Power	VF	IF	If	Flux	Efficacy	CCT	CRI	2θ½
	-	W	V	mA ［Typ］	mA ［Max］	lm	lm/W	K	Min	°
SZ8-Y19-W0-C7	Cool	Max.7.8	2.84	350	2,000	175	176	5000	Min.70	140
SZ8-Y19-WN-C7	Neutral	Max.7.8	2.84	350	2,000	173	174	4000	Min.70	140
SZ8-Y19-WW-C8	Warm	Max.7.8	2.84	350	2,000	145	146	3000	Min.80	140
SZ8-Y19-W0-C7	Cool	Max.7.8	2.99	700	2,000	320	153	5000	Min.70	140
SZ8-Y19-WN-C7	Neutral	Max.7.8	2.99	700	2,000	315	150	4000	Min.70	140
SZ8-Y19-WW-C8	Warm	Max.7.8	2.99	700	2,000	262	125	3000	Min.80	140

※ Tj=25℃→Tj=85℃(700mA) : Vf 0.15v drop, Flux 12% drop

Product : Z8Y19

Part number : SZ8-Y19-W0-C7, SZ8-Y19-WN-C7, SZ8-Y19-WW-C8 (I_F=700mA, 85℃)

Y19	CRI 70	CRI 80	CRI 90
A	W3 / W4	W2	V2 / V3
B	W3 / W4	W2	V2 / V3
C	W4	W2	V2 / V3
D	W4	W2	V2 / V3
E	W4	W2	V2 / V3
F	W2	V3	U3 / V1
G	W2	V3	U3 / V1
H	W2	V3	U3 / V1

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WICOP – Z8Y22

Advantages & Benefits

Size(mm)	2.2 x 2.2mm
Flux Output	Typ. 346lm @700mA Tj=25℃, 5000K
Key Points	Phosphor film directly attached to chip surface Market leading color uniformity High Lumen Density Compact footprint enables system level cost saving

@ Tj=25 ℃

Part No.	Color	Power	VF	IF	If	Flux	Efficacy	CCT	CRI	2θ½
	-	W	V	mA ［Typ］	mA ［Max］	Lm	lm/W	K	Min	°
SZ8-Y22-W0-C7	Cool	Max.7.8	2.91	700	2000	346	170	5,000	Min.70	140
SZ8-Y22-WN-C7	Neutral	Max.7.8	2.91	700	2000	339	167	4,000	Min.70	140
SZ8-Y22-WW-C8	Warm	Max.7.8	2.91	700	2000	293	144	3,000	Min.80	140

※ Tj=25℃→Tj=85℃(700mA) : Vf 0.1v drop, Flux 10% drop

Product : Z8Y22

Part number : SZ8-Y22-W0-C7, SZ8-Y22-WN-C7, SZ8-Y22-WW-C8 (I_F=700mA, 85℃)

Y22	CRI 70	CRI 80	CRI 90
A	W5 / W6	W3 / W4	tbd
B	W5 / W6	W3 / W4	tbd
C	W6	W4	tbd
D	W6	W4	tbd
E	W6	W4	tbd
F	tbd	W3	tbd
G	tbd	W2 / W3	tbd
H	tbd	W2	tbd

tbd ES MP

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WICOP Reference Module Concept

WICOP Module Concept	Model Name	Power [W]	LES [mm]	Flux [lm]	lm/W	IF [mA]	VF [Vdc]	Y19 Q'ty [EA]	CRI
	NZC4	**4.0**	**6.1**	**505**	**127**	360	11	4	Min. 80
	NZC8	**7.5**	**6.1**	**844**	**113**	656	11	4	
	NZC13	**13.2**	**9.8**	**1652**	**125**	397	33	12	
	NZC22	**22.1**	**9.8**	**2503**	**113**	647	34	12	
	NZC27	**27.4**	**13.0**	**3414**	**124**	824	33	24	

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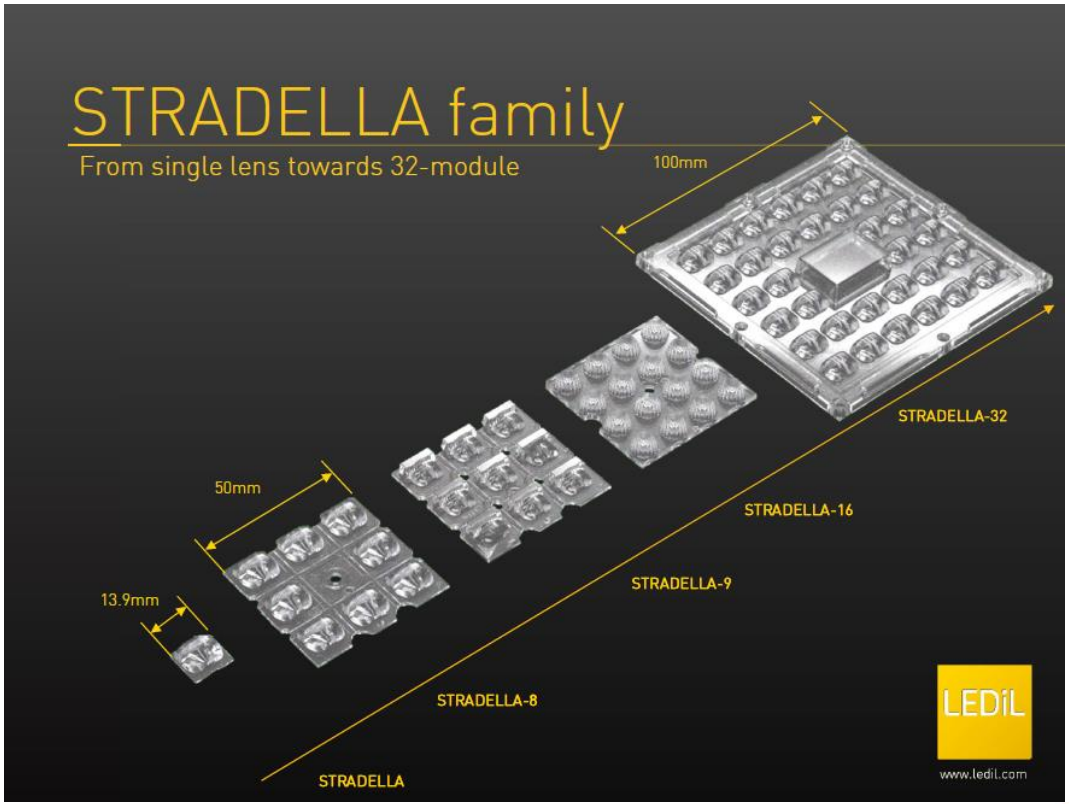
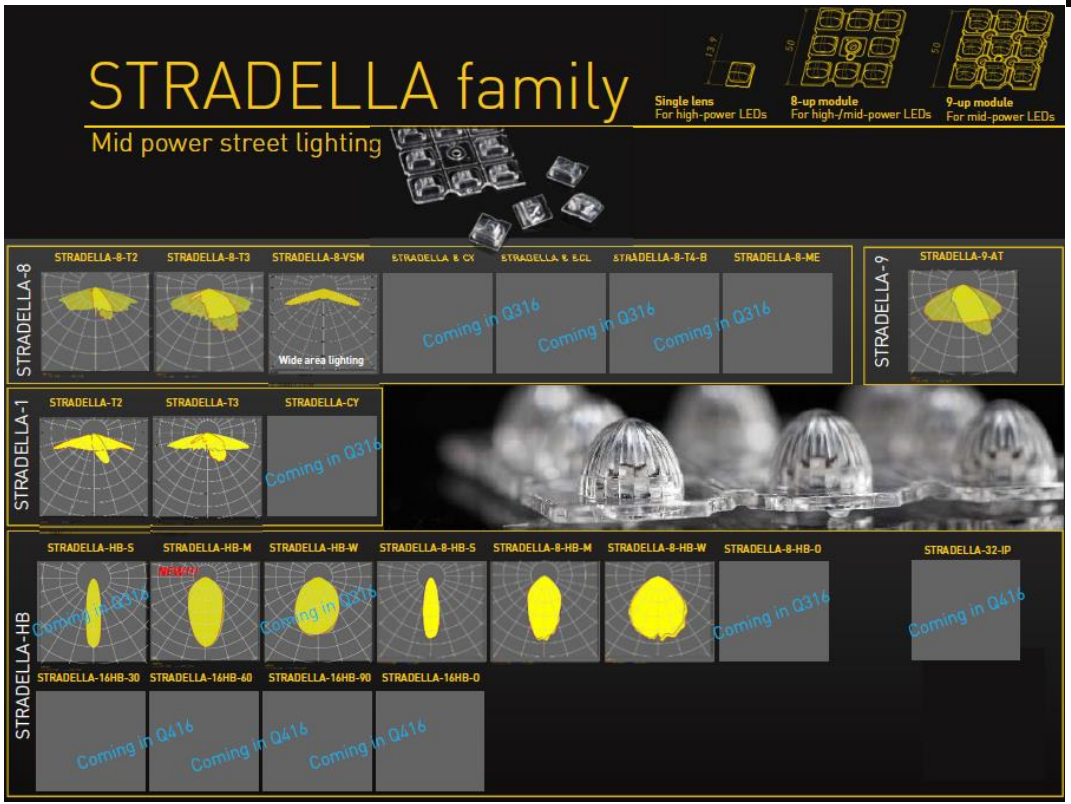

STRADELLA family
From single lens towards 32-module
100mm
50mm
13.9mm
STRADELLA-32
STRADELLA-16
STRADELLA-9
STRADELLA-8
STRADELLA
LEDiL
www.ledil.com

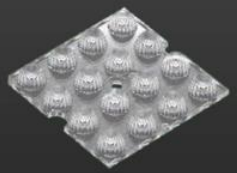

STRADELLA family
Mid power street lighting
Single lens
For high-power LEDs
8-up module
For high-/mid-power LEDs
9-up module
For mid-power LEDs
STRADELLA-8
STRADELLA-8-T2
STRADELLA-8-T3
STRADELLA-8-VSM
Wide area lighting
STRADELLA-8-CY
STRADELLA-8-ECL
STRADELLA-8-T4-B
STRADELLA-8-ME
Coming in Q316
Coming in Q316
Coming in Q316
STRADELLA-9
STRADELLA-9-AT
STRADELLA-1
STRADELLA-T2
STRADELLA-T3
STRADELLA-CY
Coming in Q316
STRADELLA-HB
STRADELLA-HB-S
STRADELLA-HB-M
NEW!
STRADELLA-HB-W
STRADELLA-8-HB-S
STRADELLA-8-HB-M
STRADELLA-8-HB-W
STRADELLA-8-HB-O
STRADELLA-32-IP
Coming in Q316
Coming in Q316
Coming in Q316
Coming in Q416
STRADELLA-16HB-30
STRADELLA-16HB-60
STRADELLA-16HB-90
STRADELLA-16HB-O
Coming in Q416
Coming in Q416
Coming in Q416

STRADELLA family

From single lens towards 32-module

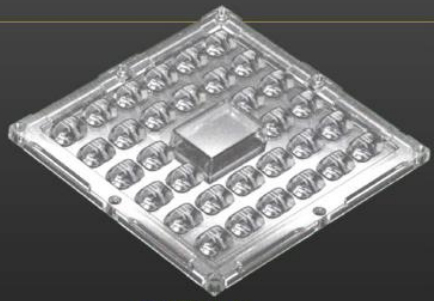
STRADELLA-8

2chip:
140lm x 8 = 1120lm
Lm density: 448lm/cm2
1chip:
70lm x 8 = 560lm
Lm density: 224lm/cm2



STRADELLA-16

2chip:
140lm x 16 = 2240lm
Lm density: 896lm/cm2
1chip:
70lm x 8 = 1120lm
Lm density: 448lm/cm2



STRADELLA-32

2chip:
140lm x 32 = 4480lm
Lm density: 448lm/cm2
1chip:
70lm x 32 = 2240lm
Lm density: 224lm/cm2

For comparison:
2x2: 4x300lm = 1200lm (480lm/cm2)
IP-2x6: 290lm/cm2

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Preliminary – Available Q4/2016

STRADA-2X2CSP-family

LEDiL introduces a range of lenses for CSP LEDs

- Range of lenses for CSP (chip scale package) LEDs
- Belongs to LEDiL standard STRADA-2X2 family, will be extended by 2x6 variants
- Enough space for smaller CSP clusters of 4 LEDs under one optic

FEATURES

- No backlight in –T2 and –T3 optics
- Coming up (Q4): -T2, -T3, -T4-B, ME, SCL, VSM
- IP version coming up
- HB versions from exisitng 2X2 series

STRADA-2X2CSP-T2

COMPATIBILITY

- LEDs:
  - Seoul Wicop2 Z8Y19, Z8Y15
  - Lumileds: FlipChip White 10

TYPICAL APPLICATIONS

- Street lighting

IP version in roadmap – based on Zhaga Book 15

LEDiL
www.ledil.com

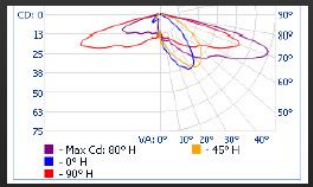
AVNET Silica

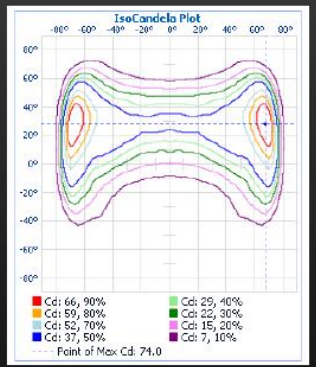
Preliminary – Available Q4/2016

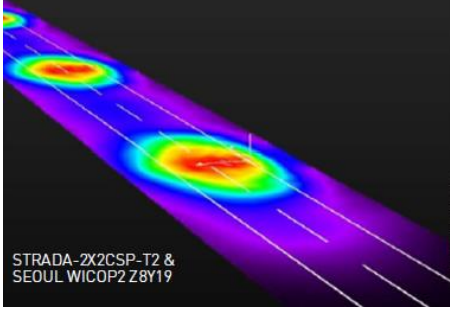
STRADA-2X2CSP-T2

LEDiL introduces a range of lenses for CSP LEDs

- ✓ IESNA Type II light distribution (other beam types will follow soon)
- ✓ Enough space for smaller CSP clusters of 4 LEDs under one optic
- ✓ FULL CUTOFF classification, Very little backlight







Luminous flux (Luminaire):	13585 lm
Luminous flux (Lamps):	14000 lm
Luminaire Wattage:	1.0 W
Arrangement:	Single row, bottom
Pole Distance:	45.000 m
Mounting Height (1):	8.000 m
Height:	7.990 m
Overhang (2):	0.000 m
Boom Angle (3):	0.0 °
Boom Length (4):	0.000 m

STRADA-2X2CSP-T2 &
SEOUL WICOP2 Z8Y19

LEDiL
www.ledil.com

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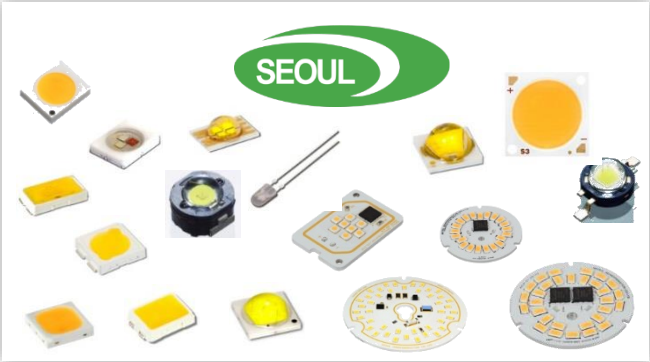
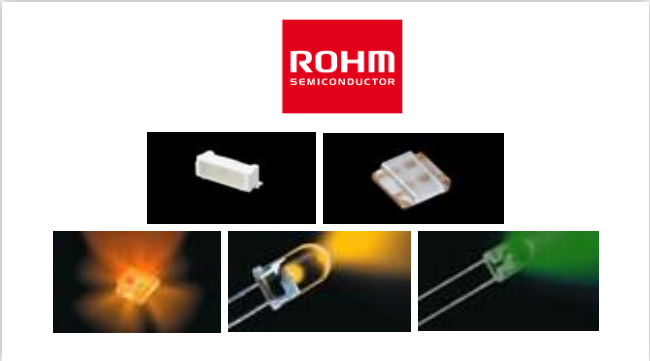
Top Quality LED Suppliers





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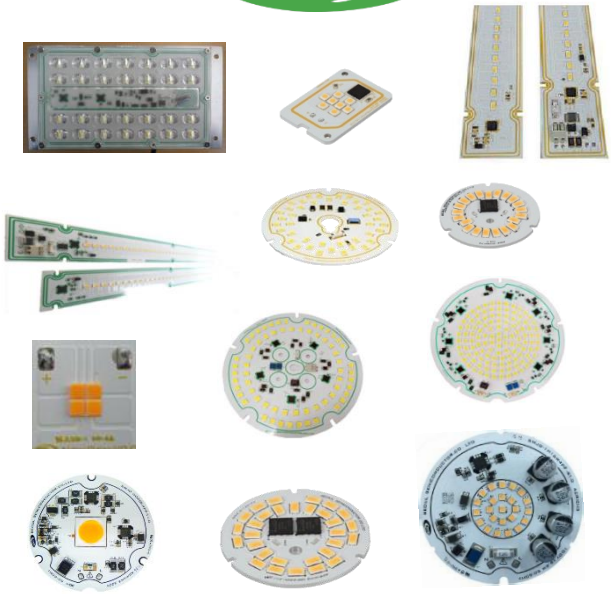
LED Modules From LED Suppliers

LUMILEDS

SHARP

SEOUL



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Eco-System Linecard

LED EVENT 2016 DEN BOSCH 1 DECEMBER 2016

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SHARP
ROHM SEMICONDUCTOR

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Thank you.