SEOUL SEMICONDUCTOR

2013 Catalogue

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A-13-04

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Quick guide to the New Products

Acrich MJT p.08

Acrich MJT is the flicker-free AC solution using our latest Multi-Junction Technology in voltage range from13V to 69V. MJT provides competitive Lm/W and Lm/$ by minimizing converter system.

Acrich2 p.10

The latest Acrich2 module saves energy by up to 50 percent and improves compatibility with phase cut dimmer and analog dimmer.

NEW

Z5M1 p.26

Z5M1 can be driven at Max.1.5A and MacAdam 3 Step binning (Warm White). It is suitable for directional lighting applications including street lights and spot lights.

NEW

5630 series p.28

5630 series provide the world's best performance in light output with 180 lm/W efficacy.

NEW

ZC series(COB) p.36

ZC series provide high luminous efficacy in 6W, 12W, 18W, 25W and 40W.

Contents

History

2013
Sep. Acrich2 modules reached 140 lumen/Watt
Jul. New Mid-Power LEDs, 5630 and 3030, achieved 180 lm/W and cut cost 50%
Apr. Achieved qualification for the UL Witness Test Data Program for Testing LEDs and modules
Launched Acrich Global Campaign for Environmental Preservation
Mar. Announced the World's Best Performing Side View LED

2012
Dec. Ranked in Top 10 Semiconductor manufacturing patent power by IEEE
Oct. Won INNOVATION AWARD 2012 with Acrich2
Sep. Acrich2 achieved the highest efficacy among AC LED modules
Jul. Announced "nPola", the world's first GaN substrate base technology
Feb. Received UL recognition for Acrich2 Modules
Jan. Announced that the company had applied, registered and secured more than 10,000 patents for LED.

2011
Oct. Launched Acrich2
Oct. Won INNOVATION AWARD 2011 with 5630
Jul. Added to the U.S Environment Protection Agency(EPA)'s list of recognized laboratories for conducting LM-80 testing of LED

2010
Sep. Acrich, selected for Zero Energy Building Research by U.S. Department of Energy.
Mar. Prof. Shuji Nakamura, the world's greatest LED lighting scholar started consulting for SSC.

2009 Mass production of Top View LED for TVs

2008 Acrich, awarded and named as Korea 10 Best New Technologies
Acrich gained RU recognition by US which is the first in the LED industry

2007 Won Industrial Award for its exports by Korean Government
Acrich is the world's first LED package which received the CE marking and TUV certification

2006 Seoul Optodevice launched the World's first mass production of DUV LED with SETi, USA
Named to the list of Asia's Top 200 Best under a Billion by Forbes
Selected as one of Asia's 100 Hot Growth Companies by Businessweek

2005 Development of Power LED for lighting

2004 The world's first LED chip development for AC
R&D center was awarded for its contribution by the president of Korea.

2002 Produced Side LED for cellular phones
Established Seoul Optodevice Co, Ltd

2001 Established Kwang Myung Semiconductor Co, Ltd

1993 Opened R&D Center

1992 Chung Hoon Lee inaugurated as CEO

Our Values - Patent

With our range of LED packages and modules, we are not just innovative, but We are also responsible to our customers as well.
More than 10,000 patents and cross license agreements provide security for our products to be installed in your applications worldwide.

Seoul Semiconductor invests 10~20% of its annual revenue in Research and Development, including funding of an affiliate company. The company holds a patent portfolio across a broad range of technologies and processes, including material, design, manufacturing and methodology. Notably, Seoul Semiconductor holds patent rights for Acrich, the semiconductor light source using a multi-cell architecture, as well as patent rights for deep UV LED technology.

We protect what we are proud of.
So we protect you too!

Seoul Semiconductor ranked in Top 10 Semiconductor Manufacturing Patent Power

Seoul Semiconductor has been ranked among the top 10 semiconductor manufacturing companies in the world for its patent portfolio and innovations by the Institute of Electrical and Electronics Engineers (IEEE), the world's largest professional association for the advancement of technology and an Intellectual Property (IP) evaluation firm.

Seoul Semiconductor's recognized strength in intellectual property (IP) and technology innovations are fundamental to the most advanced Light Emitting Diode in the market today. Recent advanced technologies developed by Seoul Semiconductor include:

Acrich uses Integrating Cell Technology and it is developed to be driven at worldwide major electric power in range of 55V to 230V.

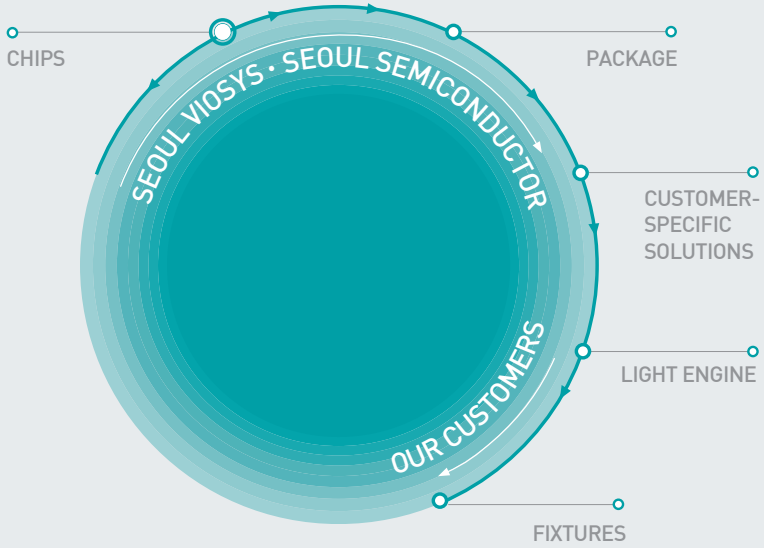
nPola is GaN substrate base technology which can improve Droop and Lumen Density dramatically by minimizing mismatch between Substrate and GaN layer. Conventional LEDs in the current market use Sapphire and Silicone, and it was reported that most of the energy is wasted to heat due to the defect caused by lattice mismatch.

The Patent Power Scorecards published by IEEE Spectrum are available on the following web pages:

2012 Patent Power Scorecard
http://spectrum.ieee.org/ns/pdfs/2012Patentscorecard2a.pdf

We create innovations for innovations.

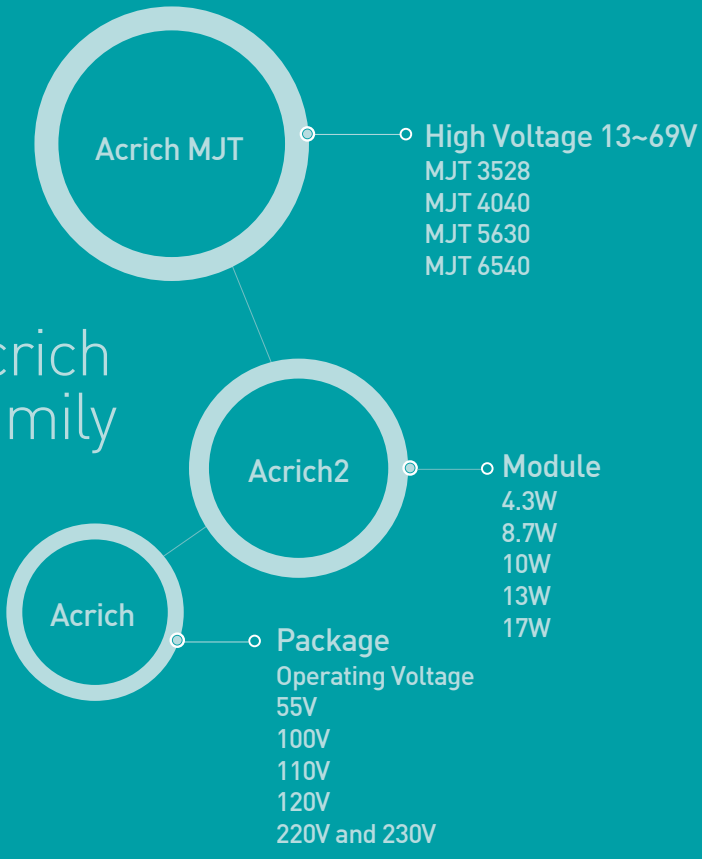
“THE REST IS UP TO YOU!”



Acrich

- Acrich MJT
- Acrich 2
- Acrich

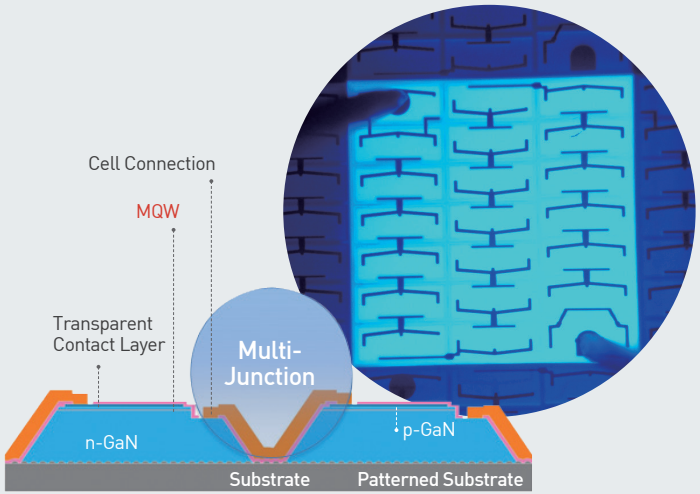
Acrich Family



Acrich MJT

Multi-Junction Technology

Acrich MJT (Multi-Junction Technology) LEDs are single-die, high-voltage, high-power devices providing designers high-voltage options without the large form factors of multi-die chip-on-boards. At 120 lumens/watt (in warm-white DC operation), the increased light density allows for cost-optimized performance in space-constrained applications. Available in a variety of packages, voltages and power levels.



Why Acrich MJT?

MJT Feature	Benefit
Low Current Operation	Increases LED Internal Quantum Efficiency
High Voltage chip	High voltage operation increases driver efficiency and reduces the number of LED packages
Multiple Lumen and Voltage options	Flexibility in lighting module design options and the ability to use the same package in different applications

Seoul Semiconductor MJT

Advantages of Multi-Junction Technology

FEATURES

- Flickerless solution
- Easy to make LED modules
- Fewer components
- A wide range of voltage 13V~69V
- High luminous efficacy up to 130lm/W
- Competitive cent/lm with scale merit

▲ MJT 3528 ▲ MJT 4040 ▲ MJT 5630 ▲ MJT 6540

Applications

- Troffer
- Flood Light
- Street Light
- Tunnel
- Wall Washer

Electro Optical Characteristics

Series	Color	Part No.	Size [mm]	VF [V]	Flux [lm]	IF [mA]	Topr[°C]	CCT[K]	2θ ½[°]	CRI (Typ)
MJT 3528	WW	SAW8WA2A	3.5*2.8*0.6	32.5	124	40	-30~+85	2,600~3,700	120	82
	CW			32.5	132	40	-30~+85	3,700~7,000		
MJT 4040	CW	SAW09H0A	4.0*4.0*2.2	64	165	20	-30~+85	4,200-6,000	120	70
MJT 5630	WW	SAW8KG0A	5.6*3.0*0.75	19	35	20	-30~+85	2,600~3,700	115	82
	CW			19	40			3,700~7,000		
	WW	SAW8KG0B	5.6*3.0*0.75	22	49			2,600~3,700		
	CW			22	53			3,700~7,000		
MJT 6540	CW	SAW8P42A	6.5*4.0*0.80	13	30	20	-30~+85	3,700~7,000	115	83

Acrich2

Brightens Up the Streets of China with New Streetlights Powered by Acrich2


Weiyang road, Yangzhou city

"...Performance was not sacrificed in the installation as the Acrich-powered solution still provides a power factor of up to 0.99 and luminance efficacy of 100lm/W. Additionally, by using a small-sized Acrich IC which replaced existing AD/DC converters, which weigh 2~4kg, significant weight saving was achieved. The overall cost of installation & maintenance was reduced more than 50% in this outdoor streetlight application. In addition, the power consumption saved more than 55% in comparison to high-pressure sodium lamps. The LEDs in these Acrich2 AC LED modules are the Acrich MJT 4040, the new high power version of the Acrich multi-junction technology (MJT) family of high-voltage LEDs..."

Seoul Semiconductor Acrich 2

Get Plugged in with Acrich2

"The latest Acrich2 16W module saves energy by up to 50 percent and improves compatibility with phase cut dimmer and analog DC dimmer"

Features & Solutions

Acrich2 is a revolutionary family of LED modules that make it easy to convert traditional light sources to solid-state lighting (LEDs). These modules do not require the drivers, bridges or ballasts associated with traditional light sources.

Acrich2 modules are the perfect replacement light sources for flush-mount fixtures, down lights and sconces.

- High Form Factor
- High Power Factor
- High Power Efficiency
- Long Life Time
- Connect AC Line Voltage directly
- UL, TUV certified

Applications

- Downlight
- Flush Mount
- Wall Sconce
- PAR
- MR16
- A19 Bulb
- GU10

Wide Voltage Range: 277V, 240V, 230V, 220V, 120V, 110V, 100V

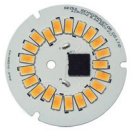
Number of IC	x 1				x 2	...	x n	Dimming
A wide range of power distribution	4W	8W	12W	16W	32W	...	200W	Analog DC 0~10v Phase Cut Dimming
Application	MR (MR16) GU (GU10)	Bulb(A19) Tube	Down Light Spot Lamp PAR Lamp			...	High Watt Application (Street Lighting, HighBay)	

Electro Optical Characteristics

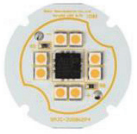
Series	Color	Part No.	VF [V]	Power [W]	CCT[K]	Binning	Flux Bin	Flux[lm] Min.	Flux[lm] Typ.	CRI
4.3W	CW	SMJE-2V04W1P3	120	4.3W	4,700-6,000	McAdam 4 Step	4a	290	330	Min.80
	NW				3,700-4,200		4b	380	400	
	WW				2,600-3,200		4c	430	450	
	CW	SMJE-3V04W1P3	220	4.3W	4,700-6,000	McAdam 4 Step	4a	290	330	Min.80
	NW				3,700-4,200		4b	380	400	
	WW				2,600-3,200		4c	430	450	
8.7W	CW	SMJE-2V08W1P3	120	8.7W	4,700-6,000	McAdam 4 Step	8a	590	650	Min.80
	NW				3,700-4,200		8b	740	800	
	WW				2,600-3,200		8c	870	910	
	CW	SMJE-3V08W1P3	220	8.7W	4,700-6,000	McAdam 4 Step	8a	590	650	Min.80
	NW				3,700-4,200		8b	740	800	
	WW				2,600-3,200		8c	870	910	
8.7W-Candle	CW	SMJC-2V08W2P4*	120	8.7W	4,700-6,000	-	ALL	580	670	Min.80
	WW				2,600-3,200					
	CW	SMJC-3V08W2P4*	220	8.7W	4,700-6,000	-	ALL	580	670	Min.80
	WW				2,600-3,200					
8.7W-Eco	CW	SMJE-2V08W2P4	120	8.7W	4,700-6,000	-	ALL	580	670	Min.80
	WW				2,600-3,200					
	CW	SMJE-3V08W2P4	220	8.7W	4,700-6,000	-	ALL	580	670	Min.80
	WW				2,600-3,200					
NEW 10W	CW	**SMJD-HE2V10W3**	120	10W	4,700-5,300	-	ALL	1,250	1,350	Min.70
	WW				2,600-3,200			1,100	1,200	Min.80
	CW	**SMJD-HE3V10W3**	220	10W	4,700-5,300	-	ALL	1,250	1,350	Min.70
	WW				2,600-3,200			1,100	1,200	Min.80
12.7W-Eco	CW	SMJE-2V1 2W2P4	120	12.7W	4,700-6,000	-	ALL	850	930	Min.80
	WW				2,600-3,200					
	CW	SMJE-3V12W2P4	220	12.7W	4,700-6,000	-	ALL	850	930	Min.80
	WW				2,600-3,200					

*Under Development

4.3W (Ø33mm)

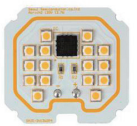


8.7W (Ø46mm)



8.7W candle (Ø30mm)

8.7W Eco (35.9x25.3mm^2)



12.7W Eco (36.5x34mm^2)

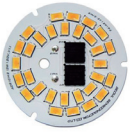
Electro Optical Characteristics

Series	Color	Part No.	VF [V]	Power [W]	CCT[K]	Binning	Flux Bin	Flux[lm] Min.	Flux[lm] Typ.	CRI
13W	CW	SMJE-2V12W1P3	120	13W	4,700-6,000	McAdam 4 Step	13a	880	1,000	Min.80
	NW				3,700-4,200		13b	1,140	1,210	
	WW				2,600-3,200		13c	1,300	1,360	
	CW	SMJE-3V12W1P3	220	13W	4,700-6,000	McAdam 4 Step	13a	880	1,000	Min.80
	NW				3,700-4,200		13b	1,140	1,210	
	WW				2,600-3,200		13c	1,300	1,360	
17W	CW	SMJD-2V16W1P3	120	17W	4,700-6,000	McAdam 4 Step	17a	1,140	1,300	Min.80
	NW				3,700-4,200		17b	1,480	1,590	
	WW				2,600-3,200		17c	1,700	1,780	
	CW	SMJD-3V16W1P3	220	17.5W	4,700-6,000	McAdam 4 Step	17a	1,140	1,300	Min.80
	NW				3,700-4,200		17b	1,480	1,590	
	WW				2,600-3,200		17c	1,700	1,780	
	CW	SMJD-2V16W2P3	120	17W	4,700-6,000	McAdam 4 Step	17a	1,140	1,300	Min.80
	NW				3,700-4,200		17b	1,480	1,590	
	WW				2,600-3,200		17c	1,700	1,780	
	CW	SMJD-3V16W2P3	220	17W	4,700-6,000	McAdam 4 Step	17a	1,140	1,300	Min.80
	NW				3,700-4,200		17b	1,480	1,590	
	WW				2,600-3,200		17c	1,700	1,780	
16W-Eco	CW	SMJD-2V16W2P4*	120	16W	4,700-6,000	-	ALL	1,070	1,260	Min.80
	WW				2,600-3,200					
	CW	SMJD-3V16W2P4*	220	16W	4,700-6,000	-	ALL	1,070	1,260	Min.80
	WW				2,600-3,200					

*Under Development

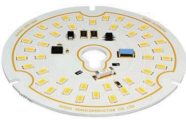
NEW

10W (Ø100mm)



13W (Ø50mm)

17W (Ø70mm)



17W (Ø100mm)

AC LEDs: Make Way for a New Generation

Article by Dave Neal | Seoul Semiconductor

The next generation of AC solutions for LED bulbs and luminares has arrived. Traditional AC LEDs have been in production for many years and although they simplify design solutions, they have several limitations. Today's Acrich2 solutions from Seoul Semiconductor combine a AC - integrated power IC technology with patented high voltage, multi-junction LEDs that overcome the shortcomings of traditional AC-powered LED solutions.

An AC LED is an LED that operates directly off of AC line voltage. The typical characteristics include dual strings of multiple LEDs (to achieve high voltages) arranged in opposite polarity (or configured with a full-bridge rectifier) to accept the AC waveform and a bias resistor to limit input current. While simple and inexpensive the AC LEDs suffer from many drawbacks including flicker, high total harmonic distortion (and subsequently poor power factor) and low efficacy.

No longer do you have to sacrifice power factor, efficiency, light quality or cost to gain the benefits of using AC technology. The Acrich2 IC solution utilizes a bank switching technology combined with a new type of high voltage LEDs that matches LED forward voltage with the line voltage waveform. Unlike the traditional AC LED solution which suffered from a high forward voltage, this approach increase the forward voltage in steps, allowing for a earlier turn on time, and a better matching of the current to the voltage waveform, thereby improving the power factor and THD. In this new solution, is the overall circuit runs on AC power not the LEDs.

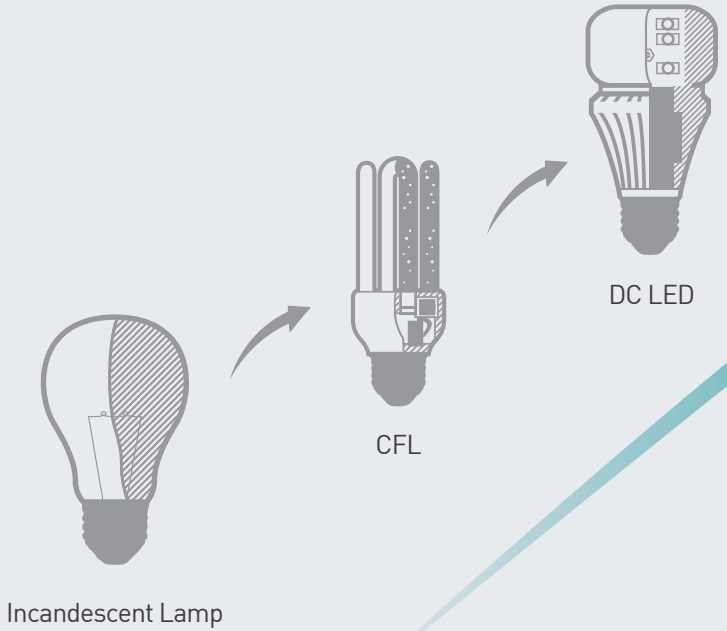
The Acrich2 High-Voltage LEDs with Multi-Junction Technology (AcrichMJT) enable a better AC solution. A multi-junction LED, unlike a standard LED that has a single junction and a 3.0V forward voltage drop, has a single semiconductor chip containing multiple light-emitting junctions within it. It allows the creation of LED packages with higher forward voltages and WITHOUT having to mount and wirebond multiple chips.

The combination of the AC driver IC and the Acrich Multi-junction LED technology allows the creation of modules that maximize efficiency, reduce part count and design complexity, improve reliability, and reduce cost.

	Traditional AC LED Technology	Acrich2 AC Technology Solution
LED Cost	Large Die, half wasted	Optimized dies size for application
Low Efficiency	Bias resistor consumes power	Switched steps for voltage match
Flicker	Higher Voltage String long off time	Switched forward voltage, short off time
Power Factor/THD	Low/High due to current/voltage mismatch	High/Low due to waveform match
High Reliability	Resistor Power consumption	No Electrolytic capacitors

To facilitate the implementation of luminaire designs using this technology, Seoul Semiconductor has created standard Acrich2 AC LED Modules that come in a wide variety of sizes, shapes and light output levels. These modules are UL recognized components and only require the soldering of two wires to connect to the AC line voltage.

"That's what we have accomplished so far."



- √ Lifetime x
- √ Power Consumption ÷
- √ Design Flexibility x
- √ Heatsink size ÷

2

"The revolution of lighting has been started from Acrich."

New Era of LED

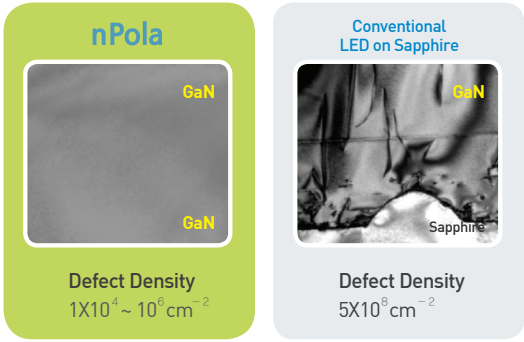
nPola

Seoul Semiconductor
New Era of LED
nPola

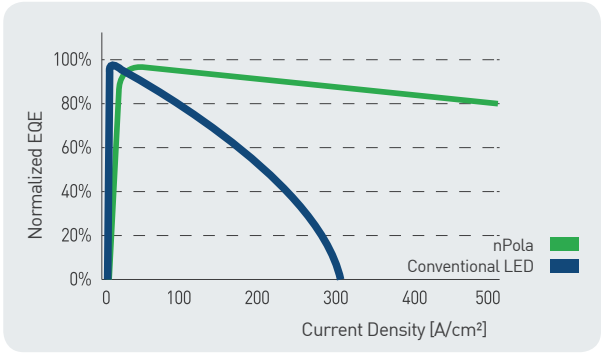
nPola

The brightness of nPola has been dramatically improved from 5 to10 times compared to one of the conventional LEDs based on equivalent die surface area.

nPola can decrease Defect Density up to 1/10,000

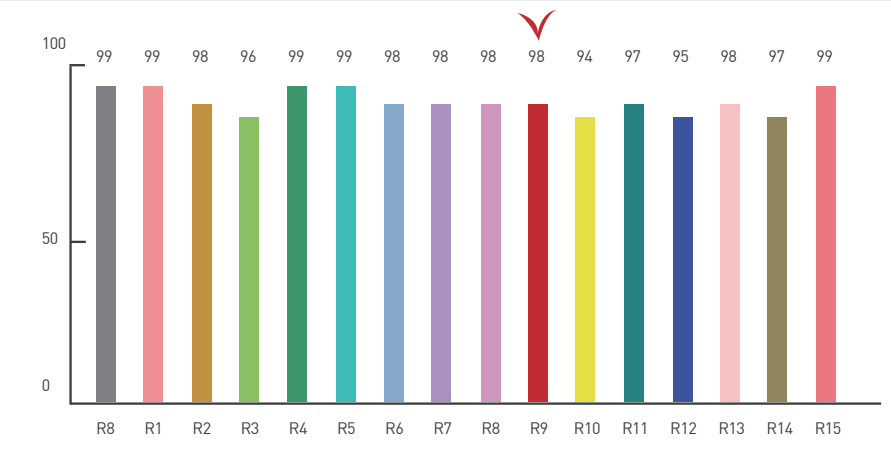


nPola frees LEDs from Efficacy Droops

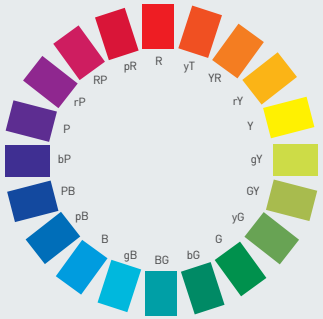


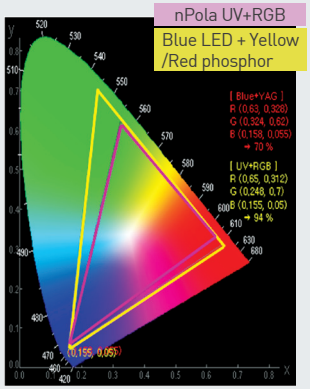
High Quality White LED by nPola UV

- In White LED Color Quality, R9~R15 is the most important factor. Conventional White LED is using Blue LED + Yellow/Red Phosphor and it has a limitation to reach high CRI in R9 and R15.
- nPola Technology strengthens UV Power from15 to 20 times compared to conventional technology.
- nPola UV LED + RGB phosphor solution can reach over 95 in all CRI from R1 to R15

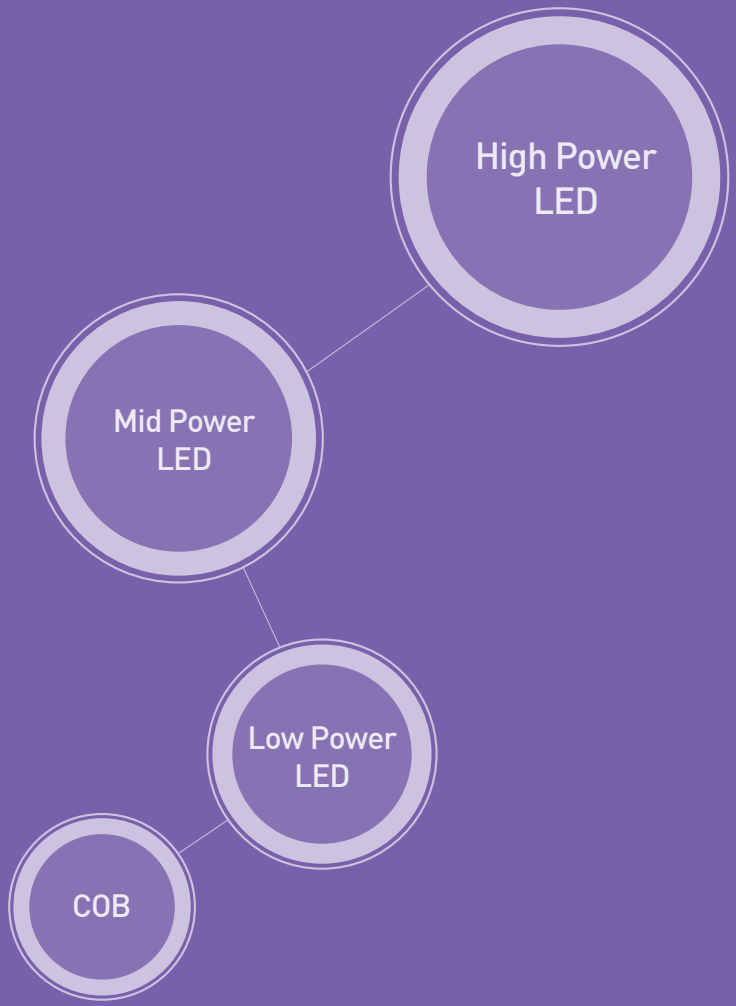


- Able to reach High Gamut for TV and Monitor





LEDs by Power



High Power LED

Seoul Semiconductor's High Power LEDs are right LEDs for world-famous places.

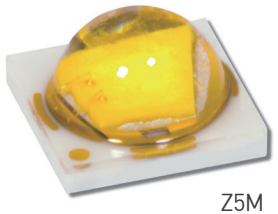
- 120th anniversary of Eiffel Tower
- 2008 Olympic Games
- 2010 Asian Games

Case Study
Z-power series installed as stage lighting at the opening ceremonies of the Asian Games 2010

Seoul Semiconductor
High Power LED

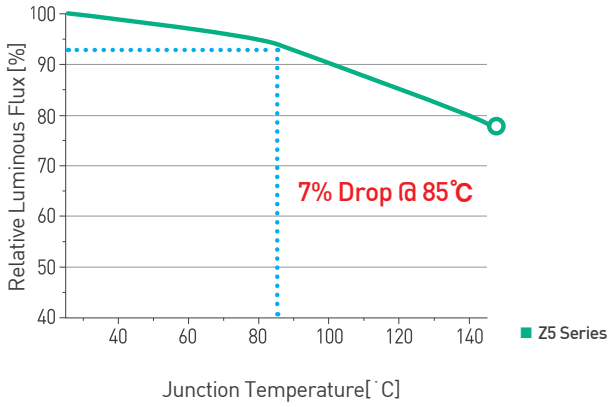
Excellent Hot Lumen Maintenance of Z5 Series

Z5 Series, world's leading high power LEDs, have excellent hot lumen maintenance. Z5 Series show only 7% of luminous flux drop in a junction temperature of 85˚C and are even available with a color rendering index(CRI) of 90.



Z5M

- LM80
- ANSI compliant
- AEC-Q101
- RoHS compliant



Z-Power LED (White)

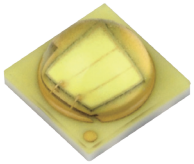
Electro-Optical Characteristics

Series	Part No.	Color	VF[V]	Flux [lm]	CCT[K]	CRI(Typ)	IF[mA]	IF[mA] (Max)	2θ½[°]	Type
Z5M	NEW SZ5-M1-W0-00	CW	2.95	155	5,300	Min.70	350	1,500	118	Emitter
	NEW SZ5-M1-WN-00	NW	2.95	150	4,000	Min.70	350	1,500	118	Emitter
	NEW SZ5-M1-WN-C8	NW	2.95	138	4,000	Min.80	350	1,500	118	Emitter
	NEW SZ5-M1-WW-C8	WW	2.95	128	3,000	Min.80	350	1,500	118	Emitter
	SZ5-M0-W0-00	CW	2.95	142	5,300	Min.70	350	1,500	120	Emitter
	SZ5-M0-W0-C8	CW	2.95	135	5,300	Min.80	350	1,500	120	Emitter
	SZ5-M0-WN-00	NW	2.95	140	4,000	Min.70	350	1,500	120	Emitter
	SZ5-M0-WN-C8	NW	2.95	122	4,000	Min.80	350	1,500	120	Emitter
	SZ5-M0-WN-C9	NW	2.95	95	4,000	Min.90	350	1,500	120	Emitter
	SZ5-M0-WW-C8	WW	2.95	116	3,000	Min.80	350	1,500	120	Emitter
	SZ5-M0-WW-C9	WW	2.95	93	2,700	Min.90	350	1,500	120	Emitter
Z5P	NEW SZ5-P1-W0-00	CW	3.05	148	5,300	Min.70	350	1,000	118	Emitter
	NEW SZ5-P1-WN-00	NW	3.05	143	4,000	Min.70	350	1,000	118	Emitter
	NEW SZ5-P1-WN-C8	NW	3.05	128	4,000	Min.80	350	1,000	118	Emitter
	NEW SZ5-P1-WW-C8	WW	3.05	115	3,000	Min.80	350	1,000	118	Emitter
Z5	SZW05A0A	CW	3.3	105	6,300	70	350	700	120	Emitter
	SZW05A0B	CW	3.3	124	6,000	70	350	700	120	Emitter
	SZWN5A0B	NW	3.3	115	4,200	Min.80	350	700	120	Emitter
	SZWW5A0B	WW	3.3	100	3,000	Min.80	350	700	120	Emitter
Z7	SZW07A0A	CW	3.3	550	6,000	70	1,400	2,800	130	Emitter
Z4	SZWW4A0A	WW	8.6	100	3,000	Min.80	120	200	130	Emitter
Z1	WZ10150	CW	3.6	100	6,300	68	400	450	120	Emitter
	NZ10150	WW	3.6	76	3,000	80	400	450	120	Emitter
P8	SPW08F0D	CW	3.4	82	6,000	73	350	500	120	Emitter
	SPW88F0E	CW	3.4	100	6,000	80	300	400	120	Emitter
	SPWW8F0E	WW	3.4	95	3,000	80	300	400	120	Emitter
P8(AUTO)	SPW08F0Z	CW	3.3	43	6,000	74	150	250	120	Emitter
	SPW08F0D	CW	3.4	82	6,000	73	350	500	120	Emitter
P4	W42180-07	CW	3.1	108	6,300	80	350	800	127	Emitter
	W42180-08	CW	3.3	110	6,000	70	350	1,000	123	Emitter
	W42182-08	CW	3.3	110	6,000	70	350	1,000	123	Star
	W49180-08	CW	3.3	125	6,000	73	350	700	95	Emitter
	S42180-08	NW	3.3	88	4,000	91	350	700	123	Emitter
	S42180H-08	NW	3.3	98	4,000	80	350	700	123	Emitter
	S42182-08	NW	3.3	88	4,000	91	350	700	123	Star
	N42180-08	WW	3.3	84	3,000	91	350	700	123	Emitter
	N42180H-08	WW	3.3	93	3,000	80	350	700	123	Emitter
	N42182-08	WW	3.3	84	3,000	91	350	700	123	Star
P9	W92050C	CW	3.65	28	6,300	70	150	200	130	Emitter

Z-Power LED (Color)

Electro-Optical Characteristics

Series	Part No.	Color	VF[V]	Flux[lm]	λd[nm]	IF[mA]	IF[mA] (Max)	2θ½[°]	Type
Z5	SZR05A0A	Red	2.4	55	625	350	700	123	Emitter
	SZG05A0A	Green	3.3	100	525	350	700	128	Emitter
	SZB05A0A	Blue	3.3	22	460	350	700	128	Emitter
	SZA05A0A	Amber	2.3	46	592	350	700	123	Emitter
P4	R42180	Red	2.3	48	625	350	800	130	Emitter
	G42180	Green	3.25	70	525	350	1,000	130	Emitter
	B42180	Blue	3.25	22	465	350	1,000	130	Emitter
	A42180	Amber	2.3	48	590	350	800	130	Emitter
	A42182	Amber	2.3	48	590	350	800	130	Star
P5-II	F50360	Full Color	2.5	35	625	350	400	120	Emitter
			3.8	57	525	350	400	120	
			3.6	13	460	350	400	120	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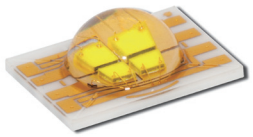
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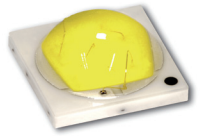
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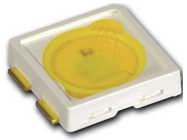
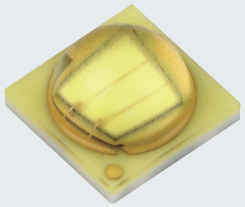

P8


P4

New Product
Z5M1



Superior efficacy and light output from a compact source

Features

- Compact symmetrical footprint (3.5mm x 3.5mm) for high-density arrays
- Full color temperature range from 2600K to 7000K and minimum CRI options of 70 and 80
- Thermal resistance of RthJS (typ.) 4.5 K/W
- Hot tested at real world operating conditions of Tj = 85°C
- Excellent current elasticity: can be driven from 150mA up to 1.5 A with high efficacies
- 1/16th ANSI compatible chromaticity bins for warm CCT color ranks G and H

Typical Performance Characteristics at 85°C

Part Number	CCT (K)	Typical Luminous Flux ΦV (lm)			Typical Forward Voltage (VF)		
	Typ.	350mA	700mA*	1.2A*	350mA	700mA*	1.2A*
SZ5-M1-W0-00	5300	142	258	393	2.78	2.96	3.14
SZ5-M1-WN-00	4000	137	250	380	2.78	2.96	3.14
SZ5-M1-WN-C8	4000	126	229	349	2.78	2.96	3.14
SZ5-M1-WW-C8	3000	117	210	322	2.78	2.96	3.14

Key Applications

- Retrofit Lamps
- Down lights
- Retail lighting
- Office lighting
- Highbay and Lowbay
- Outdoor
- Architectural

Advantages

Efficient

Delivering high lumens per watt and lm/$ to lower system costs. The new warm white Z5M1 provides Typ.121 lm/W at 3000K, CRI min 80 and Typ.145 lm/W at 6000K, CRI min 70, all at 350mA and real world operating temperature of 85°C.

Powerful

The new Z5M1, with Seoul Semiconductor's latest power chip technology, can be driven up to 1.5A (max) and with efficacies of 82 lm/W warm white (3000K, CRI min 80) and 98 lumens per watt cool white (6000K, CRI min 70), all at 1200mA and real world operating temperature of 85°C.

Color Consistency

The 3 step MacAdam Binning in warm white (2600K - 3200K) color temperatures ensures fixture to fixture color consistency especially for indoor lighting applications.

Our new featured product, the Z5M1 offers great lm/$ and lm/W for a power LED in its class. For applications where efficiency and cost are the key drivers the Z5M1 outperforms its competitors

Mid Power LED

5630 LEDs, the world's best performance in light output with 180 lm/W efficacy

The 5630 LEDs fulfill requirements such as high color stability, good CRI quality, long life time, and of course, a highly acceptable performance concerning lm/W as well as price per lumen.

Seoul Semiconductor
Mid Power LED

We head towards a better and brighter future with 5630

- Cost competitive with high lm/W (Max 180lm/W)
- Best reliability in the industry
- Max current up to 160mA
- 0.3~0.5W single chip package
- High CRI solutions (min CRI 90)
- Energy star binning
- MacAdam 3 step binning (2600-3200K)
- Optimized for bulb lighting solution

▲ 5630 C

Electro-Optical Characteristics

Part No.	CCT	Luminous Intensity [mcd]	Flux [lm]	VF[V]	Luminous Efficacy [lm/W]	CRI	IF [mA]	Thermal Resistance [RθJ-C, °C /W]
STW8Q14C	5000K	14,000	42.2	3.15	134	Min.80	100 (max. 160)	18
	3000K	12,700	38		120			
STW9Q14C	3000K	12,200	30.9		98	Min.90		

Mid Power LED (White)

Electro-Optical Characteristics

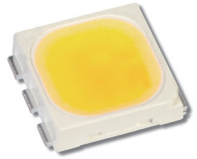
Part No.	Color	Size[mm]	VF[V]	Iv[mcd]	Iv[mcd] (Max)	CCT(K)	IF[mA]	IF[mA] (Max)	2θ½(°)	CRI(Typ)
STW9B12C	White	3.0*2.0*0.6	3.2	9,500	-	2,600-4,200	100	120	120	Min.90
STW8B12B	White	3.0*2.0*0.6	3.05	5,050	-	2,600-7,000	40	80	120	Min.80
STW8B12C	White	3.0*2.0*0.6	3.15	11,350	-	2,600-7,000	100	120	120	Min.80
C9WT821	White	3.5*2.8*1.9	3.3	4,500	-	2,600-7,000	60	90	120	92
SWT821-S	White	3.5*2.8*1.9	3.2	5,500	-	4,800-12,000	60	90	120	68
STW8C2SA	White	3.0*3.0*0.65	6.1	26,300	27,500	2,600~7,000	100	200	120	Min.80
STW9C2SA	White	3.0*3.0*0.65	6.1	20,000	24,000	2,600~4,200	100	200	120	Min.90
STW7T16A	White	5.0x5.0x1.4	3.1	7,000	-	4,700-7,000	60	90	120	75
STW8T16A	CW	5.0x5.0x1.4	3.1	6,800	7,500	3,700-7,000	60	90	120	Min.80
	WW			6,400	7,000	2,600-3,700				
STW8T36B	White	5.0x5.0x1.4	3.2	5,500	-	2,600-8,200	60	90	120	80
STW9T36B	White	5.0x5.0x1.4	3.2	5,000	-	2,600-8,200	60	90	120	90
STW8T16C	CW	5.0x5.0x1.0	3.1	9,000	-	3,700-8,200	65	100	120	Min.80
	WW	5.0x5.0x1.0	3.1	8,200	-	2,600-3,700				
STW8Q14C	White	5.6*3.0*0.75	3.15	14,000	-	2,600-7,000	100	160	120	Min.80
STW9Q14C	White	5.6*3.0*0.75	3.15	10,200	-	2,600-4,200	100	160	120	Min.90
STW9Q14B	White	5.6*3.0*0.9	3.2	9,500	-	2,600-4,500	100	160	120	Min.90
STW8Q14BE	White	5.6*3.0*0.9	3.2	11,700	-	2,600-7,000	100	160	120	Min.80
STW8Q2PA	White	5.6*3.0*0.9	3.2	8,500	-	2,600-7,000	100	160	120	Min.80

Mid Power LED (Color)

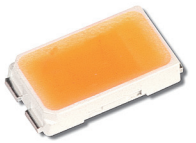
Electro-Optical Characteristics

Part No.	Color	Size[mm]	VF[V]	Iv[mcd]	Iv[mcd] (Max)	λd[nm]	IF[mA]	IF[mA] (Max)	2θ½[°]
SFT825N-S	Full Color	3.5*2.8*1.4	2.1	700	1,100	623	20	30	120
			3.2	1,200	1,600	527			
			3.2	400	560	460			
SFT825Z-S	Full Color	3.5*2.8*1.4	2.1	700	1,100	623	20	30	120
			3.2	1,200	1,600	527			
			3.2	400	560	460			
SFT722N-S	Full Color	6.0*5.0*2.5	2.1	700	1,100	623	20	30	120
			3.2	1,200	1,600	527			
			3.2	200	560	460			

▲ 3030



▲ 5050



▲ 5630

Low Power LED

SMD Type

Best Solution for Retail Lighting

Proper lighting is crucial since the food has to look fresh and appetizing in the food section. Therefore not only the light intensity but also the color spectrum of the used lamps play an important role.

One of the largest retailers in Switzerland installed new, environmentally friendly and energy efficient Lighting System with Seoul Semiconductor's 803 series. Seoul Semiconductor's 803 series are ideal for retail lighting applications which require homogeneous light distribution and high color rendering index.

SMD Type:Top View LED

Electro-Optical Characteristics

Part No.	Color	Size[mm]	VF[V]	Iv[mcd]	Iv[mcd] (Max)	CCT[K] λd[nm]	IF[mA]	IF[mA] (Max)	2θ½[°]	CRI(Typ)
KWT803-S	White	3.0*2.0*1.2	3.2	2,100	2,500	5,300-8,900	20	30	115	Min.60
C8WT803	White	3.0*2.0*1.2	3.2	1,800	2,300	2,600-7,000	20	30	115	80
C9WT803	White	3.0*2.0*1.2	3.2	1,500	2,000	2,600-7,000	20	30	115	90
ELWT801-S	White	3.5*2.8*1.9	3.4	840	1,120	-	20	30	120	-
EWT801-S	White	3.5*2.8*1.9	3.4	1,680	2,240	-	20	30	120	-
AWT801-S	White	3.5*2.8*1.9	3.3	1,600	-	2,700-4,500	20	30	120	-
ERT801-S	Red	3.5*2.8*1.9	2	90	130	635	20	30	120	-
LUYT801-S	Yellow	3.5*2.8*1.9	2.1	130	210	587	20	30	120	-
FAT801-S	Amber	3.5*2.8*1.9	2.2	220	320	606	20	30	120	-
UYGT801-S	Yellow Green	3.5*2.8*1.9	2.1	90	105	572	20	30	120	-
UPGT801-S	Green	3.5*2.8*1.9	2.2	17	36	562	20	30	120	-
MBT801-S	Blue	3.5*2.8*1.9	3.2	335	600	470	20	30	120	-

Low Power LED

Through Hole Type

Holiday lighting in Belgium using 4Φ Can type Lamp LED

Designing and implementing decorative but energy efficient illumination displays are always the most delicate issue for holiday like Christmas – the luminaires or displays must be able to be dealt with wintertime outdoor conditions such as rain, snow and ice, or very cold temperatures.

Our 4Φ Can type Lamp LEDs in cool white and warm white provide a perfect solution for decoration lighting and we proudly deliver high quality LEDs customized for special outdoor projects.

Through Hole Type:Lamp LED

Electro-Optical Characteristics

Part No.		Color	VF[V]	Iv[mcd]	IF[mA]	IF[mA] (Max)	CIE[x,y] λd[nm]	2θ1/2[°]	CRI(Typ)
Ø5 Round	LW514	White	3.2	26,000	20	30	0.31,0.31	15	Typ.68
	LW520A	White	3.2	14,000	20	30	0.31,0.31	22	Typ.68
	LW540A	White	3.3	6,000	20	30	0.31,0.31	40	Typ.68
	LW540AS	White	3.3	6,000	20	30	0.31,0.31	40	Typ.68
	LW551A	White	3.2	2,200	20	30	0.31,0.31	52	Typ.68
	LB520	Blue	3.2	3,500	20	30	470	22	-
	LR521	Red	2	7,500	20	30	625	22	-
	LR530	Red	2.2	6,500	20	30	625	30	-
	LY530	Yello	2.2	6,000	20	30	590	30	-
Ø5 Oval	LR770D	Red	2.2	700	20	30	625	70	-
Ø5 Cylinder	LB580A	Blue	3.6	250	20	30	470	80	-
Ø3 Round	LW340A	White	3.3	5,500	20	30	0.31,0.31	44	68
	LB340	Blue	3.6	800	20	30	470	40	-
	LY350	Yellow	2.2	2,500	20	30	590	45	-

Through Hole Type:High Flux LED
Electro-Optical Characteristics

Part No.	Color	VF[V]	VF[V] (Max)	Φv[lm]	Iv[mcd]	IF[mA]	IF[mA] (Max)	CIE[x,y] λd[nm]	2θ½[°]	CRI
HW321A	White	3.4	4	6	2,500	30	30	0.31,0.31	70	68
HW331A	White	3.4	4	6	1,600	30	30	0.31,0.31	110	68
HR310	Red	2.6	3	6	10,000	70	70	625	40	-

Chip On Board

The ZC series are High Flux and High Efficacy COB (Chip On Board) series designed for easy attaching to lighting fixture directly without reflow process. The thermal management performance exceeds other high power LED solutions.

Due to the small size of COB light source, it is easier to make an omni directional lamp. In addition, COB eliminates shadow effect while multiple light source of SMD packages cause many shadows. Since there is no Ag metal in Seoul Semiconductor's COB, there is no color changes occurred by SO2 and H2S.

Short Thermal Path
→ Improve Reliability

Only One Light Source
→ Best Quality of Light
→ No Shadow Effect

Small Optic Size

Electro-Optical Characteristics

Series	Part No.	Color	Power [P]	Size	VF [V]	Flux [lm]	Effi-cacy [lm/W]	CCT [K]	CRI [Typ]	IF [mA]	2θ ½[°]	RΘj-s [K/W]	Junction Temp. [℃]
ZC6	SDW01F1C	CW	6.7	13.5x13.5	37	870	130	5,000	Min.70	180	120	2.6	120
	SDW81F1C	WW	6.7	13.5x13.5	37	710	105	2,700	Min.80	180	120	2.6	120
ZC12	SDW02F1C	CW	13	19.0x19.0	37	1,780	135	5,000	Min.70	350	120	1.7	120
	SDW82F1C	WW	13	19.0x19.0	37	1,440	110	2,700	Min.80	350	120	1.7	120
ZC18	SDW03F1C	CW	18.5	19.0x19.0	37	2,520	135	5,000	Min.70	500	120	1.7	120
	SDW83F1C	WW	18.5	19.0x19.0	37	2,050	110	2,700	Min.80	500	120	1.7	120
ZC25	SDW04F1C	CW	25.9	28.0x28.0	37	3,650	140	5,000	Min.70	700	120	0.4	120
	SDW84F1C	WW	25.9	28.0x28.0	37	3,000	115	2,700	Min.80	700	120	0.4	120
ZC40	SDW05F1C	CW	37	28.0x28.0	37	5,030	135	5,000	Min.70	1,000	120	0.4	120
	SDW85F1C	WW	37	28.0x28.0	37	4,100	110	2,700	Min.80	1,000	120	0.4	120

Solution Partners

Electronic

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Taiwan Semiconductor	USA	www.taiwansemi.com	sales@tscus.com	+1-909-525-9777
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DONGWOON ANATECH	Korea	www.dwanatech.com	sales@dwanatech.com	+82-2-3465-8765
TEXAS INSTRUMENTS	Worldwide	www.ti.com		972-995-2011
STMicroelectronics		www.st.com		+41-22-929-2929
National semiconductor		www.national.com		972-995-2011
Infineon		www.infineon.com		+49-89-234-65555
Supertex		www.supertex.com		408-222-8888
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NXP Semiconductors		www.nxp.com		+31-4027-29960
Maxim		www.maximintegrated.com		408-601-1000
Power Integrations		www.powerint.com	ir@powerint.com	408-414-9200
Diodes		www.diodes.com	inquiries@diodes.com	972-987-3900
Rohm Electronics		www.rohm.com		+81-75-311-2121
Exar		www.exar.com	commtechsupport@exar.com	510-668-7000
Power Analog Microelec-tronics		www.poweranalog.com	marketing@poweranalog.com	408-733-8801
Skyworks		www.skyworksinc.com		+1-781-376-3000
Analog Devices		www.analog.com		781-329-4700
Freescale		www.freescale.com		+1-800-521-6274
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Semtech		www.semtech.com		+1-805-498-2111
Monolithic Power Systems		www.monolithicpower.com	usinfo@monolithicpower.com	+ 408-826-0600
Intersil		www.intersil.com		+1-408-432-8888

Thermal

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DDP	USA	www.datadisplay.com	ronald@datadisplay.com	+1-310-563-3413
FujiPoly		www.fujipoly.com	info@fujipoly.com	+1-732-969-100
Nuventix		www.nuventix.com	info@neventix.com	+1-512-382-8100
Yongshenkeji	China	www.szyongsen.cn	lol98288@163.com	+86-755-2992-6070
CCI	Taiwan	www.ccic.com.tw	scott_wu@ccic.com.tw	+886-2-2995-2666
SUNON		www.sunon.com	ronchen@email.sunon.com.tw	+886-2-2799-2383
Coolone	Korea	www.coolone.kr	shc1215@gmail.com	+82-70-7707-1114

Optical

Company Name	Region	Website	E-mail	Tel
Carclo	Europe	www.carclo-optics.com	sales@carclo-optics.com	+44-1753-575-011
Gaggione		www.lednlight.com	d.veryser@gaggione.com	+33-04-7476-1266
Khatod		www.khatod.com	khatod@khatod.com	+39-02-6601-3695
LEDIL		www.ledil.fi	sales@ledil.com	+358-1-833-8330
Polymer Optics		www.polymer-optics.co.uk	info@polymer-optics.co.kr	+44-118-989-3341
Fraen	USA	www.fraensrl.com	j_gilbert@fraen.com	+1-781-205-5325
LEDLink	Taiwan	www.ledlink-optics.com	joe_chen@ledlink-optics.com	+886-2-8227-6126
Shenzhen Likeda	China	www.ledlens.cn	aimee@leslens.cn	+86-755-3366-0926
BOEIM	Korea	www.boeim.com	mki86@boeim.net	+82-10-9890-9015
Sekonix	Korea	www.sekonix.com	navi307@sekonix.com	+82-31-860-1062

Optic Solution: Single

Manufacturers											
Beam Angle	Products	Carclo	Fraen	Gaggione	Khatod	LEDIL	Polymer Optics	LEDlink	Shenzhen Likeda	BOEIM	Sekonix
1-10 °	Z5	o		o		o		o		o	
	Z6									o	
	Z7									o	
	A2						o				
	A3						o				o
	A4							o			
	A7									o	
	P4	o	o	o	o	o	o	o	o		
	P5- II			o							
	P9				o						
10-20 °	Z5	o		o	o	o		o	o	o	
	A2	o									o
	A3		o	o							o
	A4							o			
	P4	o		o	o	o	o	o	o		o
	P5- II	o			o		o				
	Z1	o						o			

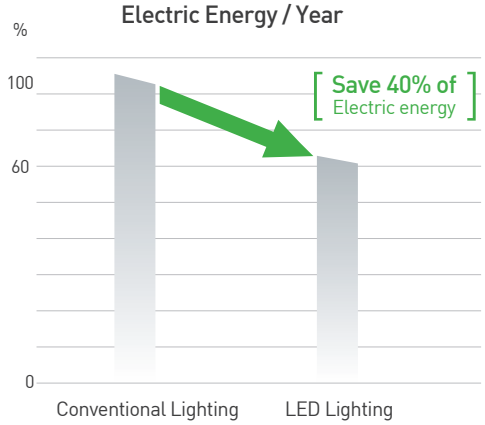
Manufacturers											
Beam Angle	Products	Carclo	Fraen	Gaggione	Khatod	LEDIL	Polymer Optics	LEDlink	Shenzhen Likeda	BOEIM	Sekonix
20-30 °	Z5	o		o	o			o	o	o	
	Z6									o	
	Z7									o	
	Z1	o						o			o
	A2	o									o
	A3		o	o							o
	A4							o			o
	A7									o	
	P4	o	o	o	o	o		o	o		o
	P5- II	o		o	o	o					
	P9				o						
30-40 °	Z5	o		o	o	o		o		o	
	A2	o									o
	A3		o	o							o
	A4							o			o
	P4	o	o	o	o			o			o
	P5- II	o			o						
	P9				o						
	Z1							o			
40-50 °	Z5	o		o	o	o		o	o		
	Z1	o						o			o
	A4							o			
	P4				o	o	o	o	o		
50-60 °	Z5					o		o	o		
	Z1							o			
	A4							o			
	P4			o				o	o		
60-70 °	Z5				o	o					
	P4					o					
70-80 °	Z5					o		o			
	Z1							o			
	A4							o			
	P4							o			
80-90 °	P4								o		
90 °~	Z5					o					
	P4								o		
Asymmetric	Z5	o		o	o	o		o	o		
	Z7										
	Z1	o						o			
	A2	o									o
	A3										o
	A4							o			
	P4	o	o	o	o	o	o	o	o		o
	P5- II	o									
	P9				o						

Optic Solution : Multi

Beam Angle	Products	Manufacturers									
		Carclo	Fraen	Gaggione	Khatod	LEDIL	Polymer Optics	LEDlink	Shenzhen Likeda	BOEIM	Sekonix
1-10 °	Z5			o	o	o		o			
	Z1							o			
	A3										
	A4							o			
	P4		o	o	o			o			
	P5- II			o	o						
	P9				o						
10-20 °	Z5	o		o	o	o		o	o		
	Z1							o			
	A4							o			
	P4			o			o	o			
	P9						o				
20-30 °	Z5	o		o	o	o		o	o		
	Z1							o			
	A4							o			
	P4		o	o	o		o	o			
	P5- II		o	o	o						
	P9				o						
30-40 °	Z5			o	o	o		o	o		
	Z1							o			
	A4							o			
	P4		o	o	o			o	o		
	P5- II		o		o						
	P9				o						
40-50 °	Z5	o		o	o	o		o			
	Z1							o			
	A4							o			
	P4						o	o			
50-60 °	Z5				o			o	o		
	Z1							o			
	P4			o	o	o		o			
	P5- II				o						
	P9				o						
70-80 °	A4							o			
	P4							o			
	Z1							o			
	P4						o				
90 °~	Z5								o		
Asymmetric	Z5	o		o		o			o		
	Z1							o			
	P4			o				o	o		

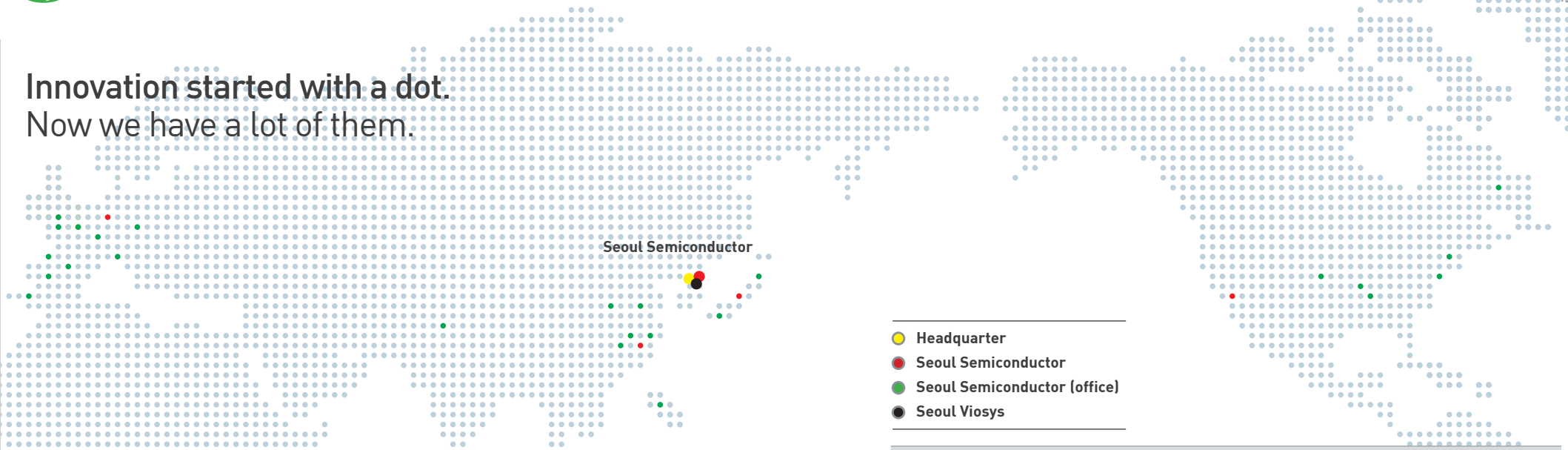
SEOUL SEMICONDUCTOR ECO-FRIENDLY MANUFACTURING STARTS WITHIN OUR OWN FACILITY

The new factory of SEOUL SEMICONDUCTOR has adopted LED for all its interior and exterior lightings which would help to reduce electrical energy cost by 40%, and it reduces environmental pollution by reusing deionized water in the manufacturing process. This philosophy is the foundation of efficient products keeping premium performance.



During last 1 year, Seoul Semiconductor has saved total 40% of electric energy usage of its new building. It also saved 0.8 million US$ per year comparing to when using conventional lighting in the past. This new LED building has been ISO 14001 certified.

Innovation started with a dot.
Now we have a lot of them.



- Headquarter
- Seoul Semiconductor
- Seoul Semiconductor (office)
- Seoul Viosys

Where to find us

October, 2013 ~ December, 2013

Date		Place	Contents
Oct.	27-30	Hong Kong (Wanchai)	Hong Kong International Lighting Fair
Nov.	05-08	Russia (Moscow)	Interlight Moscow

Seoul Semiconductor Co., Ltd (Headquarter)			
Add	1B-25, 727, Wonsi-dong, Danwon-gu, Ansan-city, Gyeonggi-do, Korea 425-851		
Tel	+82-1566-2771	Fax	+82-31-500-7600
e-mail	info.kr@seoulsemicon.com		

Seoul Semiconductor Europe GmbH			
Add	Claudius-Keller-Strasse 3B, 81669 Munich, Germany		
Tel	+49-89-450-3690-0	Fax	+49-89-450-3690-45
e-mail	info.europe@seoulsemicon.com		

Seoul Semiconductor. Inc (USA)			
Add	5856 Corporate Ave., Suite 240, Cypress, CA 90630		
Tel	+1-714-995-7151	Fax	+1-678-550-8374
e-mail	info.na@seoulsemicon.com		

China Seoul Semiconductor			
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	Tel	+86-755-8831-1696 (Lighting)	
		+86-755-8831-2165 (BLU)	
	Fax	+86-755-8831-2160	
Shanghai	Add	Rm 1609-1610, Shanghai World Trade City Buliding, No.2299 Yanan(W) Road, Changning District, Shanghai, China, 200336	
	Tel	+86-21-6270-3282	
	Fax	+86-21-6208-5754	
e-mail		info.cn@seoulsemicon.com	info.tw@seoulsemicon.com

Japan Seoul Semiconductor Co., Ltd			
Add	KS Bldg. No2 6F, 1-11-17, Shinjuku, Shinjuku-ku-Tokyo, 160-0022, Japan		
Tel	+81-3-5360-7620	Fax	+81-3-5360-7622
e-mail	info.jp@seoulsemicon.com		

Other offices		
India, Mumbai	Add	Office No. 911, 9th Floor, Filix Commercial Complex, Opp. Asian Paints, L.B.S. Marg, Bhandup (W), Mumbai 400078
	Tel	+91-9029004858
	e-mail	pradeep.shah@seoulsemicon.com
South East Asia	e-mail	info.sea@seoulsemicon.com
Australia & Middle East Asia	e-mail	info.aume@seoulsemicon.com
South America	e-mail	info.sa@seoulsemicon.com

Where to buy

Europe

Country	Distributors	Website
Pan-European	Freeway electronics	www.freeway-lighting.com
	Silica	www.silica.com
East Europe	Microdis	www.microdis.net
Belgium	Alcom electronics nv	www.alcom.be
Czech-Republic	Official Electronic	www.official.cz
Finland	OEM	www.oemelectronics.fi
France	High Tech Detection System	www.htds.fr
Germany	Neumueller Elektronik	www.neumueller.com
Italy	Acsel	www.acsel.it
	Melchioni S.p.a	www.melchioni.it
Poland	Soyter Sp. z o.o.	www.soyter.pl
Russia	MicroEM	www.microem.ru
	Symmetron	www.symmetron.ru
Slovenia/Croatia	IC Elektronika	www.ic-elect.si
Spain	Venco Electronica	www.vencoel.com
Turkey	Ozdisan	www.ozdisan.com
Ukraine	Elecom	www.elecom.kiev.ua
UK	Freeway electronics	www.freeway-lighting.com

North America

Country	Distributors	Website
Canada	J-Squared	www.jsquared.com
Mexico	Electronica Seta, S.A DE C.V	www.electronicaseta.com
US	CoreLED Systems	www.coreled.com
	Avnet	www.avnet.com
	Digikey	www.digikey.com
	Mouser	www.mouser.com

Asia

Country	Distributors	Website
China	AllTek Technology Corp.	www.alltek.com
	Chows Electronic	www.chowsopto.com
	Excelpoint International Trading	www.excelpoint.com.cn
	KeiKong Electronic LTD.	www.keikong.com
	WeiKeng International(CN)	www.weikeng.com.cn

Asia

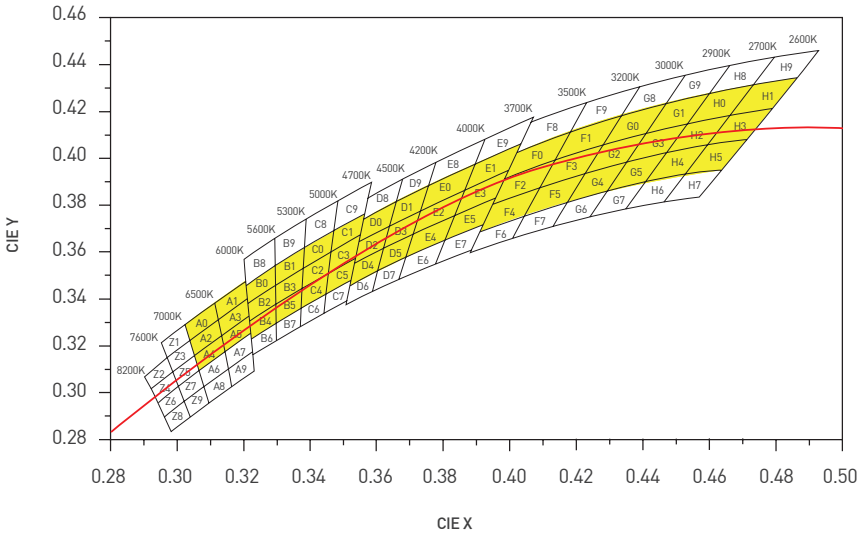
Country	Distributors	Website / Tel
Korea	Ecoluxe	+82-2-739-5300
	I-light	+82-2-6679-8098
	Frenertech	+82-70-7525-0880
	KH-electronics	www.khelec.com
	LMHKorea	www.lmhkorea.com
	Segyung-britestone	www.segyung.com-
	Seoby-corporation	+82-31-494-6269
	Sun-ha-electronics	+82-2-859-7496
	Twoinone-teychnolog	+82-2-2083-2577
	Twindevice	www.twintech21.com
	USeong-Electronics	+82-31-211-0630
Japan	Tokyo	+81-52-265-8402
	Osaka	+81-6-6191-7620
	Nagoya	+81-3-5360-7620
Taiwan	AllTek Technology Corp.	www.alltek.com.tw
	WeiKeng Industrial(TW)	www.weikeng.com.tw

Middle East / South East Asia

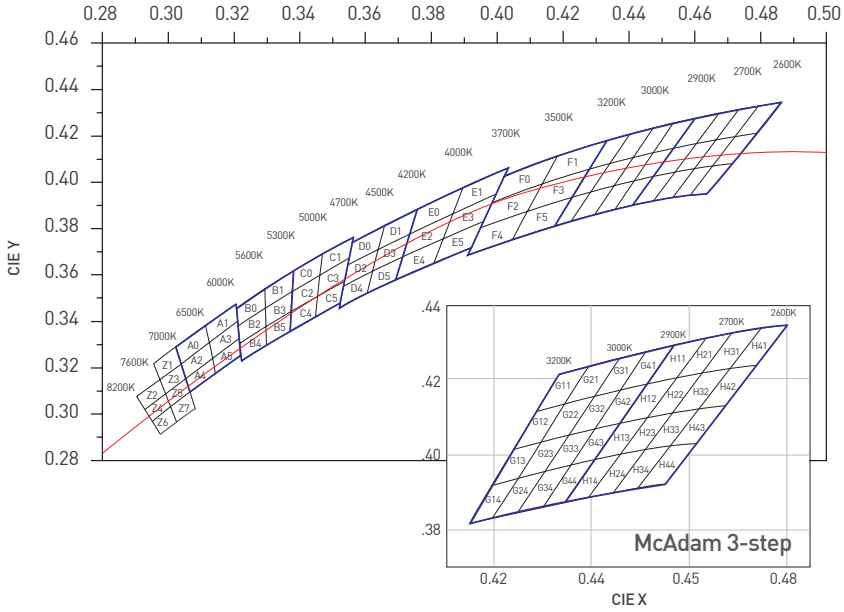
Country	Distributors	Website
Argentina	Nuvittech	www.unvitech.com.ar
Austrailia	Braemac	www.braemac.com.au
Brazil	Dae-Han Hi-Light	www.ledth.com.br
	Inter LED	www.intertk.com.br
	PPC Comercial	www.ppceletronicos.com.br
India	Excelpoint	www.excelpoint.com
	Elektronika	www.elektronikasales.com
	Arihant Elsys Pvt. ltd	www.arihantelectricals.com
Iran	NBS	n/a
Israel	LED Link	www.ledlink.co.il
Philippines	Pangaea International	www.pangaea.com.ph
Singapore	Avnet Singapore	www.em.avnetasia.com
	Excelpoint SG	www.excelpoint.com
	Pascom	www.pascom.com.sg
South Africa	NuVision	www.nuvisionelec.com
Thailand	MENTOR	www.mentorelectronics.org

NOTE

Standard Color Binning Chart



Standard Color Binning Chart



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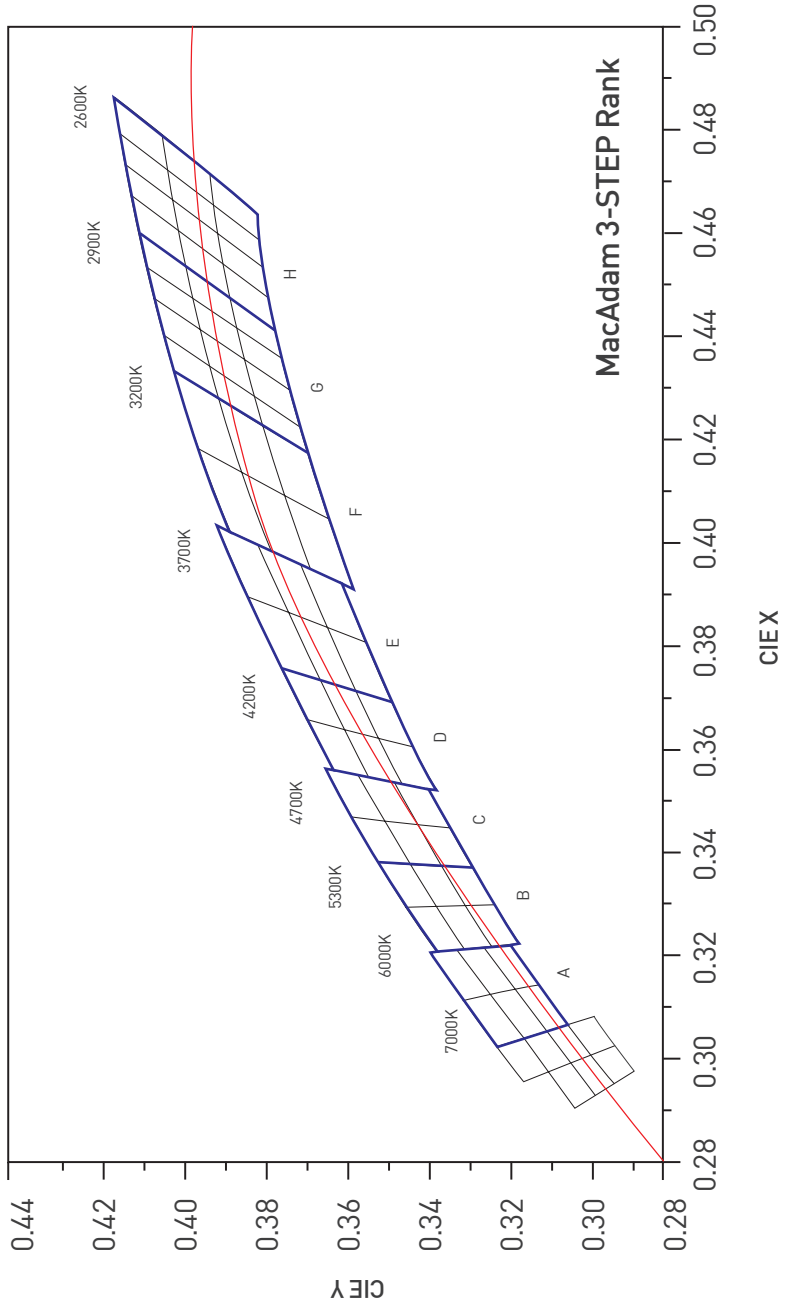
MacAdam 3-STEP Rank
2600K
2900K
3200K
3700K
4200K
4700K
5300K
6000K
7000K
A
B
C
D
E
F
G
H
0.28
0.30
0.32
0.34
0.36
0.38
0.40
0.42
0.44
0.46
0.48
0.50
CIE X
CIE Y