

Sports Lighting Solutions

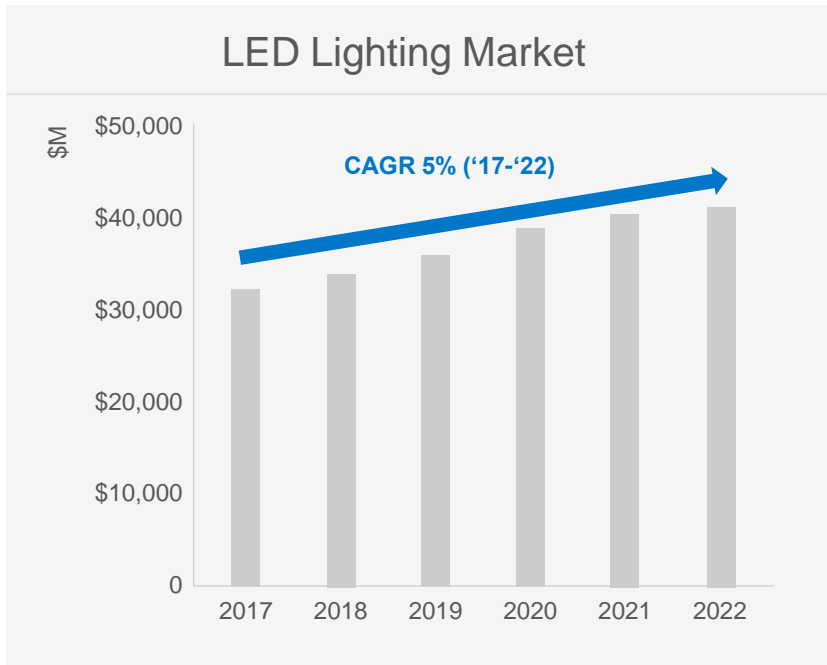
Vividly Brings the Ground's Excitement

SAMSUNG

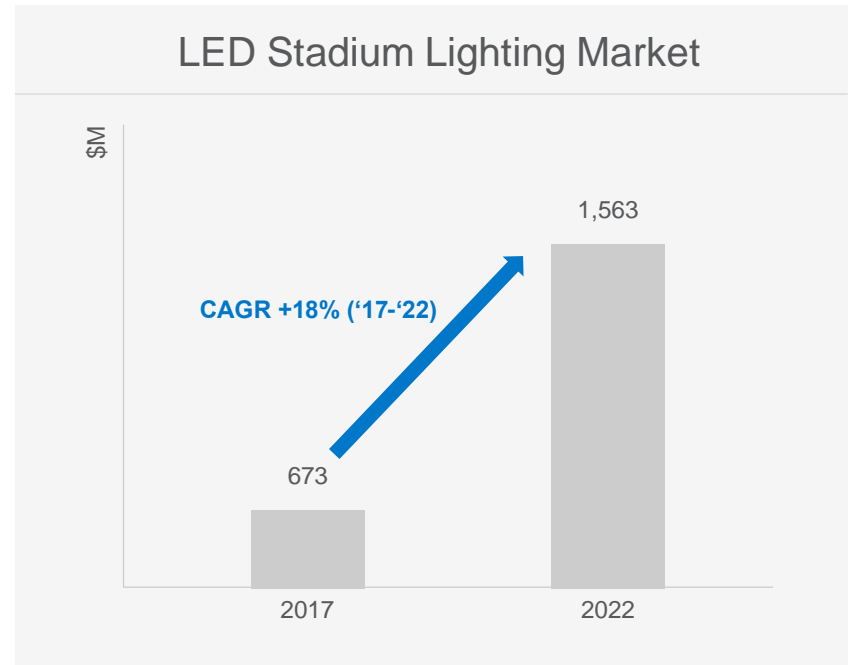


Market Dynamics

The market for LED stadium lighting is growing rapidly with sports industry



Source : LEDinside (2019)



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Key Considerations for Sports Lighting

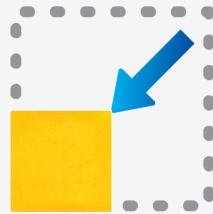
Following factors should be considered for sports lighting

High Efficacy



High efficacy LED enables overall system cost savings for sports lightings

Small LES



Small form factor facilitates narrow angle beam and reducing fixture size

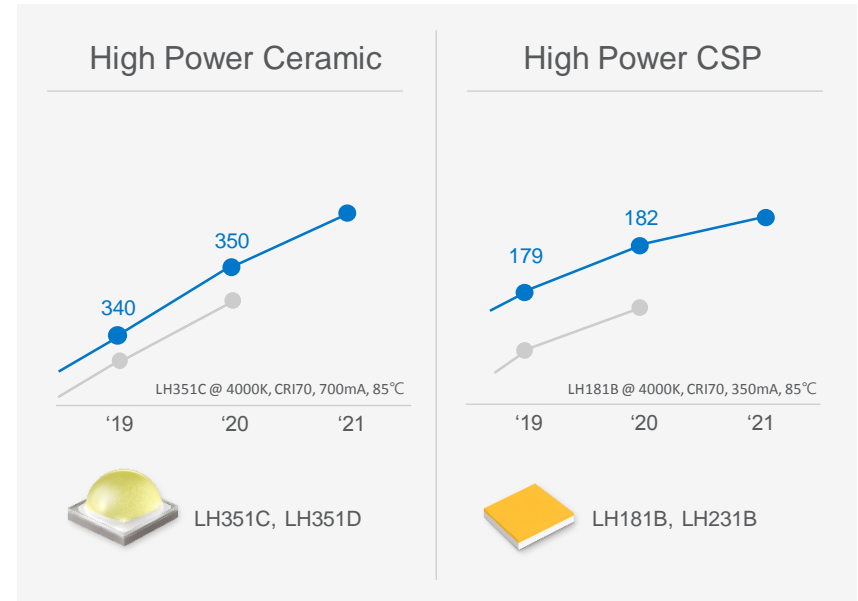
High CRI / TLCI



Higher CRI over 90+ for direct view in stadium and TLCI over 90+ for the view in broadcasting

Industry-leading Efficacy

Ongoing breakthroughs in efficacy, substantive material research, optoelectronic design, and process refinements are the key factors in high power LEDs development

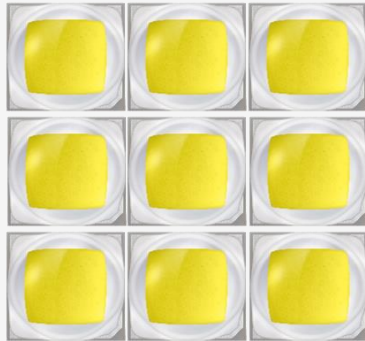


Small LES for Easier Lens Design

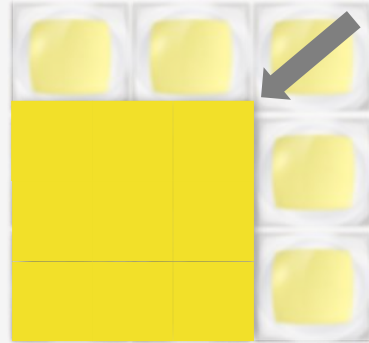
CSP delivers same performance in smaller area and helps design a narrow beam

Smaller Light Emitting Area

CSP reduces light-emitting area to 60% with equal performances compared to ceramic high power LEDs



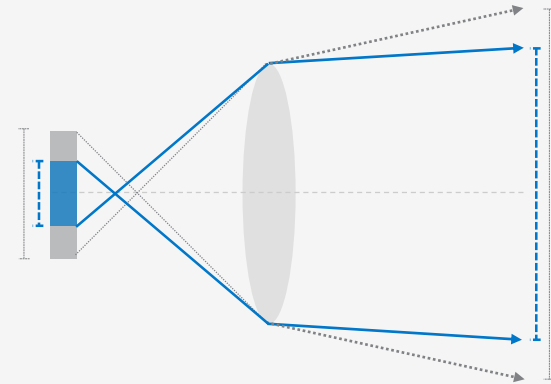
132 mm² (100%)



80 mm² (60%)

Easier Lens Design

Smaller light-emitting area makes better beam control to prevent glare or spill



Light-emitting area

Lens

Marginal ray

High CRI* and TLCI**

High power LEDs that meet CRI90+ and TLCI90+ improve the experiences of audiences for direct view at the venue and indirect watching through broadcasting



* Color Rendering Index

** Television Lighting Consistency Index

Samsung Sports Lighting Solutions

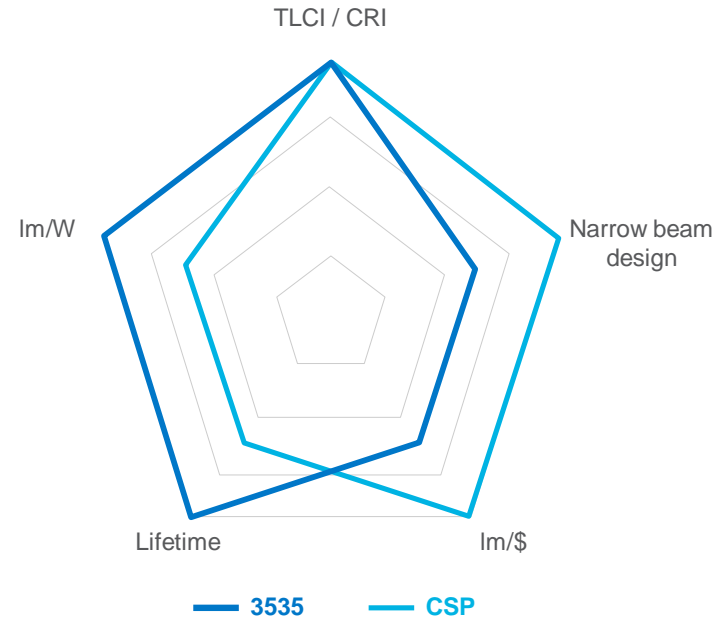
Samsung provides a selection according to various purpose of fixtures

3535

- High reliability for the stable fixtures
- Standard footprints for greater design flexibility

CSP

- Mainstream or entry grade fixture with high lm/\$
- Narrow beam design to prevent glare and spill

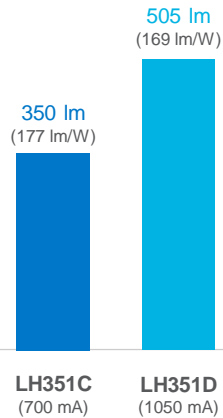


3535

Industry-leading Performance of Ceramic High Power LEDs

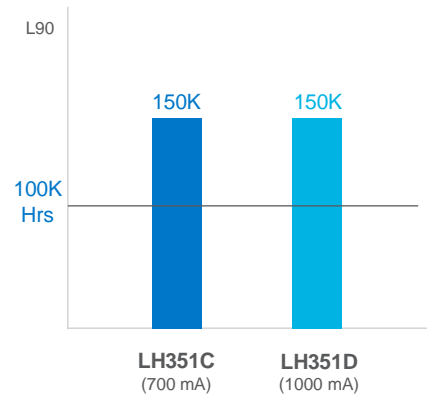
Ceramic high power LEDs deliver leading performance and highest reliability

Industry-leading Performance



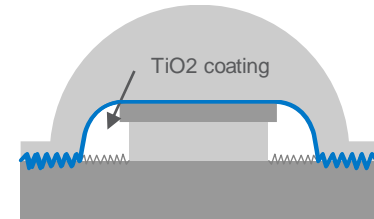
@ 4000K, CRI70+, 85°C

Long Lifetime



L90 > 100K Hrs

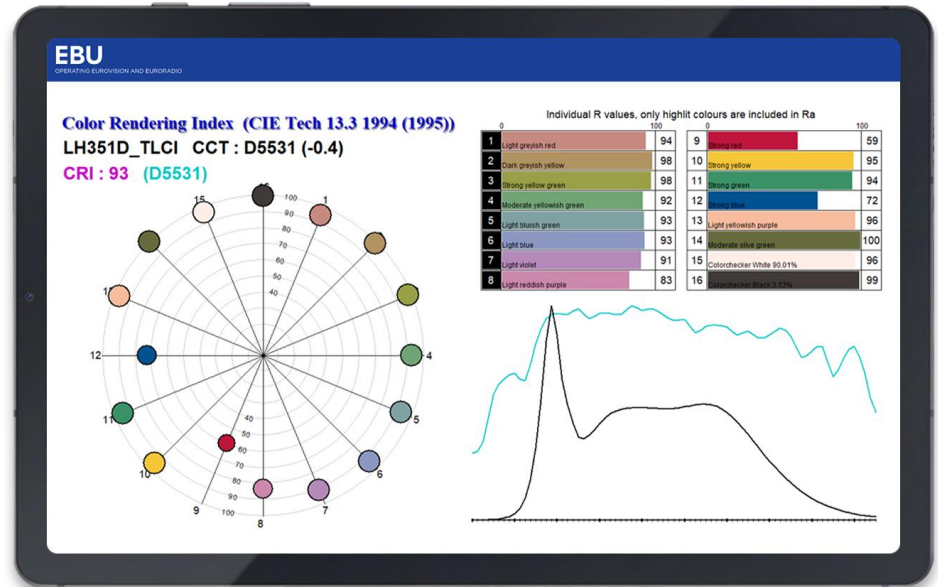
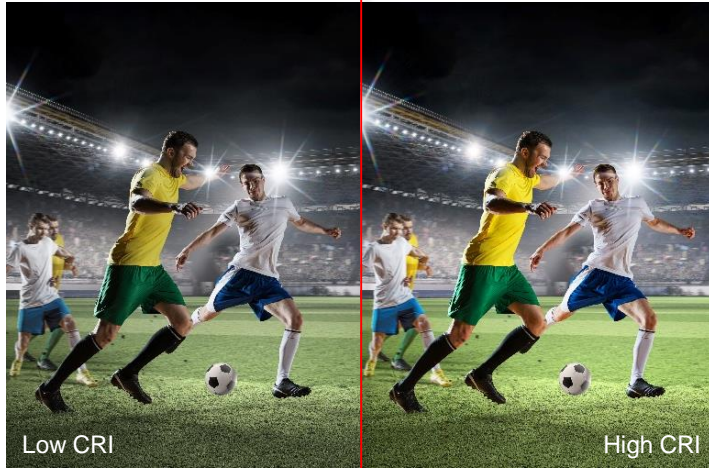
Superior Sulfur Resistance



TiO2 coating on silver plating

CRI of LH351D

CRI93 lighting at the stadium enhances the experiences of direct view of spectators



TLCI of LH351D

TLCI91 enables to realize natural color for broadcasting

TLCI Color Correction Activity by TLCI Index

85 – 100

Errors are so small that a colorist would not consider correcting them

75 – 85

A colorist would probably want to correct the color performance, but could easily get an acceptable result

50 – 75

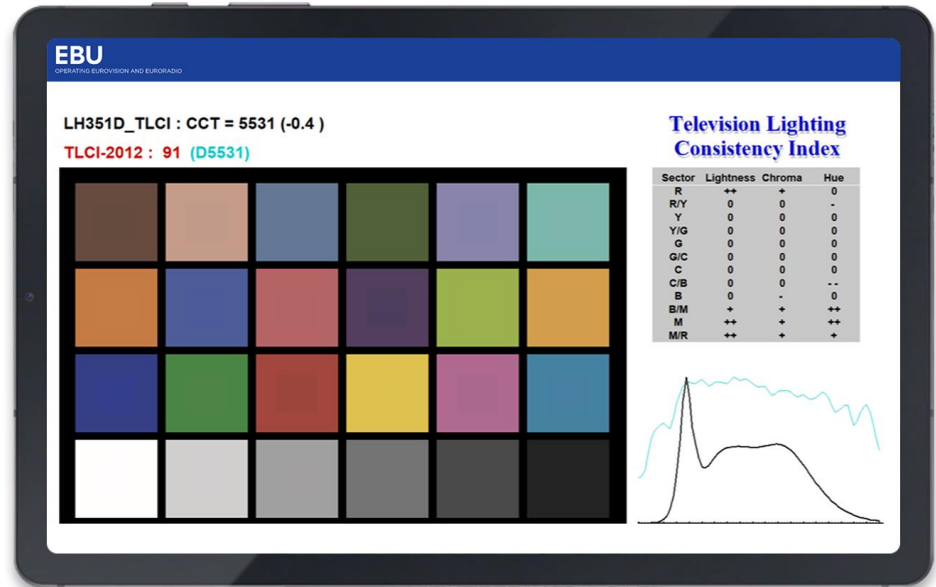
A colorist would certainly want to correct the errors, and could probably achieve an acceptable result, but it would take significant time to get there

25 – 50

The color rendering is poor, and a good colorist would be needed to improve it, but the results would not be to broadcast standard

0 - 25

The color rendering is bad, and a colorist would struggle for a long time to improve it, and even then the results may not be acceptable for broadcast



Ceramic High Power LH351C & LH351D

Specifications

	LH351C (@ 700mA)	LH351D (@ 1050mA)
Max Current (mA)	2,000	3,000
Operating Voltage (V)	2.82	2.83
Typ. Im	260	414
Im/W	132	139
Substrate	ALN	
TLCI	90+ (957)	



@ CRI90+, TLCI 90+, 5700K, 85°C

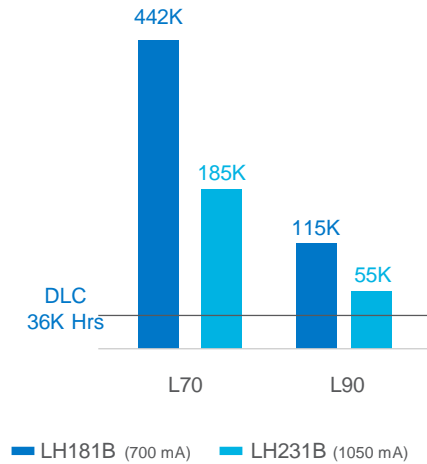
Same Footprint: 3.50mm x 3.50mm

CSP

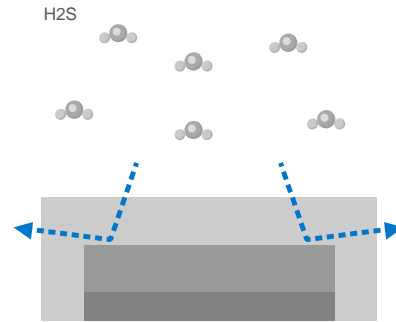
Industry-leading Performance of CSP LEDs

CSPs enable narrow angle design with smaller emission area than Ceramic HP

Long Lifetime

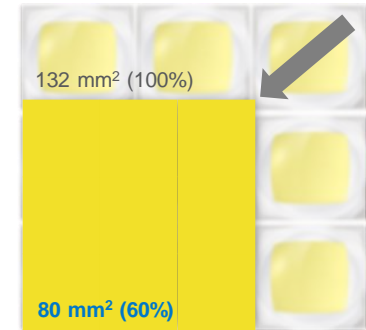


Superior Sulfur Resistance



No Ag plating material

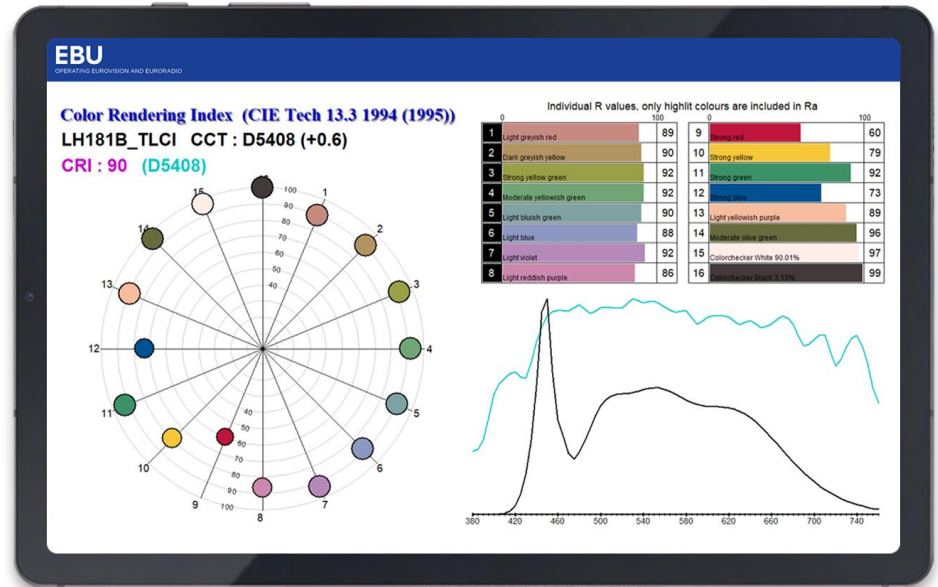
Design Flexibility



3535 vs. CSP

CRI of LH181B

Sports lighting with CRI90+ enhances the spectator experience at the stadium



TLCI of LH181B

TLCI94 enables to realize natural color for broadcasting

TLCI Color Correction Activity by TLCI Index

85 – 100

Errors are so small that a colorist would not consider correcting them

75 – 85

A colorist would probably want to correct the color performance, but could easily get an acceptable result

50 – 75

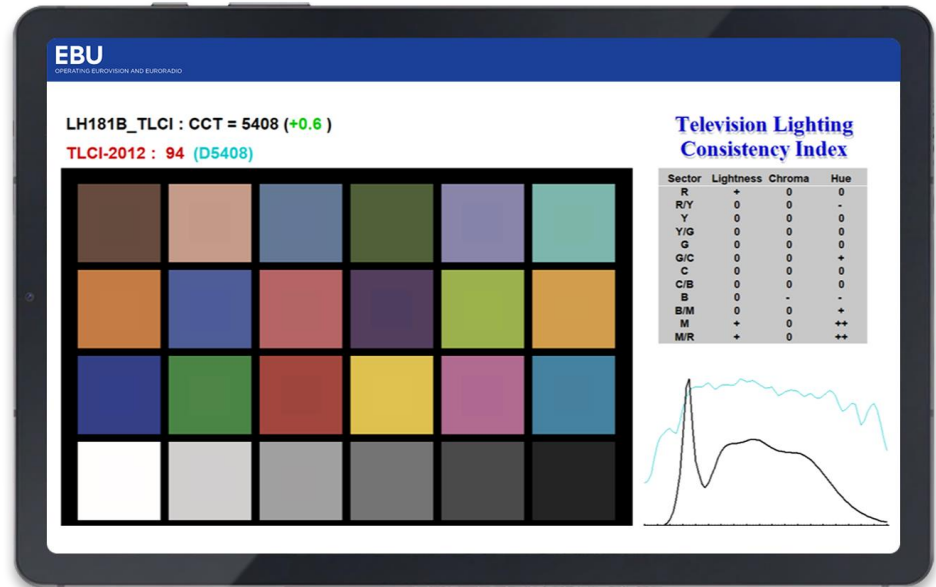
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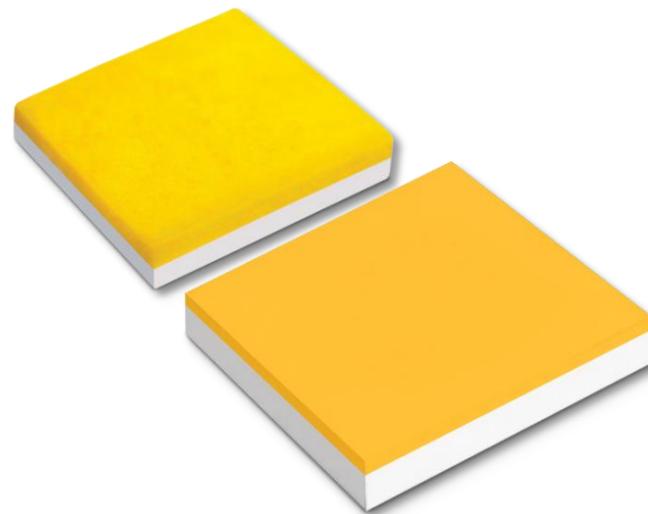
The color rendering is bad, and a colorist would struggle for a long time to improve it, and even then the results may not be acceptable for broadcast



CSP LH181B & LH231B

Specifications

	LH181B (@ 350mA)	LH231B (@ 700mA)
Max Current (mA)	1,400	2,000
Operating Voltage (V)	2.75	2.85
Typ. I_m	125	TBD
I_m/W	130	TBD
TLCI	90+ (957)	



@ CRI90+, TLCI 90+, 5700K, 85°C

Footprint: 2.36mmx 2.36mm

Footprint: 2.80mmx 2.80mm

Thank you