



JADE
SKY
TECHNOLOGIES

1551 McCarthy Blvd.
Suite 103
Milpitas, CA 95035
(408) 882-6404
www.jadeskytech.com

California Energy Commission

DOCKETED

14-BSTD-01

TN 73752

SEP 09 2014

To whom it may concern:

Founded in 2010 in Silicon Valley, Jade Sky Technologies (JST) is a clean technologies manufacturer of LED driver integrated circuits (ICs). Based in Milpitas, CA, Jade Sky specializes in driver designs that offer low cost, best-in-class LED dimming solutions. With a collective industry experience of 100+ years in semiconductors and systems, our engineering team delivers cost-effective technical advantages comprising system- and IC-level innovations, and thereby enables our customers to create products superior to those already in the marketplace. Our advisory board consists of seasoned veterans and Silicon Valley executives familiar with the consumer marketplace and semiconductor space. We appreciate the opportunity to submit comments on the current Title 20 and Title 24 efforts related to LED replacement lamp quality and performance.

Our Mission

Our mission is to take part in accelerating the consumer adoption of LED lighting. Our contribution includes developing high-performance, high-value, cost-effective IC solutions that enable lighting OEMs to deliver superior user experience and lower cost to end consumers. As such, we are extremely supportive of the California Energy Commission's 2012 Voluntary California Quality LED Lamp Specification. We have also reviewed the Title 20 proposal (Codes and Standards Enhancement (CASE) Initiative) submitted to CEC by Pacific Gas & Electric and San Diego Gas & Electric in 2013, and we support the mandatory proposals contained therein for improved LED quality, improved dimming performance, and reduced flicker operation through California code for directional, decorative, and omni-directional LED lamps.¹ We have also reviewed the Title 24 Residential Lighting proposal submitted by the CA utilities in July 2014 and we support the proposed requirements that emphasize high quality, high efficacy lighting in residential new construction. We agree that improved performance will lead to greater consumer acceptance and faster market adoption of energy saving technology.

Over the past several decades, the lighting industry has invested heavily in CFLs in the hopes of increasing efficiency in the lighting sector. However, many lighting manufacturers took the position that consumers valued cost and efficiency enough to sacrifice usability. With CFLs penetrating only 20% of lighting, clearly this assumption has not held. User experience matters.

With LEDs, the next era of modern lighting is dawning. Consumers are, regrettably, facing the same bad experiences-- bulbs that flicker, strobe, refuse to light or turn off, or die early when installed into existing circuits with dimmers or other controls. Lighting control is critically important in supporting consumer acceptance. Light level sets our mood or helps us to work

¹ http://www.energy.ca.gov/appliances/2013rulemaking/documents/proposals/12-AAER-2B_Lighting/Pg_and_E_and_SDG_and_Es_Responses_to_the_Invitation_for_Standards_Proposals_for_LED_Quality_Lamps_2013-07-29_TN-71758.pdf

effectively, and being able to set appropriate light levels keeps power bills and energy use at sustainable levels. We must not repeat the poor user experience of CFLs.

Jade Sky Technologies has solutions for these problems with high efficiency driver circuits that can dim smoothly from 0-100%, while keeping cost and size below previous generation designs. Power factors near unity convince control circuits that they're still driving hot tungsten while helping to ensure that efficiency gains are shared all the way back to the power plant.

Recent Work

JST collaborated with UC Davis's California Lighting Technology Center (CLTC) on a project designed to further the development of replacement lamps that meet or exceed the California Quality specification. The project, supported by Pacific Gas and Electric Company (PG&E), tested the compatibility of "best-in-class" lamps with dimmers found in most homes. JST incorporated its innovative driver architecture into commercially available lamps and then submitted the lamps to CLTC for evaluation. Lab testing and characterization at CLTC confirmed that the samples met or exceeded the California Quality specification, using cost-effective and easily accessible components.

In May 2014, Jade Sky Technologies announced² the recently completed demonstration of the technical and economic feasibility of meeting the flicker and dimming requirements set by the Voluntary California Quality LED Lamp Specification.

In addition to validating efficacy and CRI targets, test data shows the lamps submitted by JST were able to maintain a photometric flicker well below the level in the Title 20 LED lamp proposal submitted to CEC in 2013 by PG&E and SDG&E, over a dimming range of 0 to 100 percent light output. The lamps also measured above the minimum standard power factor over the entire dimming range used for testing. Perhaps most noteworthy of all for lamp and luminaire manufacturers, both the omni-directional and directional lamps tested for the project exhibited smooth dimming on all seven dimmers used for testing, with no flashing, flickering, pop on, cycling or other undesirable behaviors.

JST's integrated driver solution enables smooth dimming from 100 to 0 percent when paired with a sample set of commercially available dimmers and occupancy sensors. Leveraging the benefits of standard complementary metal-oxide semiconductor (CMOS) technology, JST's driver ICs enable simple, cost-effective solutions that maintain the highest levels of efficiency and power factor.

We are delighted that our technology has been validated as one cornerstone enabling best-in-class LED lighting, not just in a laboratory but also with the potential to spread across the globe. Only by focusing on what end consumers want in their lighting and offering them high-value products will lighting manufacturers be able to put forth a means to achieve global energy savings. We passionately believe that energy-efficient lighting can be made simple and economical for the user. Then meaningful energy savings will be achieved worldwide, benefitting us all.

² <http://jadeskytech.com/home/attachments/article/46/Flicker%20Free%20Press%20Release%20%28update-small%29.pdf>

Specific Recommendations

We recommend that California adopt mandatory requirements that LED replacement lamps offer smooth dimming from 100-5%. We also support the following requirements around performance throughout the dimmed range. These include:

- Reduced flicker operation (less than 30% amplitude modulation at frequencies less than 200Hz) throughout the dimmed range
- Proper operation with digital dimmers and occupancy sensors, including no light output when dimmers are in standby state
- High power factor (>0.90) throughout the dimmed range
- No audible noise (less than 24dBs) throughout the dimmed range
- Lamps should be compatible with NEMA's SSL7A specification

Next Steps

We look forward to working with the California Energy Commission as it continues to develop these standards proposals. We may have additional information that would be helpful to the Commission, and would be happy to meet in person to discuss. If we can provide test data, or additional technical information about our products, their design features, we would like to do so. We take pride in our low cost, quality dimming solutions and see no reason why LED manufacturing should not be required to utilize the available technology to ensure consumer acceptance.

Additionally, we would welcome the opportunity to provide a demonstration to the CEC (either at our lab in Milpitas or elsewhere) to demonstrate the performance offered by JST IC designs, compared to other available technology. This may be helpful for the Commission in understanding the difference between products that offer smooth dimming vs. those that do not (or those that offer true noise-free, flicker-free dimming vs. those that do not). Please contact us at your convenience if you would like to discuss further.

Thank you again for this opportunity to provide comment, and we look forward to future collaboration.

Sincerely,



Rebecca Liao
CFO
Jade Sky Technologies, Inc.
Rebecca.liao@jadeskytech.com