

## Rogers, Daniel

---

**From:** KC Fletcher <kc.fletcher@csagroup.org>  
**Sent:** Thursday, November 17, 2016 4:55 PM  
**To:** ENERGY STAR Lighting  
**Subject:** Comments – ENERGY STAR Requirements for the Use of LM-80 Data

A team of engineers at CSA group has evaluated the draft of *ENERGY STAR® Requirements for the Use of LM-80 Data*, October 21, 2016. This is their response.

### 3.2.i

1. It is not clear if Ra & R9 or SPD has to be reported at each interval or just the 0hr measurement.  
**--Recommend clarifying this requirement.--**
2. It is not clear if Ra & R9 or SPD reporting is for the average of the sample set (or subset) or if it must be separately reported for each sample.
  - a. If it is an average of the samples in a test group, then clarification is needed as to how this calculation is performed for reporting of SPD. For example, SPD is often normalized to maximum or to spectral power at 555nm (ie, peak of photopic response). Should the reported average SPD be the normalization of the average or the average of the normalized spectra? These results will differ.
  - b. If SPD is reported for every sample at every interval, then LM-80 report file size will easily be too large to send via email or reasonably printed to paper.

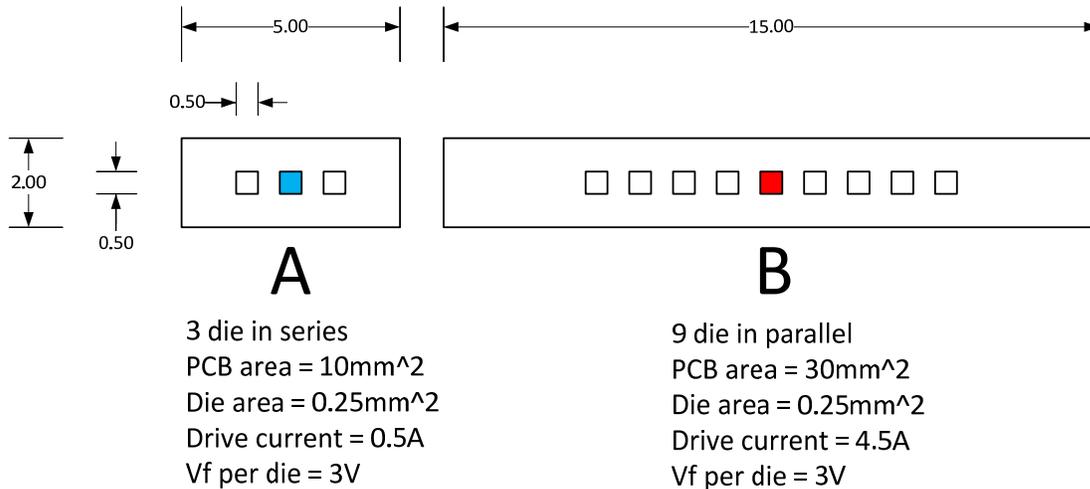
**--Recommend clarifying this requirement.--**

### 3.7.b

1. A third party test lab is not always provided with enough information from the manufacturer to calculate average current per die (e.g., die quantities, series/parallel circuit diagrams, etc.).  
**--Recommend removing this item from LM-80 test report requirements and placing the burden of proof on the manufacturer.--**

### 3.7.c

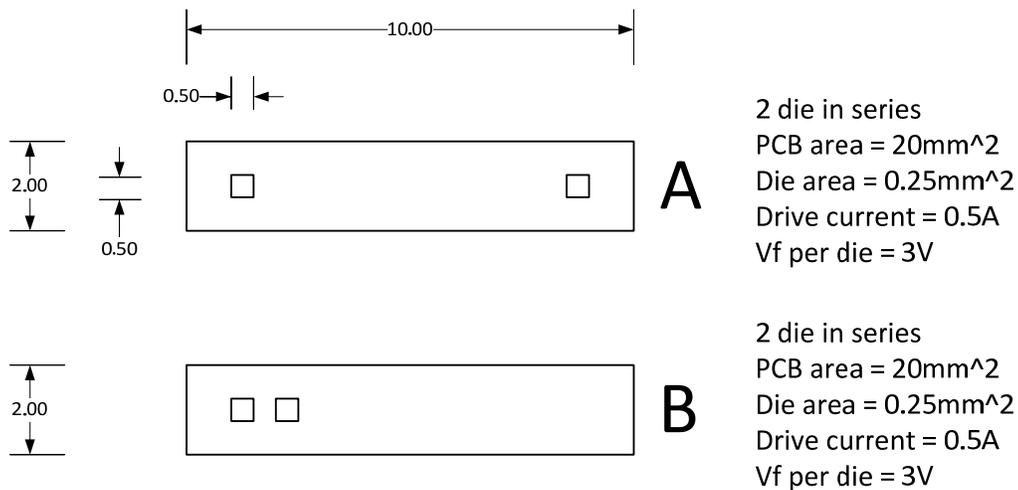
1. Removal of the testing requirements for the “largest LED array” is questionable. In the example below, parts A & B have identical average current density per die and the same power density per PCB or substrate. The proposed draft would allow part B to be represented by test data from part A. However, the die shown in blue on part A would receive thermal contribution of only two adjacent dies while the die shown in red on part B would have several dies thermally contributing to it and would result in a higher operating temperature and more rapid degradation. It would be careless to claim that the performance of part B could be represented by test results of part A.



**--Recommend reinstating the requirement to test the largest LED array.--**

- The removal of die spacing requirements is questionable. Even with the same current density per die and the same power density per PCB or substrate, if the dies are closer together, then the individual dies will operate at a higher temperature.

In the example below, the test results of part A could be used to characterize part B (identical average current density and power density) even though the dies in part B would clearly degrade faster than those in part A. It would be careless to claim that the performance of part B could be represented by test results of part A.



**--Recommend reinstating the die spacing requirement.--**

- Removal of die quantity requirement is questionable. While the argument in Note box 7.4 is reasonable, removing the requirement completely would allow a 10-die part to be represented by test data from a 5-die part, even if die size is not changed. In this case, there would not be improvements to the electrical and thermal performance. Recommend reinstating the requirement but qualifying it with a die size reduction requirement.

**--Recommend reinstating the die quantity requirement.--**

If any of these items are not clear, I would be happy to discuss further by phone or email.

Cheers,  
 KC Fletcher  
 LM-80 Program Manager

**CSA Group / Orb Optronix**

14833 NE 87<sup>th</sup> St

Redmond, WA 98052

**Phone:** 425-605-8500 x 234

**e-mail:** [kc.fletcher@csagroup.org](mailto:kc.fletcher@csagroup.org)

**Website:** [www.csagroupseattle.org](http://www.csagroupseattle.org) / [www.csagroup.org](http://www.csagroup.org)

This email message may contain confidential and proprietary information. Any unauthorized use is prohibited.

If you are not the intended recipient, please contact the sender by reply email and destroy all copies of the original message.

