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# Luminous Intensity Degradation Data for Emerald Green LEDs (560 nm) vs. Degradation Data for Standard Green LEDs (569 nm)

## Application Note 1061

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### Summary:

During product development of Emerald Green LEDs, Hewlett-Packard has noticed that this product family exhibits a larger standard deviation in luminous intensity degradation in two of our standard operating life tests as compared to our Standard Green product family. Our tests have indicated that this phenomenon is not unique to Hewlett Packard Emerald Green products, but is material related and exists to some degree in all Emerald Green LEDs based on this material system. Therefore, it is advisable to factor in this phenomenon in your designs where multiple illuminations are placed at near proximity and luminous intensity matching is desirable.

This application note reports on luminous intensity,  $I_v$ , degradation differences between Emerald Green and Standard Green LED lamp devices. This qualification test data for Emerald Green is compared to Standard Green LED reliability test data for the operating life tests outlined below. Of the tests conducted, these two tests revealed a larger standard deviation for  $I_v$  degradation as compared to our Standard Green LED products.

For the High Temperature Operating Life, HTOL, test data, the average percentage luminous intensity degradation for Emerald Green does not look much different than for Standard Green after 1000 hours of stress; -28.4% and -20.1% respectively (ss = 100).

The significance in the data is in the standard deviations. The Emerald Green LED data show a larger data spread within a single sample. For example, after 1000 hours HTOL the Emerald Green data has a standard deviation of 16.2, while the standard green data has a standard deviation of 3.8.

The same trend continues for the Room Temperature Operating Life, RTOL, test data. Again, the average percentage luminous intensity degradation for Emerald Green does not look much different than for Standard Green after 1000 hours of stress; -24.5% and -16.2% respectively (ss = 100). The standard deviations ranged from 12.2 to 3.1 respectively for the Emerald Green and Standard Green.

<b>High Temperature Operating Life Luminous Intensity Degradation</b>		
	<b>Mean</b>	<b>Standard Deviation</b>
Standard Green	-20.1%	3.8
Emerald Green	-28.4%	16.2

**Test 1:** High Temperature Operating Life (HTOL) Conditions:  
+55°C, I = 30 mA DC, I<sub>v</sub> tested @ 20 mA, ss = 100

<b>Room Temperature Operating Life Luminous Intensity Degradation</b>		
	<b>Mean</b>	<b>Standard Deviation</b>
Standard Green	-16.2%	3.1
Emerald Green	-24.5%	12.2

**Test 2:** Room Temperature Operating Life (RTOL) Conditions:  
+25°C, I = 30 mA DC, I<sub>v</sub> tested @ 20 mA, ss = 100

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Data subject to change.

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