



1. The objective of this Excel file is to calculate the gamut area index (GAI) of light sources used in general illumination. GAI results for the same light source may vary slightly depending on the wavelength range and sampling interval of spectral data. This is due to the inherent uncertainty of approximating the definite integral calculations with trapezoidal area sums (i.e., the trapezoid method for definite integrals is used for calculations) and incomplete spectral coverage when the wavelength range is less than 360 to 830 nm. For spectral data having a wavelength range covering at least 400 to 700 nm, and sampled at a wavelength interval of 10 nm or smaller, the variation of GAI is on the order of 0.5 unit when different spectral ranges and intervals are used.
2. The input to the calculator is the spectral power distribution (SPD) of the unit under test (UUT). The SPD can be in relative or absolute form. The SPD can be in any typical wavelength range and interval, for example 360-830 nm in 1 nm increments, 380-780 nm in 1 nm increments, and so on. The interpolation accuracy is significantly compromised when the wavelength interval is more than 10 nm. The program also accepts non-uniform wavelength intervals.
3. To run a calculation, paste the light source SPD into columns A and B of the UUT sheet starting on row 2. The light source ID can be entered in cell B1 but is not necessary.
4. When reusing the calculator, make sure that columns A and B are empty of values to avoid pasting new data that may contain fewer rows than a previously loaded SPD.
5. As part of the calculation, the CIE 1931 xy chromaticity values of the light source are provided and plotted. This program does not calculate the general color rendering index (CRI (Ra)). If known, enter the CRI (Ra) value in cell U38 of the UUT sheet. The CRI (Ra) vs. GAI plot will be updated to show the position of the UUT in that space.
6. This program has only been tested in Excel 2010. The Lighting Research Center and ASSIST provide this tool for informational purposes and are not responsible for any miscalculation or misuse.
7. For more information about GAI and light source color rendering, visit the following references:
 - a. ASSIST. 2010. *ASSIST recommends: Guide to Light and Color in Retail Merchandising*. Vol. 8, Iss. 1. Troy, NY: Lighting Research Center.
<http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/AR-ColorGuideforRetailLighting-March2010.pdf>
 - b. ASSIST. 2010. *ASSIST recommends: Recommendations for Specifying Color Properties of Light Sources for Retail Merchandising*. Vol. 8, Iss. 2. Troy, NY: Lighting Research Center.
<http://www.lrc.rpi.edu/programs/solidstate/assist/pdf/AR-SpecifyColorRec-March2010.pdf>
 - c. Rea, M. S. 2013. *Value metrics for better lighting*. SPIE Press.
<http://spie.org/Publications/Book/1000979>