



## ENERGY STAR<sup>®</sup> TM-21 Calculator

**Note: Users should download a new copy of this calculator for each use, to ensure use of the most up-to-date version of the calculator. Users are encouraged to bookmark the hyperlink to this calculator. Project-specific copies complete with calculations may be saved on a local drive.**

This calculator is based on the Illuminating Engineering Society's TM-21-11: *Projecting Long Term Lumen Maintenance of LED Light Sources* and *Addendum A for TM-21-11: Projecting Long Term Lumen Maintenance of LED Packages*. Calculator results have been reviewed by the U.S. National Institute of Standards and Technology (NIST). Calculations are locked; only data entry cells may be modified.

Calculator inputs are entered on the second tab, with instructions. The calculator may be used with one, two or three case temperatures. Inputting values on the second tab generates a complete TM-21 report on the Report tab.

For calculating data with different test period lengths, use data from the time period equal to the shortest time period for all temperatures.

Questions may be directed to [lighting@energystar.gov](mailto:lighting@energystar.gov)



Calculations:

3

Minimum Case Temperature ( $T_{s,1}$ ) for Extrapolation (K):	328.15
$\alpha_1$	0.0000
$B_1$	0.9976
Maximum Case Temperature ( $T_{s,2}$ ) for Extrapolation (K):	N/A
$\alpha_2$	N/A
$B_2$	N/A
$E_a/k_b$	
$k_b$ (eV/K)	8.6173E-05
$E_a$ (eV)	
A	
$B_0$	0.9976
In Situ Case Temperature ( $T_{s,i}$ ) (K):	321.33
$\alpha_i$	0.0000
Reported L80 (hrs):	>102000

Table 1: Report at each LM-80 Test Condition					
Case Temperature 1		Case Temperature 2		Case Temperature 3	
Temperature (°C):	55	Temperature (°C):	85	Temperature (°C):	105
Temperature (°K):	328.15	Temperature (°K):	358.15	Temperature (°K):	378.15
$\alpha$ :	9.19E-07	$\alpha$ :	9.44E-07	$\alpha$ :	1.74E-06
B:	1.00	B:	1.00	B:	1.00
Reported L80 (hrs):	>102000	Reported L80 (hrs):	>102000	Reported L80 (hrs):	>102000

Table 2: Report for Interpolation (based on in-situ temperature)

$T_{s,1}$ (°C)	55.00
$T_{s,1}$ (K)	328.15
$\alpha_1$	9.1922E-07
$B_1$	0.9976
$T_{s,2}$ (°C)	
$T_{s,2}$ (K)	N/A
$\alpha_2$	N/A
$B_2$	N/A
$E_a/k_b$	
A	
$B_0$	0.9976
$T_{s,i}$ (°C)	48.18
$T_{s,i}$ (K)	321.33
$\alpha_i$	9.1922E-07



# TM-21 Report

**Table 1: Report at each LM-80 Test Condition**

Description of LED Light Source Tested (manufacturer, model, catalog number)		RALED I PLUS 32 LED 58W (Se evalua en ta de 25°C) UHE Y DA-UHE LM-80-15 OSCONIQ S 5050 GTG REPORT ANSI/IES LM-80-20 800mA 17000H Test Report.N01A240811172L00101, COD. LAB: 26-0298, Corriente Driver:635.4mA, Cada Modulo:317.7mA, Corriente LED:158.85mA					
Test Condition 1 - 55°C Case Temp		Test Condition 2 - 85°C Case Temp		Test Condition 3 - 105°C Case Temp			
Sample size	25	Sample size	25	Sample size	25		
Number of failures	0	Number of failures	0	Number of failures	0		
DUT drive current used in the test (mA)	800	DUT drive current used in the test (mA)	800	DUT drive current used in the test (mA)	800		
Test duration (hours)	17,000	Test duration (hours)	17,000	Test duration (hours)	17,000		
Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000	Test duration used for projection (hour to hour)	8,000 - 17,000		
Tested case temperature (°C)	55	Tested case temperature (°C)	85	Tested case temperature (°C)	105		
$\alpha$	9.192E-07	$\alpha$	9.437E-07	$\alpha$	1.739E-06		
B	0.998	B	0.995	B	0.998		
Reported L80(17k) (hours)	>102000	Reported L80(17k) (hours)	>102000	Reported L80(17k) (hours)	>102000		

**Table 2: Interpolation Report  
(projection based on *in-situ* temperature entered)**

$T_{s,1}$ (°C)	55.00
$T_{s,1}$ (K)	328.15
$\alpha_1$	9.192E-07
$B_1$	0.998
$T_{s,2}$ (°C)	-
$T_{s,2}$ (K)	-
$\alpha_2$	-
$B_2$	-
$E_g/k_b$	-
A	-
$B_0$	0.998
$T_{s,i}$ (°C)	48.18
$T_{s,i}$ (K)	321.33
$\alpha_i$	9.192E-07
Reported L80(17k) at 48.18°C (hours)	>102000

Report Generated By: Diego Armando Palacios	Notes: Lumen maintenance is above 80% @100000 prediction (=90.99%) B10 de acuerdo con la ficha técnica del módulo Fortimo Fast Flex 2x8 DA-UHE (adjunta).
Company: Roy Alpha	
Date:2026/05/28	