

## OptoElectronix LED Light Engine Product Test Protocol

OptoElectronix™ LED lighting products undergo rigorous testing to ensure optimum quality. These reliability tests place the products into situations that greatly exceed what they will normally see over their lifetime. These tests are based on industry standards as defined by DOE/Energy Star, IEC, the U.S. Defense Department, and Underwriters Laboratories, as well as tests defined by OptoElectronix.

#	Test Criteria	Specification	Industry Association or Regulatory Agency	AC >48volts	AC/DC <48volts
1	Optical Performance				
2	CRI	LM79	DOE / Energy Star	✓	✓
3	Radiation Pattern	LM79	DOE / Energy Star	✓	✓
4	IES File	LM79	DOE / Energy Star	✓	✓
5	Product Quality				
6	Line Transient	IEC 61000-4-5, IEC 801-5	IEC	✓	
7	Electrostatic Discharge (ESD)	IEC801-2	IEC	✓	
8	Operating Temperature	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
9	Mechanical Shock	MIL-883	U.S. Defense Department	✓	✓
10	Vibration Test	MIL-883	U.S. Defense Department	✓	✓
11	Electrical Characterization	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
12	Product Life / Reliability				
13	UV Exposure	ASTM D4329	ASTM International	✓	✓
14	Ingress (product specific)	IEC 60529	IEC	✓	✓
15	3,000-hour test (HALT)	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
16	168-hour test (SHALT)	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
17	HAST Power Cycling	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
18	IR Thermal Analysis Imaging	OptoElectronix Spec.	OptoElectronix Internal Qualification	✓	✓
19	Regulatory Agency				
20	Mechanical construction, electrical integrity, safety, and performance	UL8750	Underwriters Laboratories (UL)	✓	✓
21	EMI Susceptibility	IEC-801-3/4		✓	
22	Radiated/Conducted Noise (USA)	CFR47 15.109	Federal Communications Commission	✓	
23	Radiated/Conducted Noise (Europe)	CISPR 15	IEC	✓	
24	Powerline Harmonics (USA)	IEEE-std-519:1992	IEEE	✓	
25	Powerline Harmonics (Europe)	EN 61000-3-2		✓	
26	Materials Safety & Construction	NSF Specification	National Sanitation Foundation	Optional	Optional

OptoElectronix is the leader in *The Art of LEDs* — the conception, design, and manufacture of cutting-edge, standard, highly efficient LED-based lighting.