

Verbatim LED Lighting

Innovating the future of light



 **Verbatim**[®]
Technology you can trust

The light bulb was just the beginning...

40 years of technology innovation and 60 years of lighting development combine to create lighting solutions that expand beyond the bulb.

For over 40 years, the Verbatim brand has been recognized for its dominant role in the consumer electronics industry. We have a strong reputation for performance, compatibility and quality, which has led the Verbatim brand to global market leadership. Backed by the technology developed by our parent company – Mitsubishi Chemical Holdings Company (MCHC), we've set new standards in digital storage.

Again, Verbatim is taking advantage of our relationship with MCHC by setting new standards in the technology industry.

MCHC has been developing lighting solutions and materials for over 60 years. By combining Verbatim's passion for technology and MCHC's lighting expertise, we've developed new lighting innovations that expand far beyond the bulb in LED and OLED lighting technology.



Our growing lighting portfolio is designed to enhance the quality and experience of light while reducing lighting's impact on our environment. Our LED product line includes a range of energy efficient LED retrofit lamps, color tunable OLED panels, high color rendering (CRI) LED components and solutions, and phosphor materials that make warm white light from LED chips possible.

KAITEKI

Traditionally meaning, "comfort" or "ease" in Japanese, "KAITEKI" is our motto to represent a global quality of life that will be made possible through sustainable technologies.

Sustainability, health and comfort are the key elements of the KAITEKI concept: Verbatim's LED-based solutions help to achieve all three. When considering the sustainability of LEDs, in addition to their low energy use, they also offer benefits in terms of waste reduction, recyclability, the use of materials and resources and the effect on building and design practices. LEDs are mercury-free and last longer, which means less frequent replacement and therefore reduced waste.

Sustainability

Sustainability is becoming more important to consumers' purchasing decisions every day and LED lamps are a great option for several reasons. LED lighting has very low energy consumption, requiring significantly less energy than compact florescent (CFL) and incandescent bulbs. LED bulbs also have a much longer life than CFL and incandescent lights. This means less frequent replacement, which creates less waste. Finally, LEDs also contain no mercury, so they can be recycled.

Health

Lighting is a key element of good health, with LED lighting making a significant contribution. Color temperature also plays an important role in circadian rhythms. In nature, the temperature of light changes throughout the day – going from 3000K (warm white) in the early morning, 5000K – 10000K (cool white) in midday and cycling back to 3000K in the evening. The body is accustomed to this color variation, reacting with varying levels of energy for that time of day. The ability to influence moods throughout the day with lighting, creating the desired environment, is a key element in establishing a comfortable lifestyle and maintaining synergy with our natural circadian rhythms.

Comfort

Light plays an important role in our lives – it influences emotions by creating a mood. Verbatim's Violet Chip LED lighting creates a wide variety of comfortable atmospheres – from warm and inviting when it is cold and raining outside to cool and pleasant on a hot summer's day. Whether at home, work or in a store, lighting influences our choice of activities, productivity and purchasing habits. With a range of products in different color temperatures, one can create the perfect visual atmosphere.



Daily variation in color temperature of light

Verbatim Retrofit Lamps

Verbatim LED retrofit lamps are designed as high-quality, energy-efficient replacements for incandescent and halogen lamps. Ideal for commercial and residential applications, Verbatim retrofit lamps provide clear, uniform light distributions that are fully dimmable. Verbatim LED bulbs can reduce energy consumption by over 70% without diminishing light quality. With long lifetimes up to 40,000 hrs, significant cost savings are easily achievable.



Verbatim retrofit LED lamps are available in popular sizes and color temperatures to duplicate the experience of traditional lamps. Our product line is constantly growing, including additions of outdoor wet-rated and lamps that have earned the ENERGY STAR®.

Verbatim retrofit LED lamps:

- Reduce energy consumption by over 70% when compared to traditional and incandescent lamps
- Drastically reduce maintenance costs with up to 40,000 hours design lifetime
- Protect illuminated objects from radiated heat with cool beam
- Environmentally-friendly products with no mercury or other hazardous materials and ROHS compliant
- UL listed, CE approved
- Have up to a 5-year warranty

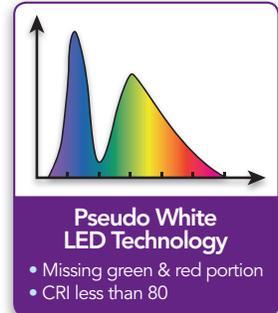
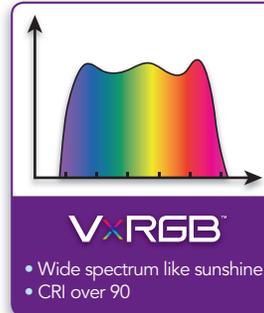
Backed by Mitsubishi quality control and industry leading warranties, Verbatim's retrofit product line is *Technology You Can Trust.*



VxRGB™ Violet Chip Technology

MCC is developing key materials and components which work together to replicate natural light and provide additional solutions for lighting control. This new generation of VxRGB products use violet excited LED chips in combination with red, blue, and green phosphors and other MCC materials to enable high quality, comfortable lighting environments. Available in modules and custom lighting solutions, Verbatim violet chip products provide all of the energy saving advantages of traditional LED lighting, plus:

- High color rendering index (greater than 90 CRI)
- White color tunability at constant output flux
- Easily controllable systems that offer high comfort and enhanced color appearance



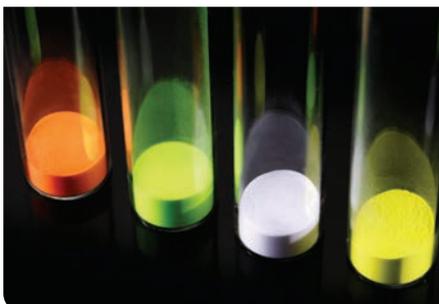
VxRGB Technology VS. Conventional LED Technology



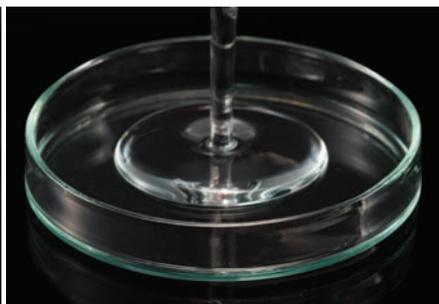
Color Tunable VxRGB Lighting

Allows you to utilize the same lighting fixture to create cool white in the daytime for a task-oriented environment, and then changing to warm light in the evening to create a relaxing mood; or using tunable, high-quality lights in a department store dressing room or makeup counter to simulate your appearance in the daytime versus nighttime.

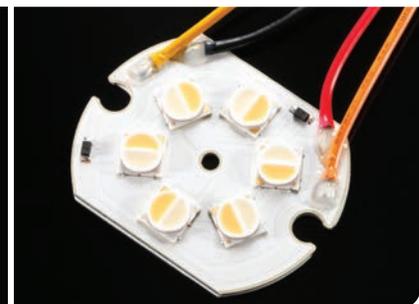
Phosphors



Encapsulant



Tunable Module

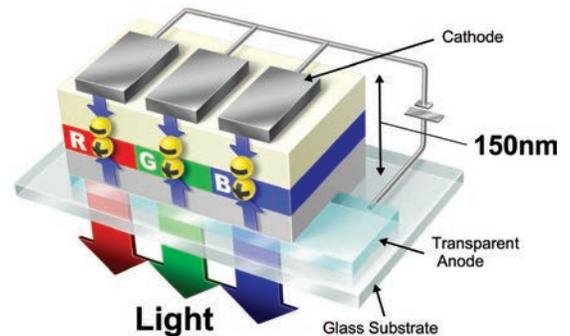


VELVE™ OLED Lighting

OLEDs (Organic Light Emitting Diodes) promise a paradigm shift in lighting design that will have designers, planners and architects glowing with excitement. OLED devices make it possible to achieve unique creative lighting by taking advantage of the nearly imperceptible surface of the light source, thinness, shape and transparency. OLED lighting contains no hazardous materials and use even less power than LEDs.

OLED is a solid-state semiconductor device composed of ultra-thin films of organic molecules that create light. MCC has developed unique materials and processes to manufacture large (5.5"sq) color OLED lighting panels we call "VELVE." Verbatim VELVE OLED panels convey a sense of rich, yet soft and deep lighting. MCC's color OLED technology gives VELVE OLED panels additional features for light designers to create comfortable living spaces:

- White color tunable from 2700K to 6500K
- RGB color tunable
- High CRI and R9 component (greater than 80)
- 100% dimming at any color
- Soft, luxurious appearance
- Large panel size – 14 x 14 cm



Verbatim LED Environmental Impact

While the KAITEKI Philosophy drives the development of technologies that make up our line of LED products, Verbatim and MCHC believe that we have a responsibility to preserve environmental resources for generations to come. Our new LED technologies make great strides in fulfilling that goal.

LED lamps allow for great reductions in power consumption (up to 80%), along with reduced CO2 emissions, when compared to equivalent incandescent bulbs. Also, the longer life cycle of 40,000 hours, compared to 8,000 for CFL and 1,000 for incandescent lights, creates less need for replacement, effectively meaning less waste. Finally, LEDs contain no mercury, making them recyclable.

All of these factors combine to create energy-efficient and cost-saving lighting options that leave little or no negative environmental impact.

Comparison based on 40,000 hours lamp use	Incandescent 40W Lamp	Verbatim 9W Lamp	
Average life of bulb	1,000 hours	40,000 hours	
Power consumption	1,600 kWh	360 kWh	
Cost of power consumption (\$0.11/kWh)	\$176	\$40	
Purchase cost	\$28 (\$0.70/lamp)	\$25	
Maintenance cost (\$2/lamp)	\$80	\$2	
CO2 emissions	2,144 lbs	482 lbs	
Total cost (based on 40,000 hours lamp use)	\$284	\$72	

Materials

Phosphor materials play a key role in converting blue LED light to natural white light that humans can enjoy. An industry leader, MCC has been developing and manufacturing fluorescent phosphors for over 40 years. Focused on the lighting industry, Verbatim is selling a variety of high quality, efficient MCC red, yellow, and green phosphors to LED device manufacturers.



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