

Product Information

PMA-Lite™ LED Photolysis Device

Catalog Number: E90002

Specifications

Dimensions (WxDxH)	8.25 x 6.25 x 2.625 in. (21 x 15.9 x 6.7 cm)
Weight	3 lb. 10.7 oz. (1.66 kg)
Frequency Range	50~60 Hz
Power Range	100~240 VAC
Maximum Power	60 W
LED Output Wavelength	465-475 nm

Product Description

PMA-Lite™ LED Photolysis Device is specifically designed for photoactivation of propidium monoazide (PMA), PMAxx™, EMA and other photoreactive dyes. It can also function as a general photolysis device to provide continuous illumination to 1.5-2 mL vials in a controlled manner. The device can hold up to 18 vials. Multiple LED lights are positioned to provide uniform and maximal illumination to all vials. An internal fan is used to reduce the heat generated from the lights to ensure near room temperature photolysis. The device has a timer that can be set for 10, 15, 20 or 30 minutes of continuous photolysis.

Features:

- Capable of providing uniform and maximal illumination to 18 X 1.5-2 mL vials.
- Internal fan to ensure a temperature of < 37°C.
- Four timer settings for 10, 15, 20 or 30 minutes of continuous illumination.
- Long-lasting LED lights with 465-475 nm emission for efficient activation of PMAxx™, PMA, EMA or other similar azido dyes.
- Unit has 120/240 V internal converter and is provided with a universal outlet adaptor for customers outside of North America.



Figure 1. PMA-Lite™ LED Photolysis Device.

Application Notes

Viability PCR (v-PCR) is a powerful technology for the sensitive and rapid detection of viable microorganisms. Unlike time-consuming culturing methods, qPCR is a fast and sensitive method of detection. However, normal PCR does not distinguish between live and dead cells. With v-PCR using PMAxx™, PMA, or EMA, you get the speed, sensitivity and specificity of PCR, plus quantifiable viability.

PMAxx™ and PMA are photoreactive dyes with high affinity for DNA. The dyes intercalate into dsDNA and form a covalent linkage upon exposure to intense visible light (Figure 2). The reaction inhibits PCR amplification of modified DNA templates by a combination of removal of modified DNA during purification, in addition to inhibition of template amplification by DNA polymerases. Because the dyes are cell membrane-impermeant, when a sample containing both live and dead bacteria is treated with dye, only dead bacteria with compromised cell membranes are susceptible to DNA modification. In a real-time PCR reaction, dead cell DNA will show delayed amplification and higher Ct than live cell DNA (Figures 3 and 4). v-PCR permits quantitation of bacterial viability, and can be used with complex, mixed-strain, or viable but non-culturable samples. Visit our website for an up-to-date list of references and a list of validated bacteria strains.

Protocol for Use

The following is a protocol for using the PMA-Lite™ LED Photolysis Device to treat cultured laboratory strains of bacteria with PMAxx™ or PMA. Treatment of complex biological or environmental samples such as feces or soil may require optimization of sample dilution, dye concentration, and light treatment time. Please see the Product Information sheets for PMAxx™ (Cat no. 40069) and PMA (Cat no. 40013 and 40019) for detailed experimental protocols.

1. Turn the PMA-Lite™ LED Photolysis Device over and use the switches to set the length of time for photolysis (Figure 5). We recommend using 15 minutes photolysis time as a starting point and optimizing photolysis time as needed. Different cell types or sample types may require shorter (as few as 5 minutes) or longer photolysis times.
2. Place samples (in clear 1.7 mL microcentrifuge or 2 mL screw top tubes) in the PMA-Lite™ LED Photolysis Device.
3. Turn the PMA-Lite™ LED Photolysis Device on using the switch on the back of the unit.
4. The LEDs will automatically shut off after the amount of time set in Step 1. Turn the unit off and remove samples for further processing or use the Restart button to begin the photolysis cycle again on fresh samples.

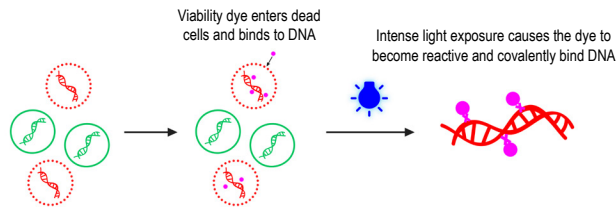


Figure 2. Principle of PMA modification for quantitation of viable bacteria by qPCR. Viability PCR dyes like PMAxx™ or PMA are membrane-impermeant, which makes them highly selective for dead cells. Once inside of a dead cell, they bind to DNA. Exposure to intense visible light renders the dyes reactive, and causes them to covalently attach to the DNA. This DNA modification prevents amplification in subsequent PCR reactions. See Figures 3 and 4 for example data.

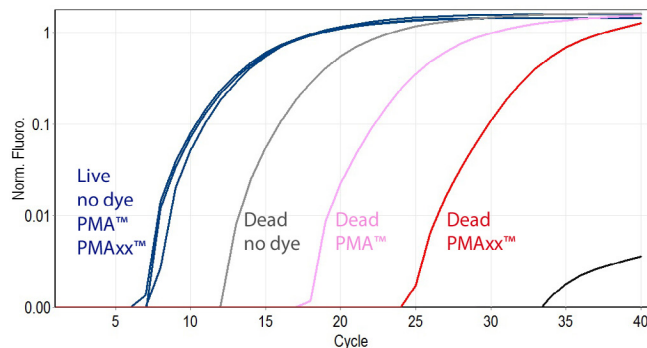


Figure 3. Live or heat-killed *Bacillus subtilis* were treated with 25 μM PMA or PMAxx™, followed by exposure with the PMA-Lite™ and DNA purification. Fast EvaGreen® qPCR Master Mix was used to amplify a 500-bp fragment of *B. subtilis* DNA. Treatment of the cells with viability dye did not affect the amplification of DNA from live cells, but caused a decrease in Ct in dead cells. qPCR of dead cells treated with PMAxx™ showed a significant further delay (>7 Ct) compared to dead cells treated with PMA.

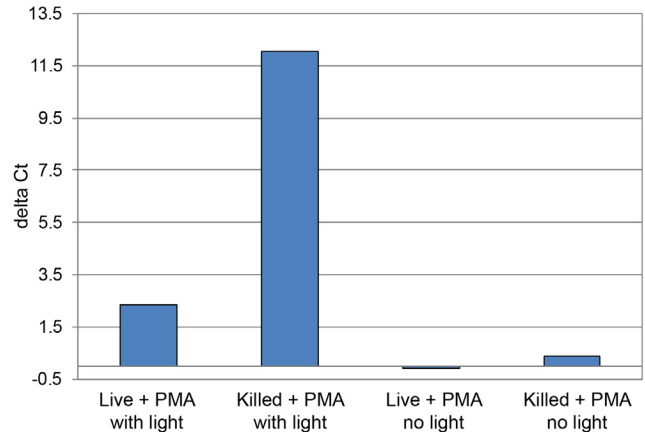


Figure 4. Effect of PMA on quantitative PCR of live and heat inactivated *Staphylococcus epidermidis*, with or without photoactivation of the dye. Delta Ct is the change in Ct value with PMA compared to without PMA (Ct with PMA - Ct without PMA). PMA has no appreciable effect on PCR amplification without photoactivation.

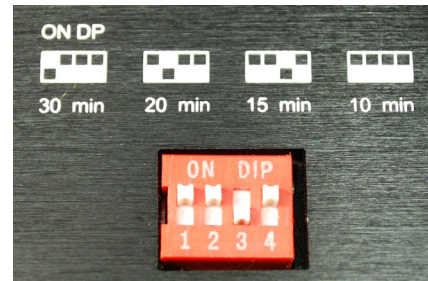


Figure 5. Switch positions for corresponding LED photolysis times. Black squares indicate the position of the switches. With the switch setting shown in this image, photolysis will occur for 15 minutes.

Frequently Asked Questions (FAQs)

Question	Answer
What is the wavelength and brightness (luminosity) of the LED lights in the PMA-Lite?	The LEDs in PMA-Lite have brightness of 600-800 millicandela (mcd). There are three LEDs next to each tube (one bottom, two side) and the wavelength is 465-475 nm.
Is there any risk of UV light produced from PMA-Lite™?	The device uses LED lights which have a visible emission range of 465 to 475 nm, so there is no UV hazard. However, the lights are extremely bright, so the user should avoid staring at them with the naked eye.
What is the expected lifetime of the LED lights?	The expected lifetime of the LED lights is 30,000 to 50,000 hours.
Is illumination even across all positions in the PMA-Lite™ device?	Each tube position on the PMA-Lite™ is illuminated by the three LED bulbs. We haven't tested positional variability, but it is likely that the illumination varies slightly between positions and between devices. However, the illumination at each position is exceedingly bright, far in excess to what is required for photocrosslinking of the viability dyes EMA, PMA or PMAxx™ to nucleic acids, so any variability should not significantly affect the v-PCR results.
Does the PMA-Lite™ require maintenance or calibration?	The device does not require annual maintenance or calibration. However, the user should check that the fan and all LED lights are functional before use. If a single LED light is out, the whole LED strip needs to be replaced. If this occurs, contact technical support at techsupport@biotium.com.

Related Products

Catalog number	Product
40069	PMAxx™, 20 mM in H ₂ O
40019	20 mM PMA in H ₂ O, 100 uL
40013	PMA (Propidium Monoazide), 1 mg
31038	PMA Enhancer for Gram Negative Bacteria, 5X Solution
40015	Ethidium Monoazide, Bromide (EMA)
31075	Viability PCR Starter Kit with PMA
31076-X	Viability PCR Starter Kit with PMAxx™ and Enhancer
31041	Forget-Me-Not™ EvaGreen® qPCR Master Mix (2-Color Tracking)
31043	Forget-Me-Not™ Universal Probe qPCR Master Mix
31045	Forget-Me-Not™ EvaGreen® qPCR Master Mix (Low ROX or High ROX)
31033, 31033-X	PMA Real-Time PCR Bacterial Viability Kit, <i>Salmonella enterica</i> (invA)
31034	PMA Real-Time PCR Bacterial Viability Kit, <i>Mycobacterium tuberculosis</i> (groEL2)
31035	PMA Real-Time PCR Bacterial Viability Kit, <i>Staphylococcus aureus</i> (nuc)
31036	PMA Real-Time PCR Bacterial Viability Kit, <i>Staphylococcus aureus</i> (mecA)
31037, 31037-X	PMA Real-Time PCR Bacterial Viability Kit, <i>E.coli</i> O157:H7 (Z3276)
31050, 31050-X	PMA Real-Time PCR Bacterial Viability Kit, <i>E.coli</i> (uidA)
31051, 31051-X	PMA Real-Time PCR Bacterial Viability Kit, <i>Listeria monocytogenes</i> (hly)
31053	PMA Real-Time PCR Bacterial Viability Kit, <i>Legionella pneumophila</i> (mip)
32001	Bacterial Viability and Gram Stain Kit
32000	Live Bacterial Gram Stain Kit, 800 assays
30027	Viability/Cytotoxicity Assay Kit for Bacteria Live and Dead Cells, 100-1000 assays

Please visit our website at www.biotium.com for information on our life science research products, including environmentally friendly EvaGreen® qPCR master mixes, DNA and RNA quantitation kits, dead cell selective stains, apoptosis reagents and more.

Materials from Biotium are sold for research use only, and are not intended for food, drug, household, or cosmetic use.

Warranty

Biotium warrants that this product will be free from defects in material and workmanship for a period of two (2) years from date of purchase. If a defect is present, Biotium will, at its option, repair, replace, or refund the purchase price of this product at no charge to you, provided it is returned during the warranty period. This warranty does not apply if the product has been damaged by accident, abuse, misuse, or misapplication, or from ordinary wear and tear. For your protection, items being returned must be insured against possible damage or loss. Biotium cannot be responsible for damage incurred during shipment of a repair instrument; It is recommended that you save the original packing material in which the instrument was shipped. This warranty shall be limited to the replacement of defective products. IT IS EXPRESSLY AGREED THAT THIS WARRANTY WILL BE IN LIEU OF ALL WARRANTIES OF FITNESS AND IN LIEU OF THE WARRANTY OF MERCHANTABILITY.

Obtaining Service

Contact Biotium Technical Support at 800-304-5357 or send an email to techsupport@biotium.com and describe the problem(s) you are experiencing. Carry out any suggested modifications or tests. DO NOT ship a device to us without first obtaining a Return Authorization from us. If it is determined by the Biotium Technical Support representative that the device should be returned for repair, a Return Authorization number will be assigned and you will receive instructions for the return. If the device is under warranty, Biotium will repair or replace the unit, and pay for return shipment. If the device is not under warranty, Biotium will give you a cost estimate before repairing the unit. Repair and shipping costs both ways are your responsibility if the device is not under warranty.