Product Information

PMA-Lite™ 2.0 LED Photolysis Device

Catalog Number: E90006

Specifications

Dimensions (WxDxH)	8.66 x 6.69 x 3.27 inches (22 x 17 x 8.3 cm)
Weight	1.85 kg (4.1 lb., 65.3 oz)
Frequency Range	50~60 Hz
Power Range	100~240 VAC
Maximum Power	60 W
LED Output Wavelength	465-475 nm

Product Description

The PMA-Lite™ 2.0 is specifically designed for photoactivation of propidium monoazide (PMA), PMAxx™, ethidium monoazide (EMA), and other photoreactive dyes. It can also function as a general photolysis device to provide continuous, controlled illumination at ~470 nm to 1.5-2 mL microcentrifuge tubes or screw cap tubes. The device can hold up to 18 tubes. Multiple LED lights are positioned to provide uniform and bright illumination to all tubes. An internal fan is used to reduce the heat generated from the lights to ensure samples stay below 37°C. The duration of photolysis can be adjusted in 1 minute intervals between 5 and 45 minutes. A convenient touch display allows users to easily set, reset, and monitor the device's running time.

Features:

- Capable of providing uniform and bright illumination to 18 tubes (1.5 mL microcentrifuge or 2 mL screw cap tubes).
- Internal fan to ensure a temperature of < 37°C.
- Timer setting can be adjusted in 1 minute intervals, with a minimum of 5 minutes and a maximum of 45 minutes.
- 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™ 2.0 LED Photolysis Device

Application Notes

Viability PCR (v-PCR) merges the specificity and sensitivity of qPCR-based methods with a dead cell selective DNA binding dye such as PMAxx™, PMA, or EMA. The technique is extremely versatile and can be applied to numerous species of bacteria, eukaryotes, viruses, and archaea.

PMAxx™ and PMA are photoreactive dyes developed by Biotium to have superior dead cell selectivity over culture-based methods and the alternative EMA v-PCR dye. The dyes form covalent crosslinks with dsDNA upon exposure to intense visible light (Figure 4). The mechanism that underlies the distinction of dead microbes from live ones is two-fold. The DNA that is crosslinked to the dye is not efficiently amplified, and it precipitates during DNA isolation, resulting in a lower recovery of modified DNA. 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 5 and 6). v-PCR permits quantitation of bacterial viability and can be used with complex, mixed-strain, or viable but non-culturable samples. Learn more about v-PCR on our website and download our full list of references and validated bacterial strains.

Protocol for Use

This is a protocol for performing photolysis of PMAxx™- or PMA-treated samples using the PMA-Lite™ 2.0. Treatment of complex biological or environmental samples such as feces or soil may require optimization of sample dilution, dye concentration, and photolysis time. Please see the product information sheets available on our website for PMAxx™ (Cat. No. 40069) and PMA (Cat. No. 40013 and 40019) for detailed experimental protocols.

1. Turn the PMA-Lite™ 2.0 on. The power switch is located on the back of the PMA-Lite™ device. The display will illuminate with the main menu (Figure 2).

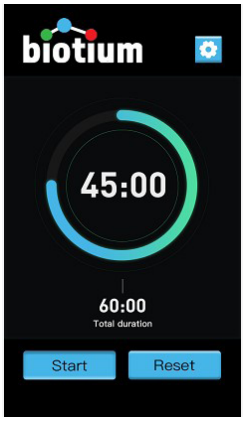

Figure 2. Example PMA-Lite™ 2.0 main menu display screen.

2. To set the length of time for photolysis, press the icon in the top right-hand corner of the display screen. This will bring up the time setting screen, where you may add or subtract time with the plus and minus icons, respectively (Figure 3). The time setting can be adjusted in 1 minute intervals. The minimum time that can be entered is 5 minutes, and the maximum is 45 minutes.

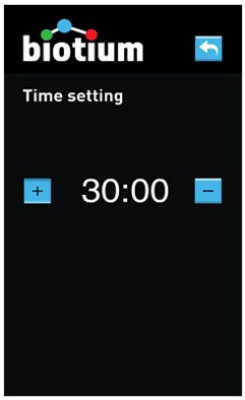

Figure 3. PMA-Lite™ 2.0 time settings screen.

3. Once the desired time is set, press the button in the top right-hand corner of the display screen to return to the home screen. The running time will be displayed in the center of the screen. The total duration is displayed below the running time on the home screen (Figure 2).

   Note: We recommend 15 minutes of photolysis as a starting point and optimizing the illumination time as needed. Different cell types or sample types may require shorter (as few as 5 minutes) or longer durations.

4. Place samples (in clear 1.7 mL microcentrifuge or 2 mL screw cap tubes) in the PMA-Lite™ 2.0.

5. Press the Start button in the main menu to begin the photolysis. The timer will count up to the time set in Step 2. Once the photolysis has begun, the Start button will become a Pause button. Pressing Pause will turn off the LEDs and pause the timer. Pressing Start again will turn the LEDs on and resume the timer. Pressing Reset will turn off the LEDs and reset the timer.

6. The LEDs will automatically shut off once the amount of time set in Step 2 has expired. Turn the unit off and remove samples for further processing. Alternatively, press the Reset button to clear the completed timer, then press Start to begin the photolysis cycle again on fresh samples.

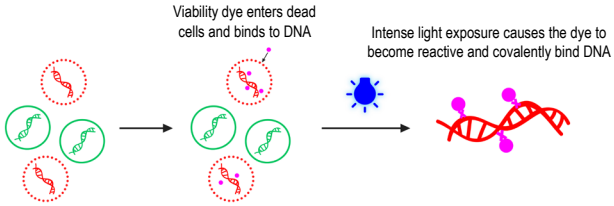

Figure 4. Principle of DNA modification for viability PCR. Viability PCR dyes like PMAxx™ or PMA are membrane impermeant, which makes them highly selective for dead cells. Once inside of a dead cell, they bind to DNA. Exposure to intense visible light renders the dyes reactive and causes them to covalently attach to the DNA. This DNA modification prevents amplification in subsequent PCR reactions. See Figures 5 and 6 for example data.

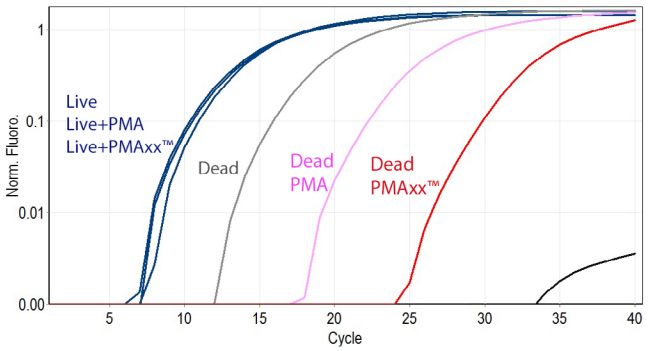

Figure 5. Live or heat-killed *Bacillus subtilis* were treated with 25 uM PMA or PMAxx™, followed by exposure with the PMA-Lite™ and DNA purification. Fast EvaGreen® qPCR Master Mix was used to amplify a 500-bp fragment of *B. subtilis* DNA. Treatment of the cells with viability dye did not affect the 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.

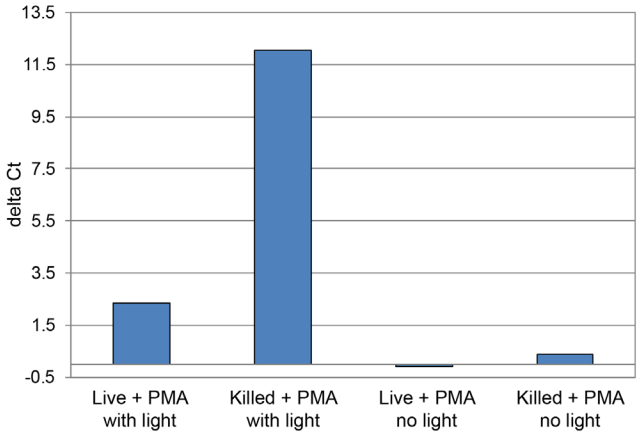

Figure 6. Effect of PMA on quantitative PCR of live and heat inactivated *Staphylococcus epidermidis*, with or without photoactivation of the dye. Delta Ct is the change in Ct value with PMA compared to without PMA (Ct with PMA - Ct without PMA). PMA has no appreciable effect on PCR amplification without photoactivation.

Frequently Asked Questions (FAQs)

Question	Answer
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 EMA, PMA, or PMAxx™ to nucleic acids. Therefore, any positional variability would 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

Cat. No.	Product
40069	PMAxx™, 20 mM in H_2O
40019	PMA, 20 mM in H_2O
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, *Salmonella enterica* (invA)
31034	PMA Real-Time PCR Bacterial Viability Kit, *Mycobacterium tuberculosis* (groEL2)
31035	PMA Real-Time PCR Bacterial Viability Kit, *Staphylococcus aureus* (nuc)
31036	PMA Real-Time PCR Bacterial Viability Kit, *Staphylococcus aureus* (mecA)
31037, 31037-X	PMA Real-Time PCR Bacterial Viability Kit, *E.coli O157:H7* (Z3276)
31050, 31050-X	PMA Real-Time PCR Bacterial Viability Kit, *E.coli* (uidA)
31051, 31051-X	PMA Real-Time PCR Bacterial Viability Kit, *Listeria monocytogenes* (hly)
31053	PMA Real-Time PCR Bacterial Viability Kit, *Legionella pneumophila* (mip)
32001	Bacterial Viability and Gram Stain Kit
32000	Live Bacterial Gram Stain Kit
40107-40113	BactoView™ Dead Stains
32019-32020	BactoView™ Viability Kits

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.

Advion Interchim scientific