



# BAPCo MobileMark® 30 Professional User Guide

Revision 1.0    Initial release

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## Introduction

MobileMark 30 Professional is an application-based, performance-qualified battery life benchmark designed to assist users in making PC purchasing decisions.

## Setup

Before attempting to install or run MobileMark 30 Professional, verify that the test system under test (SUT) meets the recommended minimum system configuration for running the benchmark. Results run on systems that do not meet the minimum requirements are valid for publication, however BAPCo will not be able to offer technical support for those configurations.

MobileMark 30 Professional Minimum system requirements:

- System running on DC battery power.
- **CPU:**– CPU: 2015 or newer x86 processor (Intel 6th Generation Core or newer, AMD A6/A8/A10-7000 series APU or newer), 2GHz or higher, dual core or higher
  - **NOTE:** OS Power modes may reduce performance below minimum hardware requirement levels. CPU must be capable of 2GHz or higher during the entirety of the test.
- **RAM:** 16 GB
- **Storage (primary boot drive) :** 30 GB of free space.
- **Operating System:** Microsoft® Windows® 11 64-bit version 22H2 or higher (10.0.22621.xxxx)
- **Resolution:** 1366x768
- **Graphics:** DirectX 12 compatible, 2GB of VRAM
- **Network:** Associate to Wi-Fi network
- **Supported Languages:** English (US)

### Pre-installation Image configuration

For best results, install MobileMark 30 Professional to a clean instance of a supported operating system, with updated hardware drivers. See the [APPLICATIONS](#) section for a list of application software installed by the benchmark. MobileMark 30 Professional includes an integrated configuration tool that will automate making changes to the system in preparation for running the benchmark. See the [SYSTEM CONFIGURATION TOOL](#) section for more information on image configuration.

- **Administrative rights:** An account with administrative privileges is required. The same account must be used to install and run MobileMark 30 Professional and the account must be configured for auto-logon.

### Virtualization Based Security

#### Default enablement

Starting with Windows 11, new installations on compatible systems have memory integrity turned on by default. This is changing the default state of the feature in Windows, though device manufacturers and end users have the ultimate control of whether the feature is enabled.

### Hardware features for automatic enablement

Memory integrity will be turned on by default when a PC includes the following minimum hardware features:

HARDWARE FEATURES FOR AUTOMATIC ENABLEMENT	
Component	Detail
Processor	<ul style="list-style-type: none"><li>• Intel 11th generation Core processors and newer</li><li>• AMD Zen 2 architecture and newer</li><li>• Qualcomm Snapdragon 8180 and newer</li></ul>
RAM	Minimum 8GB
Storage	SSD with a minimum size of 64GB
Drivers	HVCI-compatible drivers must be installed. See <a href="#">Hypervisor-Protected Code Integrity (HVCI)</a> for more information about drivers.
BIOS	Virtualization must be enabled

## Microsoft Office Removal

MobileMark 30 Professional installs a copy of Microsoft Office 2021. All traces of Office, including UWP Office app and/or Office 365 installations must be removed from the system before attempting to install MobileMark 30. Neglecting to remove an existing Office installation will cause installation failures.

Follow the instructions at the [Microsoft Office removal tool](#) page to remove your version of Office prior to attempting to install MobileMark 30 Professional. If the Microsoft Office removal tool does not completely remove Microsoft Office from your system, follow [Microsoft's manual office removal procedure](#).

Remove any Office UWP apps

- Open PowerShell as administrator: Hit Windows+X, and then choose the “Windows PowerShell (Admin)” option from the Power User menu.
- At the PowerShell prompt, type the following command and press Enter after each command to remove pre-installed apps that may interfere with benchmark execution on the system under test:
  - `Get-AppxPackage *officehub* | Remove-AppxPackage`
  - `Get-AppxPackage *OneNote* | Remove-AppxPackage`
  - `Get-AppxPackage *Office* | Remove-AppxPackage`

## MobileMark 30 Professional installation

**BAPCo recommends using disk image software to make a backup of the disk prior to installation of MobileMark 30 Professional. Although uninstallation is supported, re-installation is not supported due to DRM restrictions. BAPCo recommends making a backup of your image before installing MobileMark 30 Professional to make image recovery easier.**

To avoid invalidating the MobileMark 30 Professional installation, verify the following items prior to attempting installation:

- Remove Microsoft Office, Adobe Photoshop, WinZip or any other pre-existing installed application (s) that will be installed by the benchmark. See the [APPLICATIONS](#) section for the list of applications that MobileMark 30 Professional installs and/or uses.
- Disable Windows Tamper Protection
- Set system date and time to the correct values. Do not change system date and time once MobileMark 30 Professional has installed.

Follow these steps to install MobileMark 30 Professional:

- 1) Download MobileMark 30 Professional from the BAPCo store.

- a. Make a backup copy of the download zip to a USB key or other external drive for safe keeping.
- 2) Unpack the benchmark files.
  - a. Create a folder called MobileMark30 Professional and unpack the contents of the store download.
- 3) Using Windows Explorer, navigate back to the Disc1 folder created in Step 2.
- 4) Be sure all pre-installation checks are complete before attempting installation.
- 5) The system time and date must be correct and should not be changed once MobileMark 30 Professional is installed.
- 6) Double click on the file named MobileMark30\_Setup.exe and follow the prompts to complete the installation.

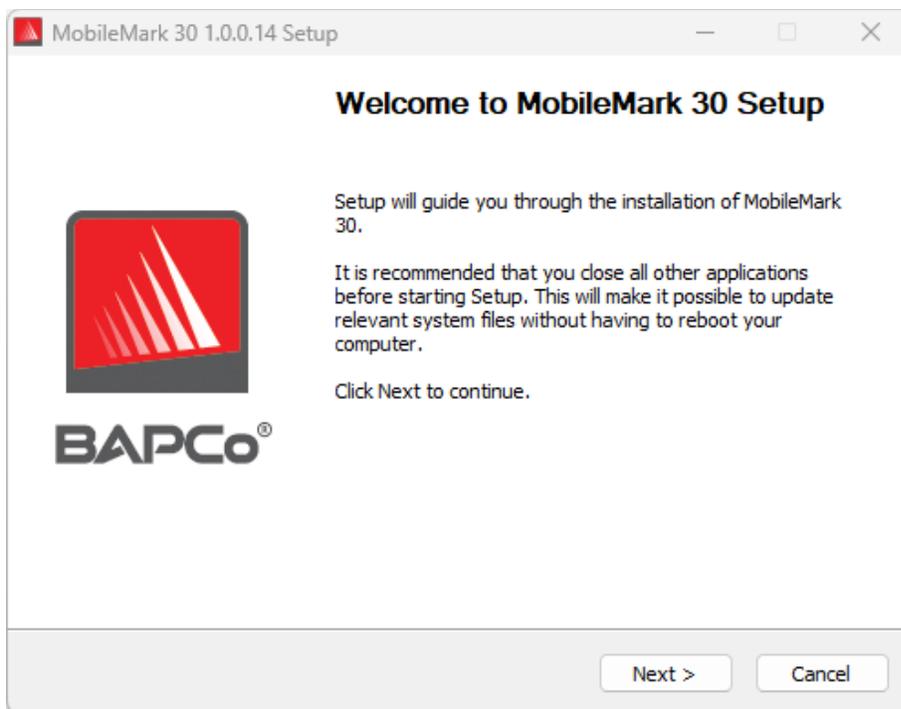


Figure 1: MobileMark 30 Professional installer window

Enter the serial number provided with the benchmark package and click 'Next' to continue.  
If you need a serial number, please contact BAPCo at [sales@bapco.com](mailto:sales@bapco.com)

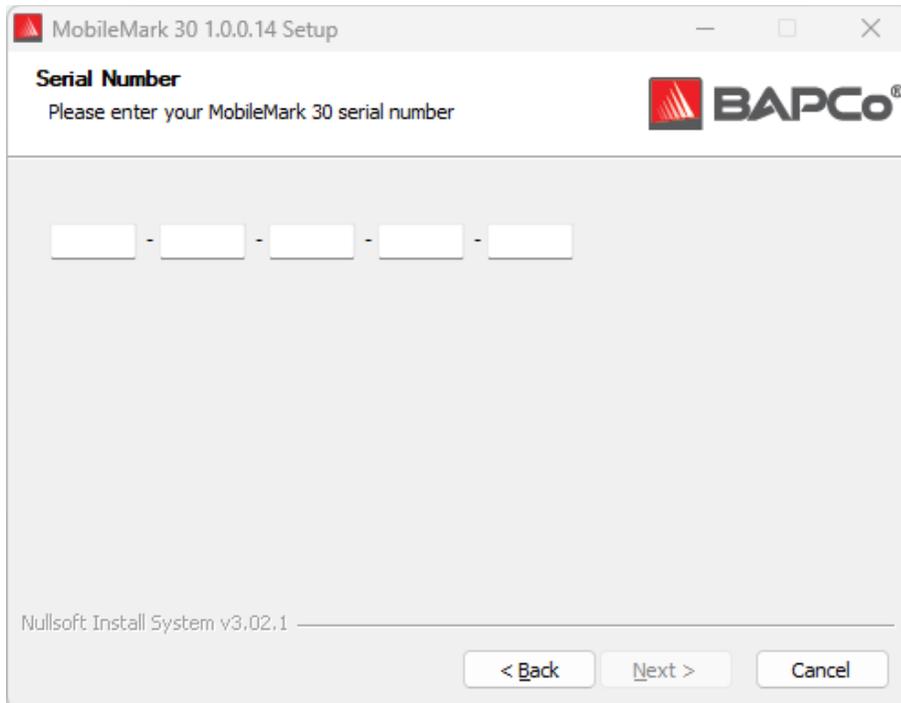


Figure 2: Enter a valid MobileMark 30 Professional serial number to proceed with installation.

Read and accept the BAPCo software EULA by clicking the option 'I accept the terms of the License Agreement', then click 'Next'.

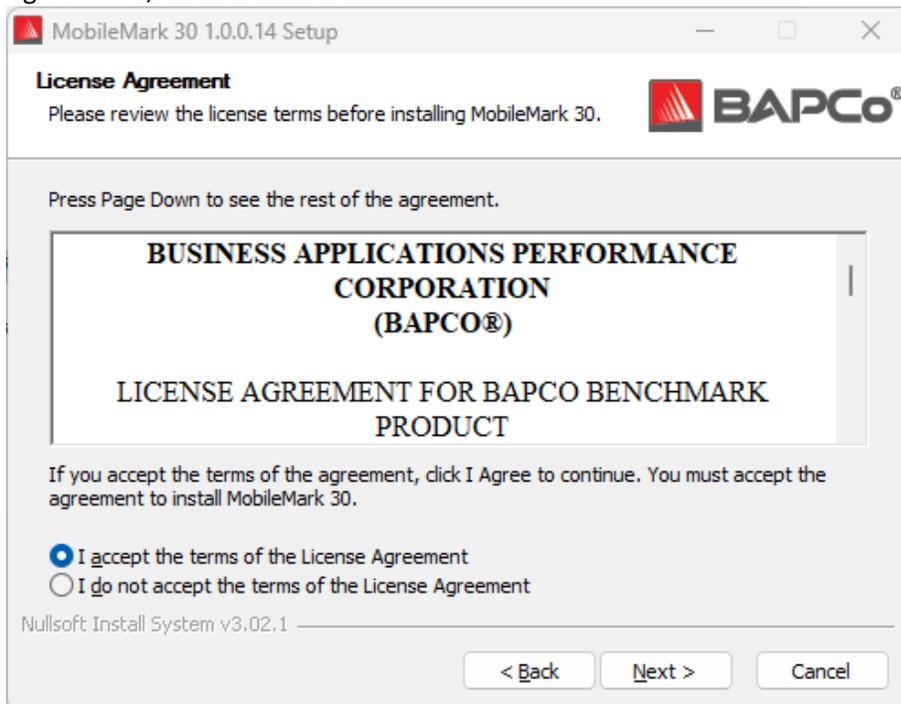


Figure 3: MobileMark 30 Professional EULA

Figure 4 shows the default destination folder in which benchmark will be installed. Benchmark components and applications will be installed when the user clicks 'Next'.

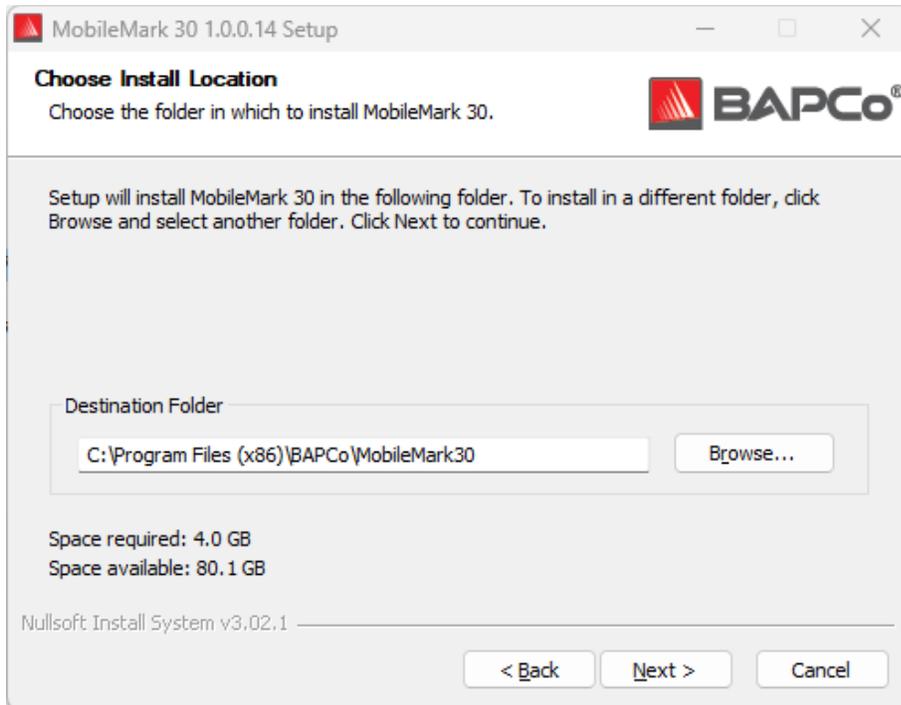


Figure 4: Installation folder location for MobileMark 30 Professional

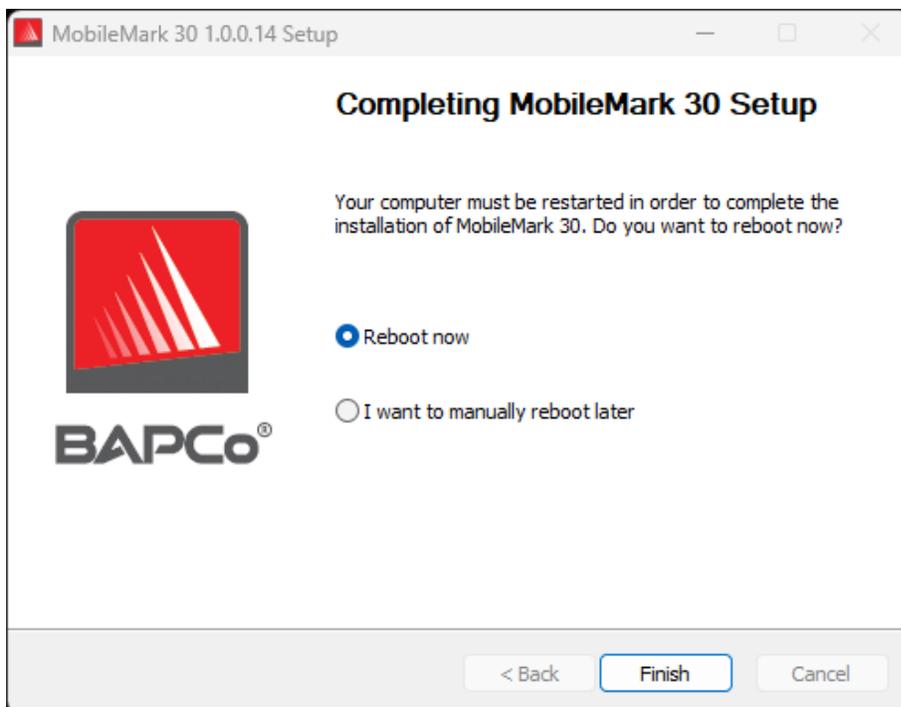


Figure 5: Installation of MobileMark 30 Professional has completed successfully.

Once installation has completed, please reboot the system before attempting to run MobileMark 30 Professional.

## **Uninstallation**

MobileMark 30 Professional can be uninstalled by navigating to the Programs and Features item in the Windows Control Panel. Choose the MobileMark 30 icon from the list of applications and select 'Uninstall'.

Due to DRM limitations of some of the applications in MobileMark 30 Professional, once the benchmark is uninstalled, it cannot be reinstalled back to the same system image.

## Running MobileMark 30 Professional

Before launching a MobileMark 30 Professional run, please verify the following:

- Battery is charged to 100%
- Wi-Fi/Ethernet, Network interfaces are turned off. MobileMark 30 Professional, doesn't require Internet connection or Wi-Fi adapter to be connected to the WLAN. The connection to the network, if enabled, may cause instability to Photoshop workloads. The app may update with additional dialog boxes appearing requiring user interaction or may cause performance issues or stability issues.
- Screen brightness is set to maintain a minimum of 250 nits (cd/m<sup>2</sup>) through the test.
- Set volume to 50%.

Start MobileMark 30 Professional by double clicking the desktop shortcut to launch the main interface as illustrated in Figure 6 below.

**Important:** If User Account Control has not been previously disabled, right-click the icon and choose 'Run as administrator', otherwise the user will be presented with the windows consent prompt to perform benchmark execution, as it requires user's administrative access token. MobileMark 30 Professional must be run under the same user account that was used to install it.

Note: MobileMark 30 Professional may also be launched via command line. See [AUTOMATED EXECUTION](#) section for more details.

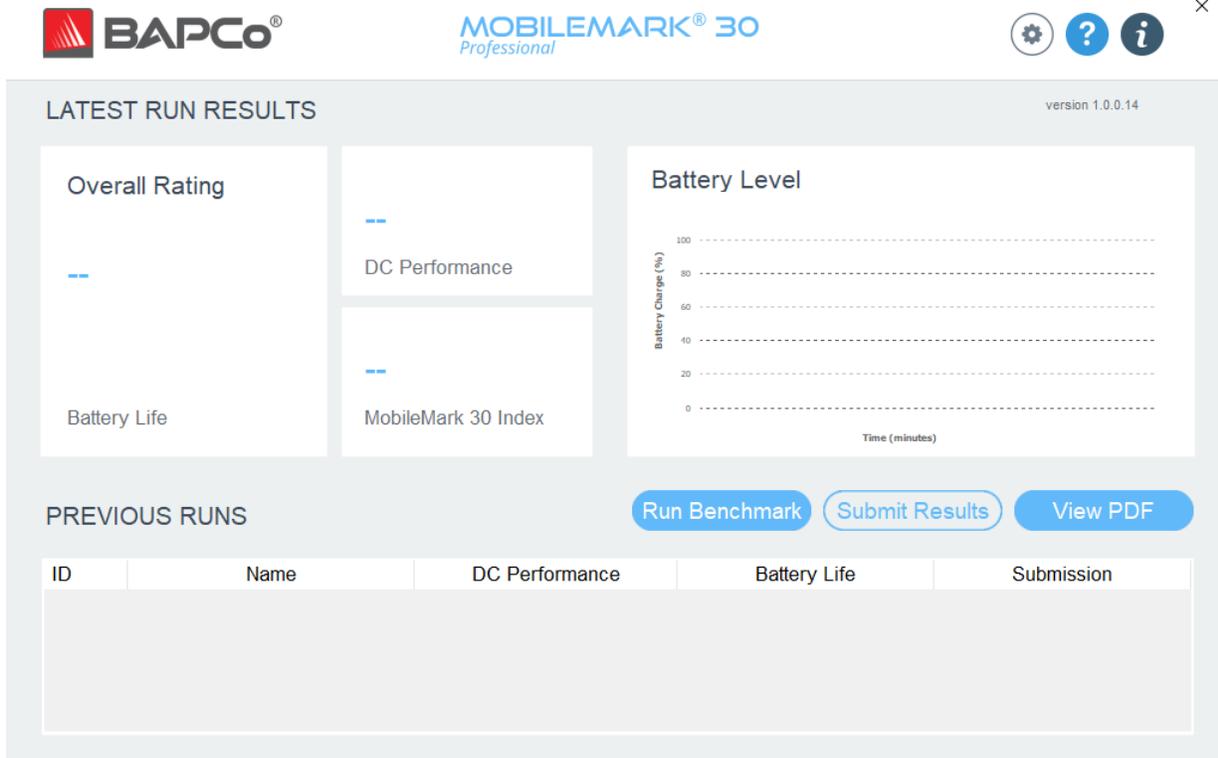


Figure 6: MobileMark 30 Professional interface.

## MobileMark 30 Professional interface

MobileMark 30 Professional includes a redesigned user interface, which is streamlined to simplify project configuration. Just click 'Run Benchmark' to launch a benchmark run with the default configuration, which will do the following:

- Run Professional scenarios for each iteration, until full battery is depleted.
  - The project name will be 'project001' for the first project. Subsequent projects will be named 'project002', 'project003', and so on.
- Conditioning run will be executed, but will not be part of the performance score calculation.
- Battery run down mode shall be Full discharge (100%).
- The system configuration tool will execute with the following options:
  - Recommended items – set to ON
  - Optional items – set to OFF

## Main UI

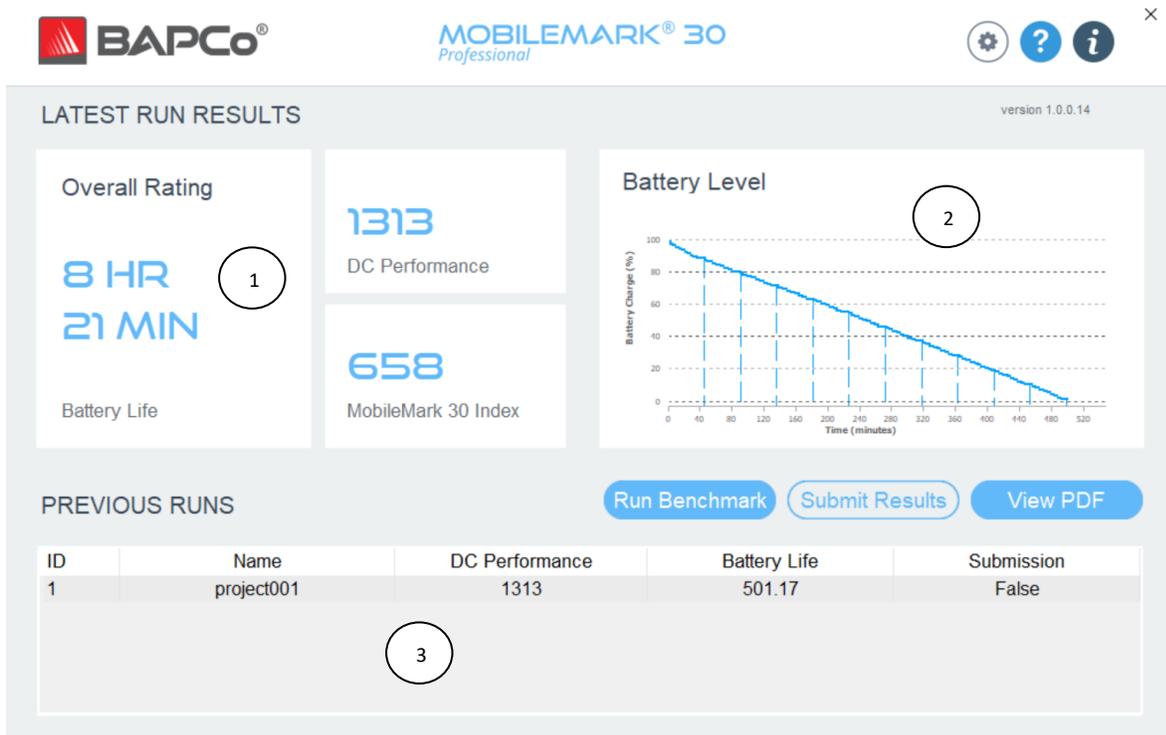


Figure 7: MobileMark 30 Professional interface after one successful run.

*Note: Data shown here in the UI is all dummy data to demonstrate UI features. It is not from any mobile system.*

In the main UI for MobileMark 30 Professional (Figure 7)

- 1 Shows the Battery Life, DC Performance score, and MobileMark 30 Index for a successful run. The UI labels are updated based on the type of benchmark run. For example, battery life is shown as Estimated Battery Life (in RED) when partial (25%) or half (50%) battery rundown mode is chosen. Refer [Benchmark Test Modes](#) for more details.
- 2 Shows the graph that indicates battery run down chart. The vertical iteration markers on the graph indicate the start time of each iteration.
- 3 Shows previous valid runs performed on this system. This gives quick snapshot of previous results. Partial and half battery run downs are not valid runs, so they won't appear in this list

## Settings UI

Users can access additional benchmark settings by clicking the settings button  in main ui. Clicking the 'Settings' button will bring up the detailed settings window as shown in Figure 8 below.

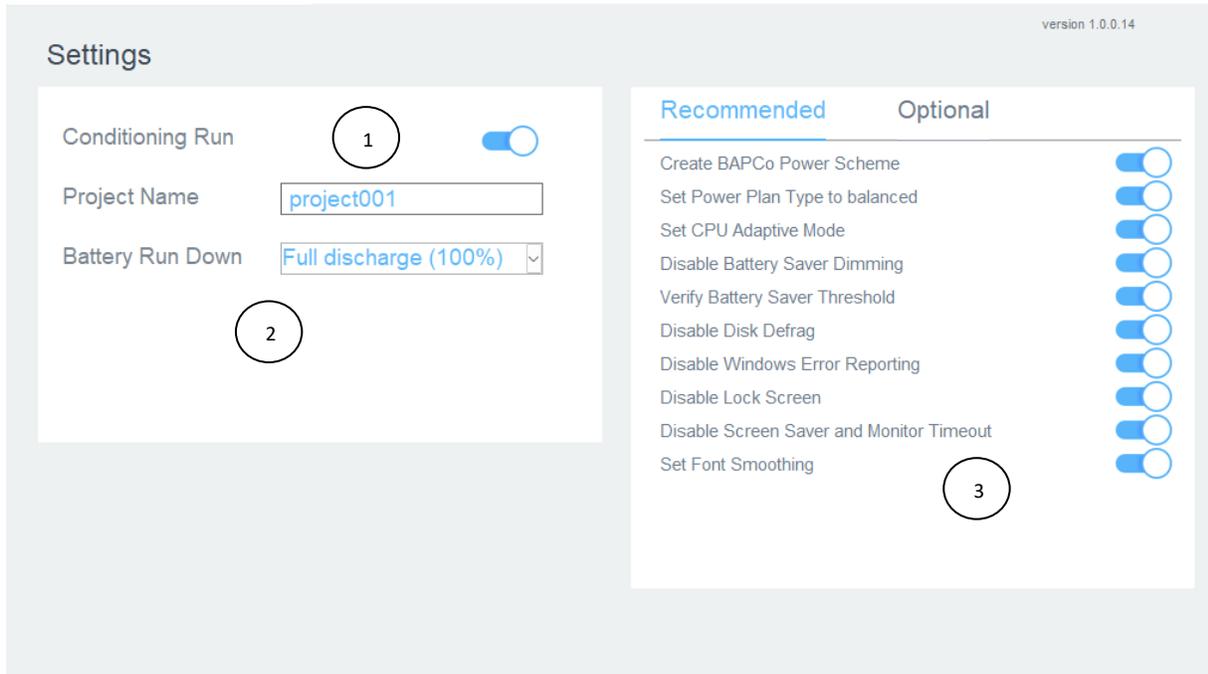


Figure 8: MobileMark 30 Professional configuration options

In the configuration options for MobileMark 30 Professional (Figure 8)

- 1 Users may specify a project name and disable the conditioning run.
- 2 All users can switch among 3 test modes to determine the duration of a battery test:
  1. Full discharge (100%): Repeats workload iterations until the battery is fully depleted. This mode gives the highest accuracy and is required for results submission/publication.
  2. Half discharge (50%): Repeats complete workload iterations until the battery has dropped by 50 percentage points relative to the starting percentage. Scores are estimated and extrapolated from the available data and are invalid for submission/publication.
  3. Partial discharge (25%): Repeats complete workload iterations until the battery has dropped by 25 percentage points relative to the starting percentage. Scores are estimated and extrapolated from the available data and are invalid for submission/publication.

Refer to [Benchmark Test Modes](#) for more details.
- 3 Users may also make changes to the configuration tool options by toggling the recommended and optional system configuration settings. See [SYSTEM CONFIGURATION TOOL](#) for more information.

## Windows 11 Power Mode

The Windows 11 Power mode has 3 positions when the SUT is running in DC power (Best power efficiency, Balanced, Best performance) that can be used in MobileMark 30 Professional testing. Notebook systems will automatically switch between different power profile configurations to optimize for AC or DC power sources. Be sure the SUT is configured with the desired settings on DC power before starting a run of MobileMark 30 Professional.

The Power mode is only available if the system under test is configured with the Balanced power plan, or a custom power plan was created using the Balanced power plan template.

Refer to the [MOBILEMARK 30 PROFESSIONAL BENCHMARKING RULES](#) section for additional information about testing devices with the Power mode.

Steps for running in Best power efficiency, Balanced, Best performance:

- 1) Unplug the SUT from AC power.
- 2) Click on the battery icon in the systray to access the System > Power & battery setting.
- 3) Select the desired Power mode.
- 4) Reconnect AC power.
- 5) Verify the power mode is set as desired by unplugging the SUT and clicking on the battery icon in the systray. The slider should be set to the position from step 3.
- 6) Reconnect AC power.
- 7) Launch MobileMark 30 Professional GUI and start the test.

A single iteration of MobileMark 30 Professional takes approximately 45 mins to complete. MobileMark 30 Professional will loop through iterations until the battery charge is exhausted. Completion of the full battery run down will vary with system configuration options and battery capacity.

## Results generation and display

The MobileMark 30 Professional user interface will display the results of the most recently run project in the main benchmark windows. On first launch after new MobileMark 30 Professional installation, results will not be displayed in the user interface until a run is completed.

### MobileMark 30 Professional scores

MobileMark 30 Professional produces three main scores at the conclusion of a successful run. The SUT must complete at least one iteration of the MobileMark 30 Professional workload to report scores. For additional details on MobileMark 30 Professional scoring methodology, please refer to the MobileMark 30 whitepaper at <https://bapco.com/mobilemark-30/>

#### Battery life

Battery life of the SUT is reported in hours and minutes. For best results, the SUT should begin the MobileMark 30 Professional run down at 100% charge.

#### DC performance

The DC performance score is the relative performance rating of the SUT vs the MobileMark 30 Professional reference system on DC (battery) power. The MobileMark 30 Professional reference system scores 1000 for the DC performance rating, therefore a SUT with a 1500 DC performance rating is performing 50% faster than the reference systems.

#### MobileMark 30 Index

The MobileMark 30 Index score combines the Battery life score (in minutes) and the overall DC performance score into a single metric, showing the balance between battery life and performance. A higher value is better.

#### Results PDF/XML

MobileMark 30 Professional saves the results from each run as a PDF document and XML file in the Results folder located on:

*Desktop\Results\MobileMark30\<project\_name>\<project\_name>.xml*

*Desktop\Results\MobileMark30\<project\_name>\<project\_name>.pdf*

The XML-formatted results file contains machine-readable data describing the benchmark conditions, settings, and results in detail, including iteration count, battery life, estimated battery life, system configuration settings, and other pertinent details. For a detailed breakdown of the XML structure and node types, please consult the design documentation.

The PDF-formatted results file serves as a human-readable report containing much of the same information. Because the XML results file contains more detailed information than the PDF, it is embedded within the PDF as a file attachment (in addition to being written out as a separate file). The XML file can be extracted from the PDF using a PDF reader that supports PDF file attachments.

BAPCo refers to the PDF results file as a Full Disclosure Report (FDR). An FDR may be submitted to BAPCo for publication or stored as required for compliance with [MobileMark 30 Professional Benchmark Rules](#) that govern publication of test results.

## Errors, Database dumps and Logs

### Error reporting and screen captures

MobileMark 30 Professional reports all errors and screen capture into the “errors” folder for all users at the location below:

*Desktop\Results\MobileMark30\<project\_name>\errors*

Folder	Files	Description
<b>errors</b>	harness_errors.csv	List any errors captured by the harness.
	error_screenshot	if there is a script error a screenshot with PNG extension will be added.

### Database snapshots

After completion of each run benchmark copies the database’s (scripts and harness) from the installation location to Results folder at the location below:

*Desktop\Results\MobileMark30\<project\_name>\databases*

Folder	Files	Description
<b>database</b>	MobileMark30.db	SQLite database used by the harness infrastructure.
	MobileMark30_script.db	SQLite database used by the scripts/workload infrastructure.

## Harness logs

Users have access to a set of reports tailored to their needs and permissions. These reports provide essential insights into the benchmarking process and performance metrics.

Folder	Files	Description
logs_harness	battery_estimate.csv	List estimated battery for each iteration
	sysinfo.csv	Records the system information
	measure_standby.csv	Records the connected standby time per iteration
	newpowercfg.txt	The new power plan or pwrcfg dump after applying system configuration
	originalpowercfg.txt	The original power plan or pwrcfg dump before applying system configuration

## Results submission

Currently there are no supported methods for submitting results to the [BAPCo Result Database](#):

### Submit from MobileMark 30 Professional

- At this time the 'Submit Results' button on the MobileMark 30 Professional main window is disabled. So users will not be able to submit the most recent FDR from UI.
- To submit the valid FDR, send the FDR to BAPCo support at [support@bapco.com](mailto:support@bapco.com).

### Submit results by web browser

- At this time result submission through web browser [results.bapco.com/upload](https://results.bapco.com/upload) is disabled for MobileMark30 Professional. In order to submit a valid FDR , send the FDR to BAPCo support at [support@bapco.com](mailto:support@bapco.com).

## Automated installation

MobileMark 30 Professional may be installed through the command line. The following command line switches are available:

- /S - silent install, no GUI
- /SN <serial number> - pass serial number to the installer

To install MobileMark 30 Professional from the command line, open a command prompt, change to the directory where the MobileMark30\_Setup.exe file is located and issue the following command, replacing <1234-5678-9123-4567-8912-34567> with the 25 digit serial number provided at time of purchase.

Example command for unattended installation

```
C:\>start /wait MobileMark30_Setup.exe /S /SN= <1234-5678-9123-4567-8912-34567>
```

## Installer exit codes

When complete, the installer will return an exit code (stored in %ERRORLEVEL%). See below for the exit codes and their meanings:

- 0 - Success
- 3010 - Success, reboot required
- 1 - Installation abort by user
- 2 - General installation problem
- 3 - Missing or invalid serial number
- 4 - The following applications must be uninstalled before installing MobileMark 30 Professional
- 5 - MobileMark 30 Professional (64-bit) can only be installed on 64-bit machines
- 6 - MobileMark 30 Professional installer is already running
- 7 - Installer must be run from the setup file: MobileMark30\_Setup.exe
- 9 - Application installation missing. Invalid installation. Please uninstall and reinstall MobileMark 30 Professional.
- 10 - Installation directory must be less than 145 characters or another version of benchmark is already installed.
- 14 - Minimum OS requirement is not met.

## Automated execution

MobileMark 30 Professional also supports execution from the command line. Supported command line parameters are provided in the list below.

Short Name	Long Name	Description	Example
<b>p &lt;name&gt;</b>	project	Specify project name	-p "test" or --project="test"
<b>nv</b>	noverify	This option enables user to disable the Verification dialog	-nv or --noverify
<b>nc</b>	noconditioning	Disable system conditioning run	-nc or --noconditioning
<b>cr &lt;0/1&gt;</b>	configstore	Enables or Disables restoration of system configuration. By default, restore is enabled.	-cr 1 or --configstore 1
<b>l &lt;value&gt;</b>	license	Update/Modify benchmark license key	-l "12-12" or --license "12-12"
<b>sc &lt;list of values&gt;</b>	setsystemconfig	Specify system config items. default, all=on   off, PowerScheme=on   off, PowerPlan=on   off, DisableBatterySaver=on   off, SetCPUAdaptiveMode=on   off DisableBatterysaverDimming=on   off, VerifyBatterySaverThreshold=on   off, DiskDefrag=on   off, ErrorReporting=on   off, DisableLockScreen=on   off, ScreenSaver=on   off, SetFontSmoothing=on   off, HardDiskTimeout=on   off, LaptopLidClose=on   off, SystemRestore=on   off, LaptopLidClose=on   off, EnableDarkMode=on   off, WindowsSecurityCenter=on   off	- sc="powerplan=off,windowspups=on"
<b>cli</b>	commandlinerun	Auto populate command line specified options	-cli or --commandlinerun
<b>ns</b>	nosysinfo	Skip System information collection	-ns or --nosysinfo
<b>brd &lt;value&gt;</b>	batteryrundown	Specify battery run down mode, Full Drain(1)/Half Drain(2)/Partial Drain(3)	-brd=2 or --batteryrundown=2
<b>h</b>	help	Displays this help	-h or --help

## Example Command Lines

- 1) The example command below will launch MobileMark 30 Professional with the default system configuration items, create a project called ‘**test\_project**’ using command line is below:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -cli
```

- 2) The example command below will launch MobileMark 30 Professional with the default system configuration items, create a project called ‘test\_project’, **Battery run down mode (Half discharge, 50%)**, using command line is below:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -brd=2 -cli
```

- 3) The example command below will launch MobileMark 30 Professional with the default system configuration items, create a project called ‘test\_project’, **no conditioning, no verification**, using command line is below:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -nc -nv -cli
```

- 4) The example command below to **update the type of license** after benchmark is installed on the system under test:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -l <1234-5678-9123-4567-8912-34567>
```

- 5) The example command below to **skip system configuration restore** after benchmark finishes the test on the system:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -cr 0
```

## Automated data collection

MobileMark 30 Professional's workload manager allows the user to execute scripts to aid in the processing of results at the conclusion of a run. Placeholder scripts are included with each installation in the C:\Program Files (x86)\BAPCo\MobileMark30\Automation\ directory.

- Unplug.bat is executed when MobileMark 30 Professional prompts the user to unplug the system under test, prior to starting the battery run down.
- ProcessResults.bat is executed at the conclusion of a successful run of MobileMark 30 Professional. Users can add commands to this script to copy results to a new location or call additional commands specific to their environment.
- ProcessError.bat is executed if MobileMark 30 Professional exits with an error condition. Insert commands to this script to do things such as copying error logs to a new location or call other commands for post processing of errors.

## Benchmark settings

### Benchmark Test Modes

This section describes various battery test modes supported by MobileMark 30 Professional.

#### Battery Run Down Mode

The settings UI has a Battery Run Down drop down menu, allowing users to choose between different battery run down modes: Full discharge (100%), Half discharge (50%), and Partial discharge (25%). This option is also available via command line using `-brd <value>` switch.

- 1 – indicates full discharge (100%)
- 2 – indicates half discharge (50%)
- 3 – indicates partial discharge (25%)

The half and partial discharge modes allow a user to get an estimate of system battery life without having to wait for a complete battery rundown. Best accuracy is achieved by a full test, while 50% drain gives a good compromise between accuracy and convenience and 25% offers the least accuracy and highest convenience. Because they are only estimates, results from a half or partial test are invalid for submission or publication and will accordingly be marked as invalid for such purposes.

For a half or partial discharge test, the benchmark checks after each iteration completes whether the total amount of battery drain since the start of the test meets the minimum criteria defined by the user (e.g., at least 25 or 50 percentage points of total drain relative to battery level at the start of the test). If the specified criteria are fulfilled, the benchmarking process ceases and proceeds to estimate the battery life and performance.

The benchmark will not necessarily stop at the exact moment when the requested level of battery drain has been reached. It will always wait for the completion of the iteration in progress before halting the test and producing estimated results.

Results obtained in half or partial discharge modes are marked as “invalid” within the generated PDF, accompanied by a watermark. Additionally, the UI highlights these "Estimated" results in red. These results are not valid for submission or publication.

Additionally, to improve user experience in event of a test failure, if a full discharge test somehow fails part-way through testing and the benchmark determines that the battery has drained far enough to produce an estimate (at least 25 percentage points), it will produce estimated results rather than simply considering the test a failure and not showing any results. As with any estimated results, these will be invalid for submission/publication.

## System Configuration Tool

The configuration tool runs automatically at the start of each test, and records the state of each item on the system under test prior to modifying it for benchmark execution. At the conclusion of the run, each modified setting will be returned to its previous state.

By default, the configuration tool sets the Required and Recommended items as described below. Optional items are not set by default.

Users may modify the default items by clicking on the settings icon and navigating the Recommended or Optional configuration tabs. Note that Required settings cannot be disabled.

If additional control of the system configuration items is required, please refer to the section

[SYSTEM CONFIGURATION FROM COMMAND line](#).

The following is a list of configuration options with their priorities that can be applied using the System Configuration tool. Some items may apply only to certain supported operating systems, as noted in the item's description. An example command line string for each configuration item is also included in the description.

### Required

Make configuration changes that are required for the benchmark to run. These items are enabled by default and cannot be disabled.

#### **Disable User Account Control (UAC)**

Disables User Account Control to prevent Administrator elevation prompts from appearing during benchmark runs. The system must be rebooted to apply this change.

#### **Set DPI scaling to 100%**

Sets the desktop scaling to 100%. Prevents failures on higher resolution displays.

#### **Disable Low Battery Actions**

Prevents the system from shutting down or from posting a warning when the battery reaches the low level.

#### **Disable Network Proxies**

Disables proxy server configuration for Internet connection settings.

#### **Disable System Sleep and Hibernate**

Prevents the system from going to sleep or hibernating and disables the "Require password on wake" setting.

#### **Disable Windows Update**

Disables the Windows Update service.

#### **Enable Windows Search**

Makes sure that the Windows Search service is enabled and running.

#### **Disable WinSAT**

Disables the WinSAT scheduled task

### **Recommended**

Make configuration changes that are recommended in order to obtain repeatable scores, and minimize the occurrence of errors. Recommended items are enabled by default. Recommended items may be disabled by clicking the slider next to the configuration item or using the command line option.

#### **Create BAPCo Power Scheme**

Creates a new power scheme named "BAPCo MobileMark 30" based on the system's currently active power scheme. If applied, all subsequent power profile configuration changes are applied to the newly created power scheme. If this option is not enabled, all power profile configuration changes are applied to the currently active power scheme.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=PowerScheme= on|off"
```

#### **Set Power Plan Type to "Balanced"**

Sets the "Power Plan Type" option (sometimes referred to as "Power Plan Personality") of the active power scheme to "Balanced". This setting tags the active power plan with an overall personality that favors energy savings. Drivers and applications may query this setting to determine their respective performance vs energy savings behavior. This option may be used whether or not the "Create BAPCo Power Scheme" option is checked. If "Create BAPCo Power Scheme" is not enabled, "Set Power Plan Type" will be applied to the currently active power scheme.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc= PowerPlan=on|off"
```

#### **Set CPU Adaptive Mode**

Sets the minimum CPU performance state to 5% and the maximum value for CPU performance state to 100% on both AC and DC power.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=SetCPUAdaptiveMode= on|off"
```

### **Disable Battery Saver Dimming**

Disables screen dimming when Battery Saver is engaged.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=DisableBatterySaverDimming= on|off"
```

### **Verify Battery Saver Threshold**

Sets the battery saver threshold to less than or equal to 20%. [REFER TO THE WINDOWS 11 POWER MODE](#) section for more information.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=VerifyBatterySaverThreshold= on|off"
```

### **Disable Disk Defrag**

Disables the Defrag scheduled task.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc= DiskDefrag= on|off"
```

### **Disable Windows Error reporting**

Prevents the Windows Error reporting tool from presenting error reporting windows.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=ErrorReporting= on|off"
```

### **Disable Windows Lock screen**

Disables the lock screen to prevent it from blocking application input.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=DisableLockScreen= on|off"
```

### **Disable Screen Saver and Monitor Timeout**

Turns off the screen saver. Disables display timeout in the power profile for both AC and DC options.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc= ScreenSaver= on|off"
```

### **Set Font Smoothing**

Turns on Windows font smoothing.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
SetFontSmoothing= on|off"
```

## Optional

Make configuration changes that are typically not needed to obtain repeatable scores, but which may be needed in some rare cases. Optional items are not enabled by default.

### Disable Battery Saver

Disables system going to battery saver mode.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
DisableBatterySaver= on|off"
```

### Disable Hard Disk Timeout

Prevents the hard disk from going to sleep.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
HardDiskTimeout= on|off"
```

### Disable Windows System Restore

Disables Windows system restore.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
SystemRestore= on|off"
```

### Ignore Laptop Lid Close

Prevents the system from going to sleep if the lid is closed during a benchmark run.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
LaptopLidClose= on|off"
```

### Enable Dark Mode

Follows the system setting by default. If Dark mode is not turned on, setting this item to 'on' will enable Dark mode for the subsequent run.

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=  
EnableDarkMode= on|off"
```

## System configuration from command line

When running MobileMark 30 Professional from the command line, the system configuration items will be set according to their defaults unless the user specifies options on the command line.

Example:

```
"C:\Program Files (x86)\BAPCo\MobileMark30\bin\MobileMark30.exe" -p test_project -sc=PowerScheme= Off"
```

The above command will execute the benchmark in a project called 'test\_project' and run the defaults of one iteration plus the conditioning run. The 'Create BAPCo Power Scheme' option in the configuration tool will be set to 'Off'. MobileMark 30 Professional will not create the BAPCo Power scheme before modifying the system configuration for the test.

For cases where users do not want to set any system configuration items, all the system configuration items must be specified as set to 'Off' on the command line.

The Recommended and Optional config tool items can be toggled with "--sc all=On|Off", which will allow the user to disable all the system configuration options without having to specify each item on the command line. Configuration items listed as Required cannot be disabled.

## Benchmark Usage

This subsection describes the behavior of MobileMark 30 Professional during the execution of a benchmark run.

### Best Practices

In order to obtain reliable, reproducible results, BAPCo recommends using the default settings in the MobileMark 30 Professional interface. To run with the default settings, just launch MobileMark 30 Professional and click 'Run Benchmark'.

- Conditioning run enabled
- Performance slider set to 'Balanced' while on DC power
  - Changes to the performance slider must be made while on DC power. Configuring the slider on AC power will not change the setting for DC power.
- Display brightness must be set to 250 nits on DC power. See the [BENCHMARKING RULES](#) section for additional details.
- When using BAPCo benchmarks to evaluate performance or battery life, one should install the latest production drivers from the hardware manufacturer. Drivers included with the operating system may not be device specific or newer drivers may be available from the device manufacturer. Using incorrect drivers could result in significantly reduced performance.

### Heads Up Display (HUD)

The Heads Up Display appears in the upper right corner of the desktop and provides information about the currently running project.



Figure 9: MobileMark 30 Heads Up Display

- Version: Displays the MobileMark 30 Professional version number (major.minor.patch.build).
- Est Battery: Estimated battery life (in minutes) appears after one completed iteration.
  - Note that battery run down is not linear, please complete a full run down for most accurate results
- Project: The project name of the current test.

- Scenario: The name of the currently running scenario
- Status: The name of the currently running script

### **Keyboard/mouse input blocking**

Once workload execution begins, the workload manager will lock the system to prevent accidental input from the mouse or keyboard from disrupting the workload automation. The workload manager will continue to execute the selected scenarios for the current project and will display the results at the successful conclusion of the run. Refer to the [STOPPING A RUN IN PROGRESS](#) section below for additional information on keyboard and mouse input blocking.

### **Error handling**

By default, when MobileMark 30 Professional encounters an error during the execution of a project, the workload manager will log the error and then reboot the system as long as there is still charge remaining.

### **Advanced troubleshooting**

MobileMark 30 Professional offers an advanced troubleshooting option with the BENCHMARK\_TIMEOUT\_MULT environment variable. This variable increases the amount of time a benchmark script waits before throwing an error and either attempting a retry or halting the run. The default value for BENCHMARK\_TIMEOUT\_MULT is 1.0. Increasing the value to 2.0 doubles the error handling timeout, 3.0 triples the timeout, and so on. Try increasing this value if the SUT experiencing errors due to a lower performing HW configuration (HDD vs SSD, less system RAM installed) or if errors are occurring during low remaining battery charge.

### **Stopping a run in progress**

If it becomes necessary to stop a benchmark run in progress, follow these steps:

1. Press the CTRL-ALT-DEL keys at the same time to bring up the Windows change password screen.
2. Click 'Cancel' to return to the desktop.
3. Keyboard and mouse input should now be enabled.
4. Navigate to the systray in the lower right corner of the screen and find the BAPCo icon, as shown below.
5. Right click the icon and choose 'Stop'.



*Figure 10: BAPCo systray icon. The green triangle indicates MobileMark 30 Professional is running.*

## Reference system

MobileMark 30 Professional performance scores are normalized using a reference system. The reference system scores '1000' for DC performance on professional scenario and '1000' on the overall MobileMark 30 Professional DC performance score. The MobileMark 30 Index score for the reference system is ~585. The battery life of the system under test is reported in hours and minutes.

### Lenovo ThinkPad T14 Gen 4

- **System:** Lenovo ThinkPad T14 Gen 4
- **Processor:** Intel 13th Generation Intel Core i5-1345U vPro Processor (E-cores up to 3.5 GHz, P-cores up to 4.70 GHz)
- **Operating System:** Windows 11 Professional 22H2 (10.0.22621.xxxx)
- **Memory:** 32GB DDR5-5200Mhz (16 GB Soldered + 16 GB SODIMM)
- **Display:** 14" WUXGA (1920 x 1200), IPS, Anti-Glare, Non-Touch, 100% sRGB, 400 nits, 60Hz, Low Power, Low Blue Light
- **Storage:** 256 GB SSD M.2 2280 PCIe Gen4 TLC Opal
- **Graphics:** Intel Iris Xe Graphics
- **Camera:** 5MP RGB+IR with Microphone
- **Wireless:** Intel® Wi-Fi 6E AX211 2x2 AX
- **Battery:** 4 Cell Li-Polymer 52.5 Wh
- **AC/DC OS Power Mode:** Balanced (for DC performance measurement purposes)

## Applications

MobileMark 30 Professional installs and/or uses the following applications. Only one instance of the application can be installed. BAPCo recommends users start with a clean installation Windows 11 or remove following applications if previously installed.

- Corel WinZip 26.0 Enterprise
- Microsoft Office LTSC Professional Plus 2021 (v16.0.14332.20493)
  - Microsoft Word 2021 Professional Plus
  - Microsoft PowerPoint 2021 Professional Plus
  - Microsoft Excel 2021 Professional Plus
  - Microsoft Outlook 2021 Professional Plus
- Adobe Photoshop<sup>®</sup> CC (v25.0)

Please note some of these applications have licensing restrictions which cause them to expire after 30 days requiring a full-restore of the system under test from backup and then installing new instance of MobileMark 30 Professional.

## Scenarios

MobileMark 30 Professional scenarios and workload descriptions are below.

### **Professional**

The Professional scenario has been designed to focus on the activities of the modern mobile office user who seeks to remain productive while on the go. These activities include spreadsheets, word processing, presentations, PDFs, image manipulation, file compression, decompression with encryption and file launches.

## Support

Technical support for MobileMark 30 Professional is provided on the web at <https://bapco.com/support> and via email at [support@bapco.com](mailto:support@bapco.com).

MobileMark 30 Professional Minimum system requirements:

- System running on DC battery power
- **CPU:**– CPU: 2015 or newer x86 processor (Intel 6<sup>th</sup> Generation Core or AMD A6/A8/A10-7000 series APU or newer), 2GHz or higher, dual core or higher
  - **NOTE:** OS Power modes may reduce performance below minimum hardware requirement levels. CPU must be capable of 2GHz or higher during the entirety of the test.
- **RAM:** 16 GB
- **Storage (primary boot drive):** 30GB of free space.
- **Operating System:** Microsoft® Windows® 11 64-bit 22H2 (10.0.22621.xxxx)
- **Minimum Display Resolution:** 1366×768
- **Graphics:** DirectX 12 compatible, 2GB of VRAM
- **Supported Languages:** English (US)
  - Additional languages to be added in future update: Brazilian Portuguese, Simplified Chinese, French, German, Italian, Japanese, Polish, Spanish (SP)

Results run on systems that do not meet the minimum requirements are valid for publication, however BAPCo will not be able to offer technical support for those configurations.

When contacting support please include the following information.

- MobileMark 30 Professional version, e.g. 1.0.0.123
- System configuration information
- Step by step instructions for reproducing the problem
- Rate of error, e.g. 100%, 50%
- Archive of the results folder for errored project run located at:
  - *Desktop\Results\MobileMark30\<project\_name>*
- Ensure the errored project run in above location contains
  - error folder for benchmark error logs from the failing run.
  - databases folder for MobileMark30.db and MobileMark30\_script.db file.
- If reporting a problem with installation, locate the benchmark installation logs:
  - *%TEMP%\MobileMark30\_Disc1.log*
- Archive the folder and the logs listed above using WinZip, WinRAR, etc.
- Attach the archive file to the support request email sent to BAPCo support, or please upload the archive file through the form at <https://bapco.com/support>
- When reporting multiple errors, please include a description for each problem being reported.

## MobileMark 30 Professional Benchmarking Run Rules v1.0

This document describes the rules governing publication of results derived from running the BAPCo MobileMark 30 Professional benchmark. Any licensee who wishes to publish such results is obliged to adhere to all rules and regulations described in this document or other documents provided by BAPCo related to execution and reporting of MobileMark 30 Professional benchmark results. BAPCo reserves the right to change the rules outlined in this document at any time. Licensees are encouraged to consult BAPCo website at [www.bapco.com](http://www.bapco.com) for the latest information regarding execution and publication rules. For more information, please consult the Software License Agreement.

### Benchmark Execution

#### Workload Manager

All benchmarks must be run using the MobileMark 30 Professional Workload Manager. This utility is an executable program that runs the MobileMark 30 Professional benchmark. It also includes a module that generates the final benchmark results for the system under test. All published results must be derived only from a complete and correct run of the benchmark. All tests must be performed without modification to any part of the MobileMark 30 Professional software.

The collective set of hardware and software used in generation of an official MobileMark 30 Professional result must be available to the public as defined by BAPCo's availability criteria. The following specific rules apply:

#### Operating System

The operating system used to generate and publish results must be a publicly available release from the original software vendor. Consult the product manual at [www.bapco.com](http://www.bapco.com) for the current list of supported operating systems. Upgrade of specific drivers that are released and maintained by vendors other than the operating system vendor (e.g. graphics drivers, disk drivers, motherboard setting files, multimedia drivers) is allowed provided these drivers are publicly available, release-quality drivers from original vendors of such drivers. Licensees may also use operating system service packs, API updates (e.g. Direct X) and other such updates provided they are publicly available, release-quality software from the original vendor, and that they meet the benchmark's Operating System requirements. Licensees should also consult license agreements from individual software vendors to ensure compliance with vendor benchmark restrictions.

## **System Configuration**

To ensure the integrity of MobileMark 30 Professional results, test systems must maintain the same hardware configuration and software settings throughout the execution of the test. Any modification to hardware configuration and/or software settings will invalidate the results

### **Hardware**

The system hardware used to generate official MobileMark 30 Professional results must be publicly available at the time of publication or within 60 days thereafter. The system must be purchasable as a complete platform from an Original Equipment Manufacturer within 60 days of publication. Alternatively, licensees may report results for systems which may not be available from an OEM but whose individual components are publicly available and purchasable from various vendors at the time of publication or within 60 days thereafter. Note that the 60-day grace period does not apply to system software. All software used must be publicly available and be of release-quality available from the original software vendor.

### **Software**

OEM software used to generate official MobileMark 30 Professional results have no grace period, and therefore must be release quality and publicly available from the original vendor immediately upon publication of results.

### **Performance or Battery Life Enhancements**

Use of performance or battery life enhancements such as using a software utility or other technique is allowed under the following conditions. Any performance or battery life enhancing software must be a release-quality, publicly available offering from the original vendor(s). Any performance or battery life enhancing techniques must be accessible to the public at large. Use of either method must be documented and included with the FDR submission. Performance or battery life enhancing techniques must not compromise the integrity of the system under test or the MobileMark 30 Professional software. The use of drivers or other software specifically optimized for the purpose of increasing MobileMark 30 Professional battery life or performance qualification scores is expressly prohibited. BAPCo shall reserve the right to review the usage of such tools or techniques and invalidate submitted results at its sole discretion.

### **Screen Brightness**

The test system display brightness must be set to a minimum brightness of **250** cd/m<sup>2</sup> (nits) for

LCD backlit display panel or comparable Perceptual Contrast Length (PCL) value as determined via the MobileMark 30 screen Brightness Profiler wizard for valid FDR submission. This screen brightness setting must be maintained for the duration of the test, except when “Modern Standby” is in use (see below). Screen dimming, ambient light sensing or use of any other technology to alter the screen brightness during the test is not allowed unless specifically supported by the benchmark.

The new screen Brightness Profiler wizard helps guide the user through the process of setting the SUT screen brightness while on DC (battery) power, and includes the following:

- Display warm-up, as needed.
- Display of black and white checkerboard test pattern, with optional overlay for probe position.
- Adjustment of screen brightness to have comparable Perceptual Contrast Length (PCL) to **250** cd/m<sup>2</sup> LCD backlit display panels, with a worse case limit of **250** cd/m<sup>2</sup>.
- Systems not capable of reaching the specified brightness must be documented as part of any FDR submission and must run at maximum brightness setting.

Refer to the Brightness Profiler user guide at <http://www.bapco.com/products/mobilemark-30> for more information.

## **Modern Standby**

Use of operating system supported Modern Standby is allowed at the tester’s discretion provided that:

- The test system meets the requirements of the Microsoft Modern Standby specification: <https://learn.microsoft.com/en-us/windows-hardware/design/device-experiences/modern-standby>
- Standby/Hibernate: Use of operating system supported standby/hibernate capability is NOT allowed, with the exception of Modern Standby when used in accordance with the rules above.

## Windows 11 Power Modes and Battery Saver

The Windows 11 Power Modes may be used to configure the system under test, provided that the slider position remains the same for the duration of the test (Ex. Best power efficiency, Balanced, Best performance).

- The Battery Saver threshold must not exceed 20%
- The setting “Lower screen brightness while in battery saver” must be unchecked.

## Full Disclosure Report

A complete Full Disclosure Report (FDR), must be generated by the Workload Manager for all published results. This FDR must include the MobileMark 30 Professional battery life rating and the performance qualification, as well as the performance scores for each of the three scenarios. Additional information about the configuration of the system under test must also be included in the FDR. The format and the information included in this report is determined by BAPCo. No modifications should be made to the FDR (modifications to the FDR will invalidate the FDR).

## Publication of results

BAPCo requires all licensees to submit FDRs to the BAPCo website (<https://results.bapco.com>) for all publicly available published results. Results may be submitted by any of the following methods:

1. Click ‘submit results’ button from inside the benchmark.
2. Upload results to website: <https://results.bapco.com>
3. Email submission: [report@bapco.com](mailto:report@bapco.com).

FDR’s produced from Battery Estimation Mode may not be submitted to BAPCo or published.

Licensees are responsible for retaining FDR records for all published results. Results submitted by email will also be published at [results.bapco.com](https://results.bapco.com).

All FDRs submitted by licensees to BAPCo are subject to a 10-working day review period. During this review period any BAPCo member can challenge the submitted FDR or submit a counter FDR. When a challenge occurs or a counter FDR is submitted, BAPCo will decide which, if any, of the FDRs will be accepted for inclusion in the FDR database.

Any publication of results must be accompanied by at least the system model number plus any discrepancies between the shipping configuration of that system model and the configuration of the system model tested.

Results collected on systems that do not meet the minimum system requirements for running MobileMark 30 Professional may be published if submitted to BAPCo for inclusion in the FDR database. However, BAPCo will only offer technical support for system configurations that meet or exceed the minimum system requirements for MobileMark 30 Professional.

Any publication of MobileMark 30 Professional results must include the MobileMark 30 Professional Battery Life score, the MobileMark 30 Professional DC Performance score, and the MobileMark 30 Professional Index score from the same run.

Any publication of MobileMark 30 Professional results must include a link to the matching result in the online results database at [results.bapco.com](https://results.bapco.com).

### **Relative Performance**

Licensees have the option of publishing the relative performance (and battery life) of two or more systems (for example, “System X is 15% faster than System Y using MobileMark 30 Professional”) if the licensee adheres to the Benchmark Execution and Publication rules above for all systems.

If a licensee publishes the relative performance of two or more systems and one or more of those systems does not adhere to the Benchmark Execution and Publication rules above, the licensee must state that the performance results are “estimated” or “projected” when making the claim (for example, “We estimate that System X is 15% faster than System Y using MobileMark 30 Professional”). Publishing absolute scores of estimated or projected results is not permitted.

### **Availability**

When publishing MobileMark 30 Professional results, the tested system must be available for purchase by the public either at the time of publication or within 60 days after publication. Note that the 60-day grace period does not apply to system software. All software used must be release-quality and made publicly available from the original software vendor.

### **FDR Processing**

The submitted FDRs are processed by BAPCo and classified as:

*Released for publication* - The results are released for publication as filed.

*Rejected* - The results are rejected for publication as filed.

The Released for publication classification is in no way a validation or an endorsement of the results by BAPCo. Licensees are free to publish results if a complete and valid FDR has been generated and submitted to results.bapco.com. BAPCo will perform frequent audits of the submitted FDRs and reserves the right to revoke the license granted to licensees who have not adhered to the regulations described in this or other MobileMark 30 Professional documentation. In the case where an FDR is returned to the licensee with rejected classification, the licensee must immediately stop publication of the rejected results until the matter is clarified by BAPCo. Any publication of results must be accompanied by at least the system model number plus any discrepancies between the configuration of the stated model number and the configuration of the system tested. Any publication of MobileMark 30 Professional results must include the MobileMark 30 Professional Battery Life score, the MobileMark 30 Professional Overall DC Performance score, and the MobileMark 30 Professional Index score from the same run. The term MobileMark is a registered trademark of the Business Applications Performance Corporation and may only be used in conjunction with performance metrics generated by the MobileMark 30 Professional Workload Manager. Any other performance characterizations may be made but must be derived from the performance metrics generated by the Workload Manager. The terms MobileMark and MobileMark 30 Professional may not be used as the performance metric describing such characterizations.

### **Publication of Results on Non-OEM Platforms**

BAPCo accepts FDR submissions and allows the publication of performance qualified battery life indices when using MobileMark 30 Professional for making "non-OEM" platform comparisons. This includes performance-qualified battery life comparisons on systems that are not shipped from an OEM as a complete platform. An example of such comparisons would be swapping to a different hard disk or changing the amount of RAM in the test system and demonstrating the impact on the benchmark results. Results submitted to BAPCo or published on non-OEM platforms must be marked as Modified on the accompanying FDR submission and whenever appearing in publications of any kind. Any publication of MobileMark 30 Professional results must include the MobileMark 30 Professional Battery Life score and MobileMark 30 Professional DC Performance Score and MobileMark 30 Professional Index Score from the same run.