# SYSmark® 25

July 13th, 2020
Revision 1.1


Revision History:

1.0 – Initial version of the SYSmark 25 White Paper

1.1 – Corrected typo about RAM channels in Section 2.8, Corrected reference link names in Section 2.1, Updated APPENDIX A with information on licensing.

## About BAPCo

Business Applications Performance Corporation (BAPCo) is a non-profit consortium with a charter to develop and distribute a set of objective performance benchmarks for personal computers based on popular computer applications and industry standard operating systems.

For more information about BAPCo or a complete list of the current membership, see our website at http://www.bapco.com/.

# Table of Contents

# 1    Introduction

SYSmark® 25 is the latest revision of the preeminent system performance benchmark series that measures and compares PC performance using real world applications, featuring new workloads, features, updated third-party applications, updated system configuration tool, localized GUI support for nine different languages (to be added in a future update), and support for Microsoft Windows 10 64-bit.

SYSmark 25 gives commercial and government IT decision makers, media, channel buyers, consultants, and system and component designers and manufacturers an objective, government and non-government agencies and standards bodies an easy-to-use tool to evaluate PC performance across the wide range of activities that a user may encounter.

SYSmark 25 is designed for those who want to:
- Evaluate and compare current Windows-based desktop, notebook, 2-in-1 and tablet computers for purchase consideration based on system performance, system responsiveness and energy consumption.
- Provide useful information to their audience(s) to assist in the evaluation and purchase of desktop, notebook and tablet computers.
- Evaluate desktop, notebook and tablet computers to better optimize the performance, responsiveness, or the energy consumption of the system
- Establish standards for the measurement of system performance, system responsiveness, and energy consumption.

Unlike synthetic benchmarks, which artificially drive components to peak capacity or attempt to deduce performance using a static simulation of application behavior, SYSmark 25 uses real applications, real user workloads, and real data sets to accurately measure how overall system performance impacts user experience.

SYSmark 25 builds upon BAPCo's 29-year history of building benchmarks to evaluate platform technologies.  Benchmarks designed by BAPCo are the result of cooperative development between companies representing the breadth of the computing industry.  They harness a consortium of knowledge to better reflect the business trends of today and tomorrow.

This document describes the methodologies employed in the development of SYSmark 25. For detailed instructions on how to install and run SYSmark 25 products, please refer to the documentation provided on the installation media and/or the BAPCo web site (www.bapco.com).

Refer to the BAPCo product versions FAQ located in the SYSmark 25 support section at http://www.bapco.com/support for more information.

## 2 BAPCo Development Process

BAPCo creates benchmarks in accordance with the BAPCo Development Process, a set of milestones and checkpoints collaboratively developed and agreed upon by the BAPCo membership.

Early in the process, prevailing business personal computer usage models are identified and grouped into scenarios according to their fit within a workflow. Applications are selected for each usage model on the basis of market research and technical feasibility.

BAPCo members then join together with expert application users in development sessions to collaboratively develop a workload specification for each scenario, defining each user/PC interaction which is to be simulated by the benchmark.

The goal of the development sessions is to produce representative business application workloads for the benchmark. Each application workload consists of three elements: the input data set, the tasks performed on the input data set, and the generated output. An example of generated output would be an image generated through an iterative process of steps to create a desired appearance. These three elements of the workload are chosen to represent the workflow of a user skilled in each given application.

After the workload specifications are created at the development sessions, BAPCo developers implement the workloads according to those specifications while satisfying benchmarking constraints to ensure the stability of the benchmark, the consistency of results, and the feasibility of implementation and distribution of the benchmark.

## 2.1 Milestone Overview

The BAPCo development process is divided into six major phases (Initialization, Design and Planning, Implementation, Validation, Characterization and Launch).  Each phase consists of a series of milestones, some of which may be worked on concurrently.

The membership must vote to close each milestone.  Once all the milestones within a phase are complete, the membership must vote to exit the phase and enter the next phase.  BAPCo members work in a collaborative process where decisions regarding products are made by majority vote rather than unanimously.

The following is the list of the development phases and the corresponding milestones.  Some of these milestones are explained in greater detail in the following sections, as noted in this list.

1. **Initialization Phase**
   a. Milestone 0 – Committee kickoff
   b. Milestone 1 – Benchmark market and customer analysis
   c. Milestone 2 – Product positioning and customer value proposition
   d. Milestone 3 – Preliminary marketing requirements document
   e. Milestone 4 – Select product name
   f. Milestone 5 – Final marketing requirements document
2. **Design and Planning Phase**
   a. Milestone 6 – Preliminary engineering requirements document
   b. Milestone 7 – Usage model selection *(see section 2.2)*
   c. Milestone 8 – Application selection *(see section 2.4)*
   d. Milestone 9 – Define member resource commitments
   e. Milestone 10 – Define development infrastructure
   f. Milestone 11 – Define scoring methodology *(see section 2.5)*
   g. Milestone 12 – Define application licensing requirements
   h. Milestone 13 – Plan and execute workload development sessions *(see section 2.6, 2.7)*
   i. Milestone 14 – Define product release criteria
3. **Implementation Phase**
   a. Milestone 15 – Create implementation schedule
   b. Milestone 16 – Determine reference machine *(see section 2.8)*
   c. Milestone 17 – Software engineering *(see section 2.9)*
4. **Validation Phase**
   a. Milestone 18 – Validation testing
   b. Milestone 19 – Define risk management plan
5. **Characterization Phase**
   a. Milestone 20 – Characterization testing
6. **Launch Phase**
   a. Milestone 21 – Product pricing
   b. Milestone 22 – Pre-launch materials
   c. Milestone 23 – Release to manufacture vote and sign-off
   d. Milestone 24 – Distribute early press evaluation
   e. Milestone 25 – Duplicate and distribute media
   f. Milestone 26 – Post-launch materials

## 2.2   Usage Model, Sub Scenario, and Scenario Selection

In milestone 7 of the BAPCo Development Process, PC usage models are chosen for inclusion in a benchmark.  For SYSmark 25, BAPCo chose a wide variety of usage models in which the user experience is influenced by system performance.

BAPCo then grouped related usage models into 7 sub scenarios – Document Editing, Spreadsheets, Web Browsing, Photo Editing, Photo Organization, Video Editing, and Responsiveness.  Each of these sub scenarios is described as follows:

#### Document Editing

The Document Editing sub scenario models productivity usage of email creation/management, PDFs, presentations, and word processing.

#### Spreadsheets

The Spreadsheets sub scenario models scientific simulations, forecasting, modeling within a spreadsheet application.

#### Web Browsing

The Web Browsing sub scenario site loads, web compute, and tab switching within a web browser.

#### Photo Editing

The Photo Editing sub scenario models photography editing and post processing.

#### Photo Organization

The Photo Organization sub scenario models photo cataloging and ML based image recognition.

#### Video Editing

The Video Editing sub scenario models nonlinear video editing and composite video rendering for use in social media and other online venues.

#### Responsiveness

The Responsiveness sub scenario models usages where the ability of the system to react quickly to the user's input impacts the experience of using the system (i.e. – users want to feel like the system responds smoothly and quickly).  Some workloads include: application launches, file launches, and multi-tasking.

## 2.3　Scenario Grouping

The sub scenarios are grouped according to the descriptions below, as illustrated by Figure 1.
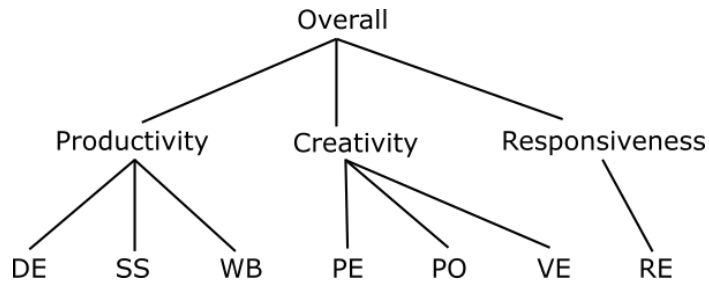


**Figure 1: SYSmark 25 Scenario Grouping**

**Productivity**

The Productivity scenario contains Document Editing, Spreadsheets, and Web Browsing sub scenarios.

**Creativity**

The Creativity scenario contains Photo Editing, Photo Organization, and Video Editing sub scenarios.

**Responsiveness**

The Responsiveness scenario contains usage models such as application launches, and file opens taken from other sub scenarios.

## 2.4    Application Selection

In milestone 8, after the usage models have been collected into scenarios and sub scenarios, applications are chosen for the scenarios on the basis of market research and technical feasibility.

BAPCo strives to include the latest versions of the chosen applications in the final product, except in rare cases where technical limitations may prevent doing so.

For SYSmark 25, BAPCo has identified the following representative applications for the four usage scenarios.

A summary of the application versions installed and used by SYSmark 25 version 1.0.0.24 is included in Appendix A.

**Table 1: Productivity Applications**

| Application | Version | Document Type |
|---|---|---|
| Adobe® Acrobat® | Pro DC | Portable document files, image files |
| Audacity® installer | 2.3 | Application Installation |
| AutoIt | 3.3 | AU3 scripting files |
| Corel® WinZip | 21 | Zip files, assorted document files |
| Google Chrome | 81 | Web Browser |
| Microsoft® Excel® | 2019 | Spreadsheets |
| Microsoft® Outlook® | 2019 | E-mails |
| Microsoft® PowerPoint® | 2019 | Presentation files |
| Microsoft® Word® | 2019 | Word processing documents |
| Shotcut installer | 19 | Application Installation |

**Table 2: Creativity Applications**

| Application | Version | Document Type |
|---|---|---|
| Adobe® Lightroom® | CC Classic | Image files |
| Adobe® Photoshop® | CC 2019 | Image files |
| Adobe® Premiere Pro® | CC 2019 | Video files |

## 2.5    Scoring Methodology

In milestone 11, BAPCo decides the types of results that will be produced by a benchmark and the scoring methodology that determines how those results are calculated.

Importantly, BAPCo determines the scoring methodology before determining the content of the workloads, which helps ensure that a methodology is chosen for its ability to generate results that correspond to user experience, not for the results it produces on a pre-determined set of workloads.

For SYSmark 25, BAPCo evaluated the merits of a variety of scoring methodologies and chose a methodology on the basis of how it met the following criteria:
- The scoring methodology should give expected results:
  - The resulting score should differentiate between systems with different performance.
  - The resulting score should be repeatable and not have high variation.
  - The resulting score should not be affected by benchmark artifacts, such as the number of tasks within a scenario.
- The relative performance between any two systems should not be affected by the selection of the calibration system.
- The resulting score should reflect the performance of user initiated multitasking operations.
- The scoring methodology should be easy to understand.

SYSmark 25 measures system performance by measuring the response time of tasks on a PC using real applications and simulated user input.  In the SYSmark 25 scoring methodology, task response times are used to generate a performance rating that reflects the user experience.  The faster a PC responds to the application workloads in SYSmark 25, the higher its SYSmark 25 performance ratings will be.

For more information on how task response times are measured, see section 2.9.

A complete SYSmark 25 run will output an SYSmark 25 Overall performance rating, a Productivity performance rating, a Creativity performance rating, and a Responsiveness performance rating.

### Sub Scenario Rating

Each sub scenario has a rating calculated by taking the sum of the response times of tasks in that sub scenario as performed on the test system and then comparing it with the sum of those same task response times as performed on the calibration system (see section 2.8).  The calibration sum is divided by the measured sum on the test system and multiplied by 1000.

### Productivity Rating

The Productivity Rating is calculated by taking the geometric mean of all the Document Editing (DE), Spreadsheets (SS), and Web Browsing (WB) sub scenario ratings (prior to rounding).  The result is then rounded to the nearest integer.

### Creativity Rating

The Creativity Rating is calculated by taking the geometric mean of all the Photo Editing (PE), Photo Organization (PO), and Video Editing (VE) sub scenario ratings (prior to rounding). The result is then rounded to the nearest integer.

### Responsiveness Rating

The Responsiveness rating is simply the Responsiveness sub scenario rating taken as is.

### Overall Rating

The SYSmark Overall Rating is calculated by taking the geometric mean of all 7 of the sub scenario ratings (prior to rounding). The result is then rounded to the nearest integer. To obtain an overall rating, you must run all both parent level Productivity and Creativity scenarios (all 7 sub scenarios).

### Productivity and Creativity Energy Consumption

When the Energy Consumption Test is enabled each parent level scenario has an energy consumption value in Wh. This is an aggregate of the total energy consumed (as measured by the power meter) during the active workload portion of the scenario. Each iteration's energy consumption is averaged to produce the scenario energy consumption value.

### Overall Energy Consumption

When the Energy Consumption Test is enabled the SYSmark Overall Energy Consumption is determined by taking the summation of all the Scenario Energy Consumption values (prior to rounding).

## 2.6 Workload Development Sessions

Once the usage models, scenarios, applications, and scoring methodology for the benchmark are decided, BAPCo members and application experts meet to create the application workloads that will be used in the benchmark.

For SYSmark 25, the workload development sessions consisted of a one week of face-to-face meetings that included representatives from BAPCo member companies and expert application users who had professional experience with the applications chosen for the benchmark. The application experts included professionals in the fields of small business marketing, financial forecasting, graphic design, video editing, web development, and enterprise IT deployment.

In the workload development sessions, the experts take the lead, weaving the usage models supplied by BAPCo into a storyboard of user interactions with a series of applications. Each user/PC interaction is written down in a workload specification, the specification used to automate the workloads later.

At the end of the workload development sessions, BAPCo comes away with a detailed workload specification for each of the benchmark scenarios and all of the input data sets needed to reproduce the workloads created at the sessions.

### Additional Workload Considerations

The following additional factors come into consideration at the workload development sessions:

#### Input Data Set

Frequently in the sessions, the experts need raw digital content to serve as an input data set for a workload. Examples of such content might include a video to transcode, a presentation to modify, or documents to compress. When experts need such content, care is taken to ensure that they use something that is functionally representative of content they might use or encounter professionally.

For instance, if pictures are needed in order to create a web photo gallery, an expert might walk outside and take pictures using the same equipment he/she uses professionally. If a 3D model of a building is needed for a landscape workload, an expert might purchase a stock model from his/her usual online resource. Like the user interactions, all of these source materials are captured at the development session and used later in the development of automated workloads.

#### Task Switching and Concurrent Execution

In some cases, experts are encouraged to switch between open applications (e.g., as a user might between an e-mail program, word processor, and spreadsheet) or to leave activities running in the background as they perform work in another application (e.g., as a user might leave a compression task to run in the background while browsing the web).

## 2.7    Scenario Workload Descriptions

The scenario workloads created at the workload development sessions for SYSmark 25 are described below:

### Productivity

The Productivity scenario models office environment like usage including word processing (mail merge, document comparison, and PDF conversion), spreadsheet data manipulation (data modeling, financial forecasting), web browsing, email, presentation editing, software development (code compilation), application installation, and archiving files.

### Creativity

The Creativity scenario models editing digital photos (applying filters and creating HDR photos), cataloging digital photos (organizing catalog, use of facial detection to group people), and editing digital video (create a timeline from various source clips and transcoding the output).

### Responsiveness

The Responsiveness scenario is a combination of operations taken from the Productivity and Creativity scenarios. Such operations include application opens, file opens, file saves, and more.

## 2.8    Calibration System

The calibration system is a system chosen in milestone 16 as a reference point for all other SYSmark 25 results.  BAPCo chose the configuration below for its wide availability and its representation of a typical mainstream PC at the time of release of SYSmark 25.

SYSmark 25 has been calibrated in such a way that a PC with performance equivalent to this calibration system for a given workload will have a performance rating of 1000.  A system twice as fast as the calibration system on a given workload (or, equivalently, that responds in half the time on average) will have a performance rating of 2000.  This is true for both overall ratings and scenario ratings.

The calibration system for SYSmark 25 has the following configuration:
- Lenovo® ThinkCentre™ M720q
- Processor: Intel® Core™ i5-8500T @ 2.10 GHz
- Operating System: Microsoft Windows 10 Pro x64 19H2 (10.0.0.1863.418)
- RAM: 1x8 GB DDR4 single channel
- Graphics: Intel® HD Graphics 630
- Resolution: 1920x1080
- Audio: Integrated High Definition Audio
- Storage: 256GB NVMe SSD
- Networking: Integrated Gigabit Ethernet

A fresh operating system installation is performed on the system (not an OEM factory optimized image).

The calibration sum for each sub scenario is obtained according to the following process:
- Run SYSmark 25 on the calibration system (process idle tasks disabled, conditioning run enabled, Energy Consumption Test enabled, 3 iterations)
- For each sub scenario we:
   - Identify the median iteration by finding the iteration with the median sub scenario rating score
   - The calibration sum for the particular sub scenario is the response time total from that sub scenario in the median iteration
- The Energy Consumption value for each scenario and overall is derived from the median iteration for each scenario

For more details about the configuration of the calibration system, please contact support@bapco.com.

Please note that the minimum requirements to run SYSmark 25 products are listed in Appendix C and are not equivalent to the calibration system.

## 2.9 Benchmark Implementation

Once the workload specifications have been created, BAPCo begins the important work of translating the workload specifications into an automated benchmark in milestone 17.

SYSmark 25 is built upon scripts that do things much the way a user would, using controls like buttons, text input boxes, and menus to navigate applications. See Appendix D for screenshots of the benchmark in action.

To ensure that SYSmark 25 has deterministic behavior, BAPCo uses a framework to install applications, collect system information, run the scenario scripts, record performance measurements, calculate performance ratings, and display test results. The framework is kept lightweight, consuming a minimal amount of memory and compute resources, in order to ensure that performance measurements reflect the workload performance and do not include overhead from the framework.

The fundamental measurement metric in SYSmark 25 is *response time*. Response time is defined as the time it takes the computer to complete a task that has been initiated by the automated script. A task can be initiated by a mouse click or a keystroke. The duration of each task is measured by the framework. Examples of tasks include launching an application, finding text in a document, copying a file, encoding a video, and performing an image manipulation.

The framework has several methods of detecting task completion, depending upon the method the application uses to signal task completion to the user. For example, the framework may wait for the application to show a completion message in the form of a pop-up window, or may wait for a progress dialog to disappear and for control of the application to be returned to the user.

# 3    Workload Characteristics

This section provides data illustrating the performance characteristics of SYSmark 25 version 1.0.0.24.

## 3.1    Sensitivity Analysis

The series of charts below shows the sensitivity of SYSmark 25 to different system characteristics, including the amount of CPU frequency, number of CPU cores, storage, graphics adapter, system memory, and display resolution.

Within each study only one system component (e.g. memory) is varied.  All the other system components are held constant.  To best illustrate the sensitivity, one configuration is chosen as a baseline and the ratings for the other configurations are shown as the percentage difference relative to the baseline.

Due to system implementation differences, these figures are only accurate for the configuration description listed below in each sub-section.  These sensitivities will vary from one configuration to the next.

### 3.1.1    Sensitivity Analysis Base System Configuration

| | |
|---|---|
| **CPU Model** | Intel Core i9-9900k |
| **Base CPU Frequency** | 3.3 GHz |
| **CPU uArch** | Intel® Core 9000 Series Processors |
| **Physical Cores** | 8 |
| **Logical Cores** | 16 |
| **Chipset** | Z390 |
| **RAM** | 2 x 8GB DDR4-2666 (16 GB Total) |
| **Storage** | Intel 660p SSD, 512 GB M.2 NVMe |
| **OS** | Windows 10 x64 May 2019 Update aka "19H1" |
| **Resolution** | 1920 x 1080 @ 60 Hz |
| **Graphics** | Intel UHD Graphics 630 |

Note: For these tests, Intel Turbo Boost Technology and Intel Hyper-Threading Technology have been disabled to better highlight the specific component being tested in each sensitivity study.

### 3.1.2    Sensitivity to CPU Frequency

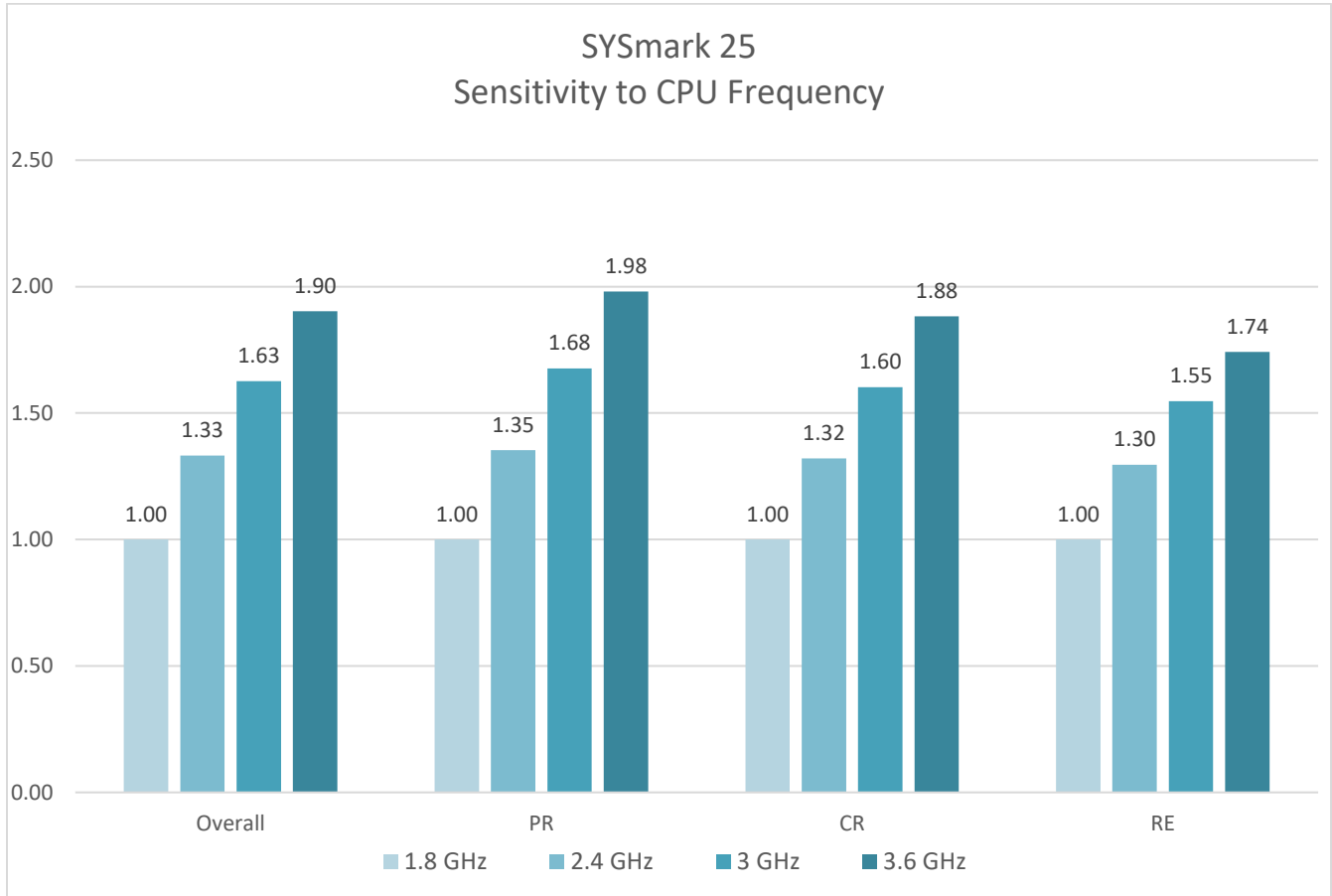The CPU frequency of a system is changed from 1.8 GHz to 3.6 GHz in steps of 600 MHz



**Figure 1: CPU Frequency Sensitivity**

### 3.1.3 Sensitivity to CPU Core Count

The number of CPU cores is controlled by changing system BIOS settings to enable 2 cores, then 4 cores, 6 cores, and finally all 8 cores of an 8-core processor.
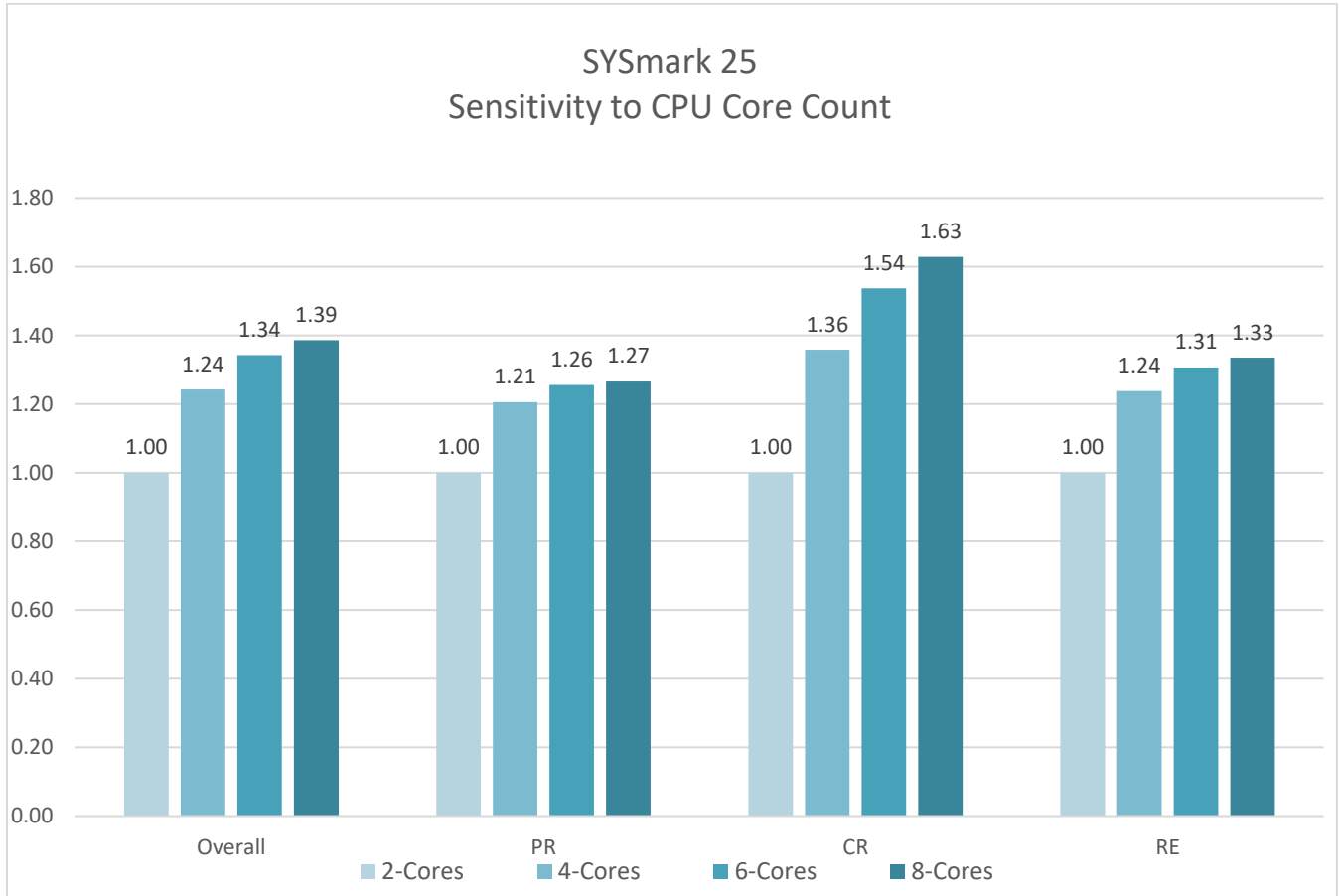


**Figure 2: CPU Core Count Sensitivity**

### 3.1.4    Sensitivity to Storage

The primary storage device is changed according to the figure below.  A Seagate 500GB 5400RPM hard drive, Western Digital 7200RPM SATA III 1TB hard drive, Intel® SSD 545s, Intel® SSD 660p and Intel® Optane™ SSD 900p
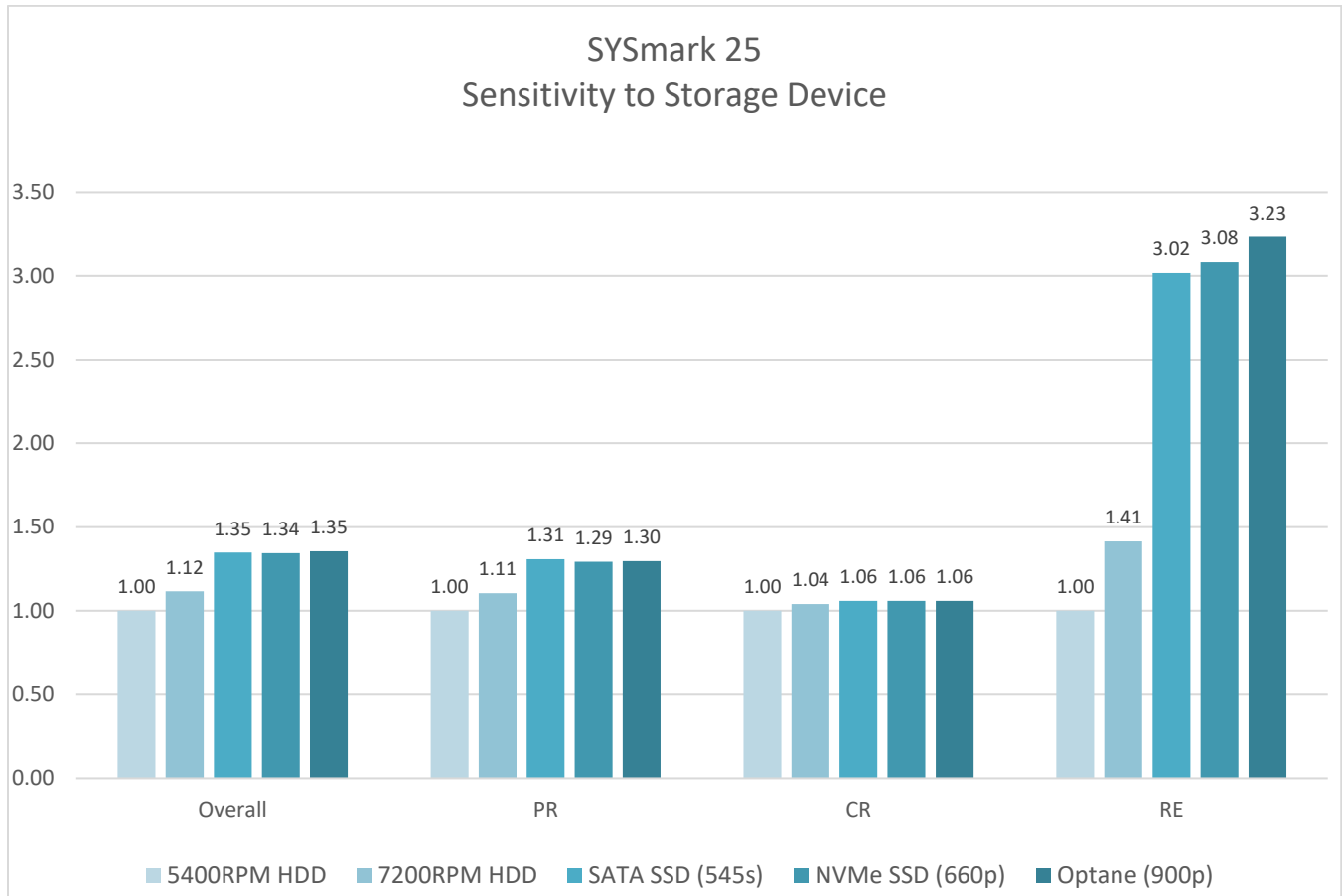


**Figure 3: Storage Sensitivity**

### 3.1.5    Sensitivity to Graphics Subsystem

The video card is changed according to the table below.  For these tests, we used discrete video cards all from the same manufacturer to ensure the graphics driver family from each configuration was constant.  A Nvidia GeForce® GT 1030, GeForce® GTX 1650, GeForce RTX™ 2060, and GeForce RTX™ 2080 Ti were used.
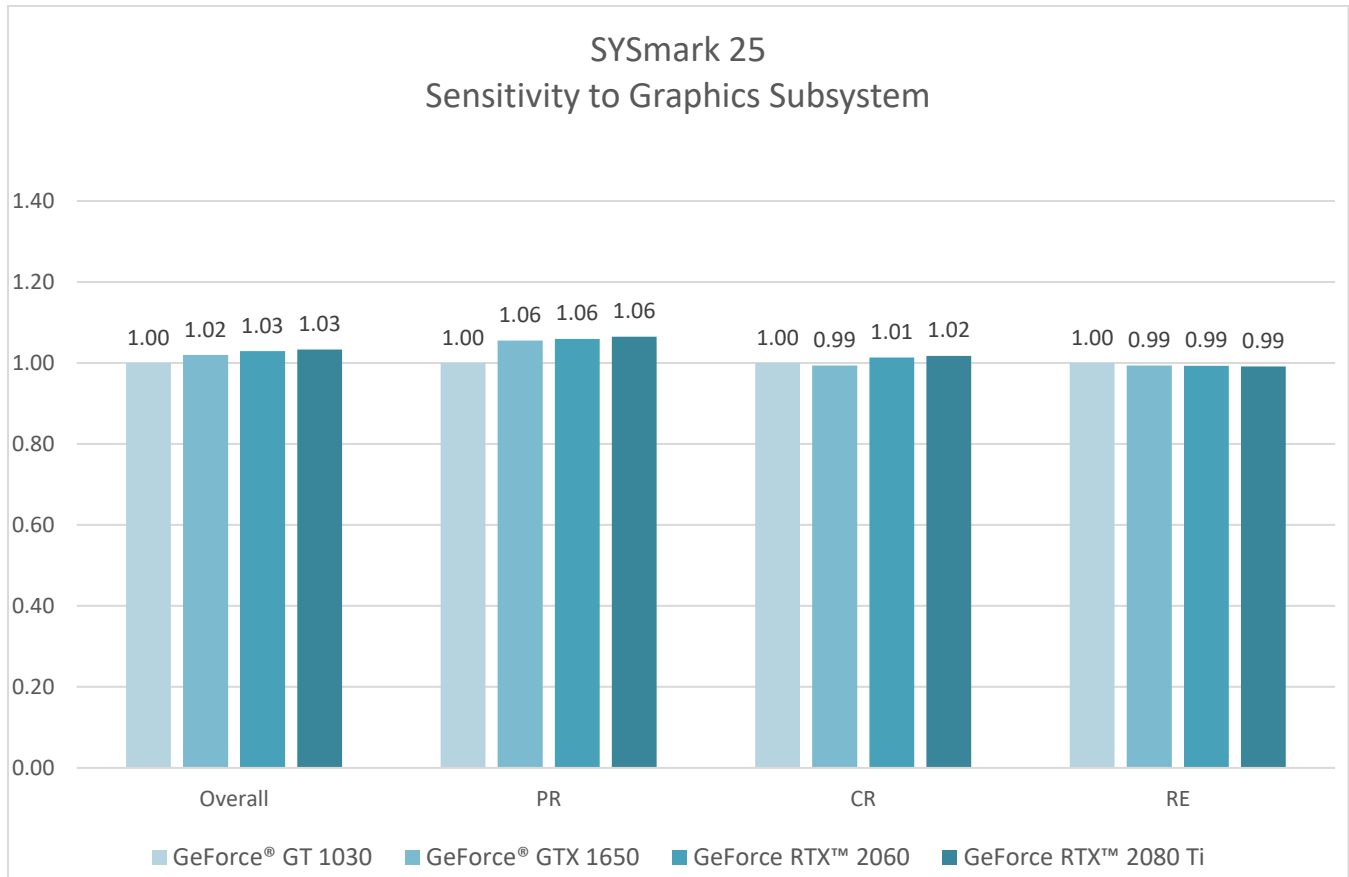


**Figure 4: Graphics Subsystem Sensitivity**

### 3.1.6    Sensitivity to System Memory Capacity

The total system memory is changed from 4 GB single channel, 8 GB Single Channel, 16 GB Single Channel, 4 GB dual channel, 8 GB dual channel and 16 GB dual channel.  The memory type for all tests is DDR4-2666. We compare single channel, dual channel, and single vs. dual channel.
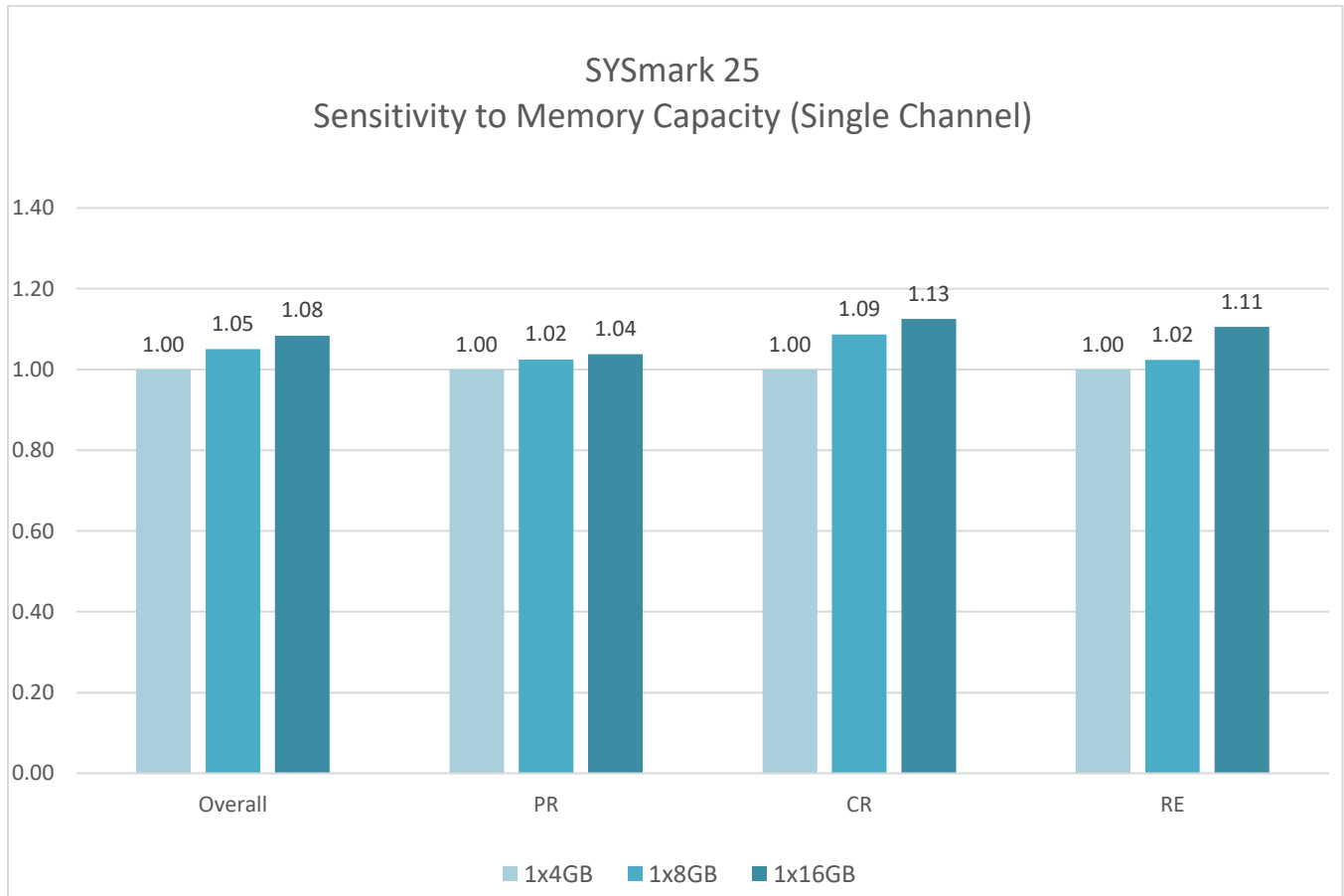
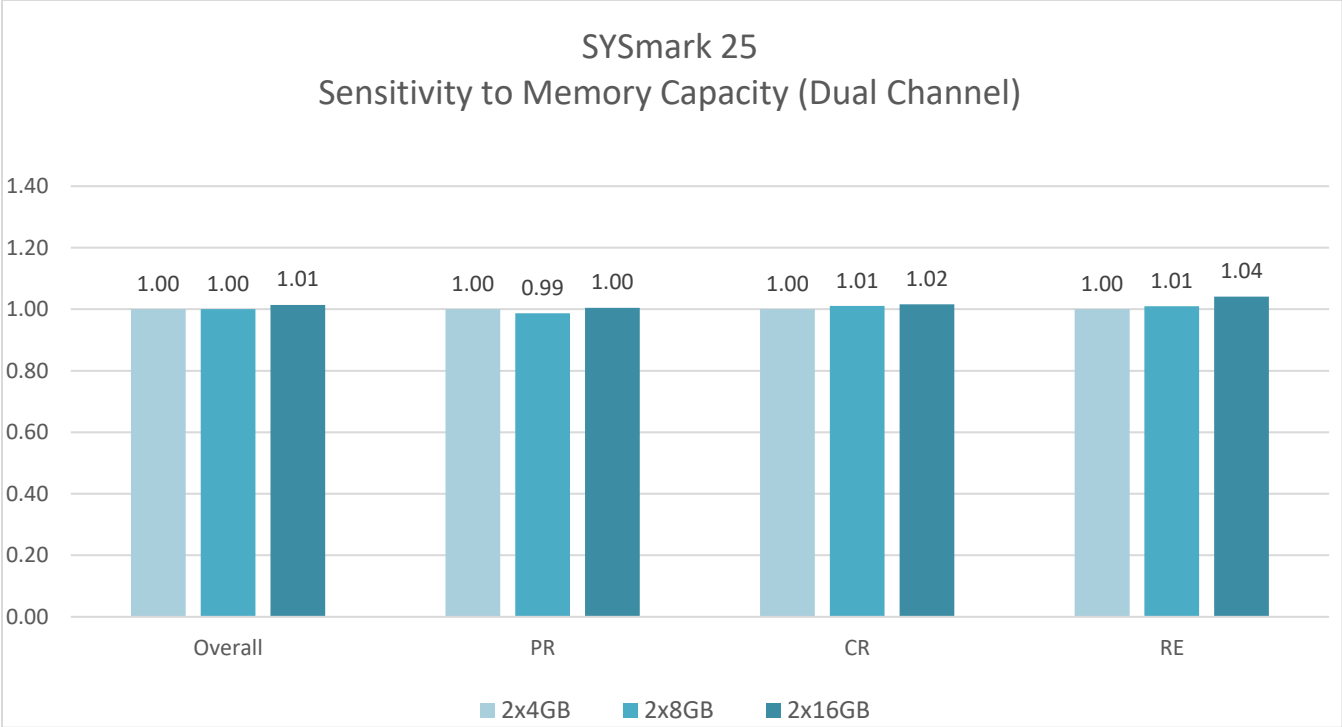

**Figure 5: System Memory Sensitivity (Single Channel)**

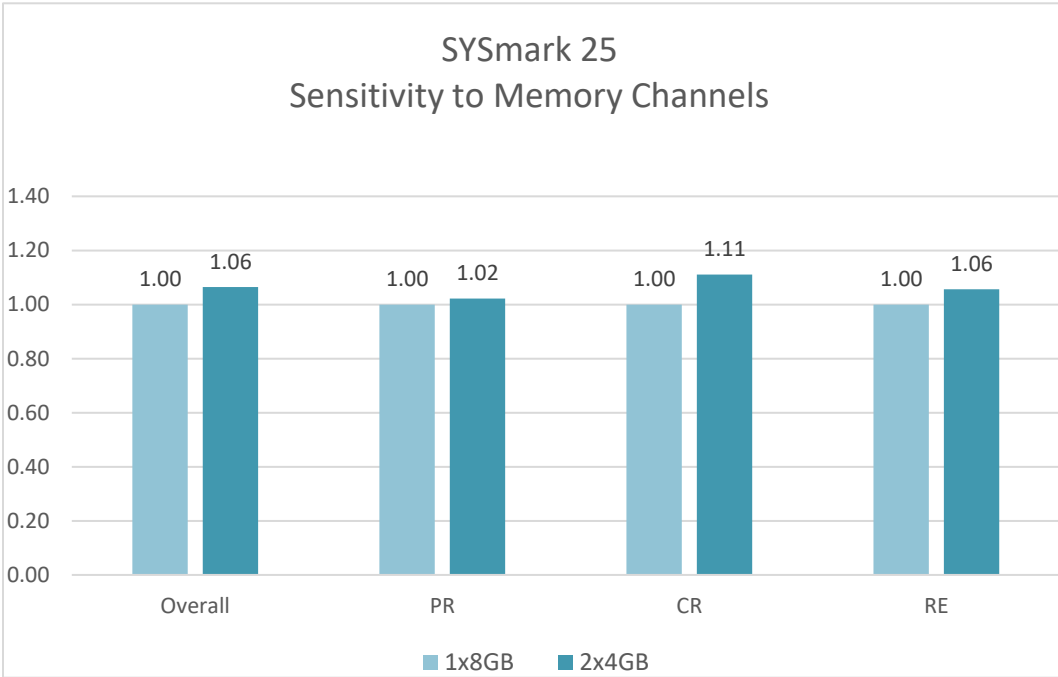**Figure 6: System Memory Sensitivity (Dual Channel)**



**Figure 7: System Memory Channel Sensitivity (Single vs. Dual Channel)**

### 3.1.7 Sensitivity to Display Resolution

The display resolution is changed according to the figure below using integrated graphics.
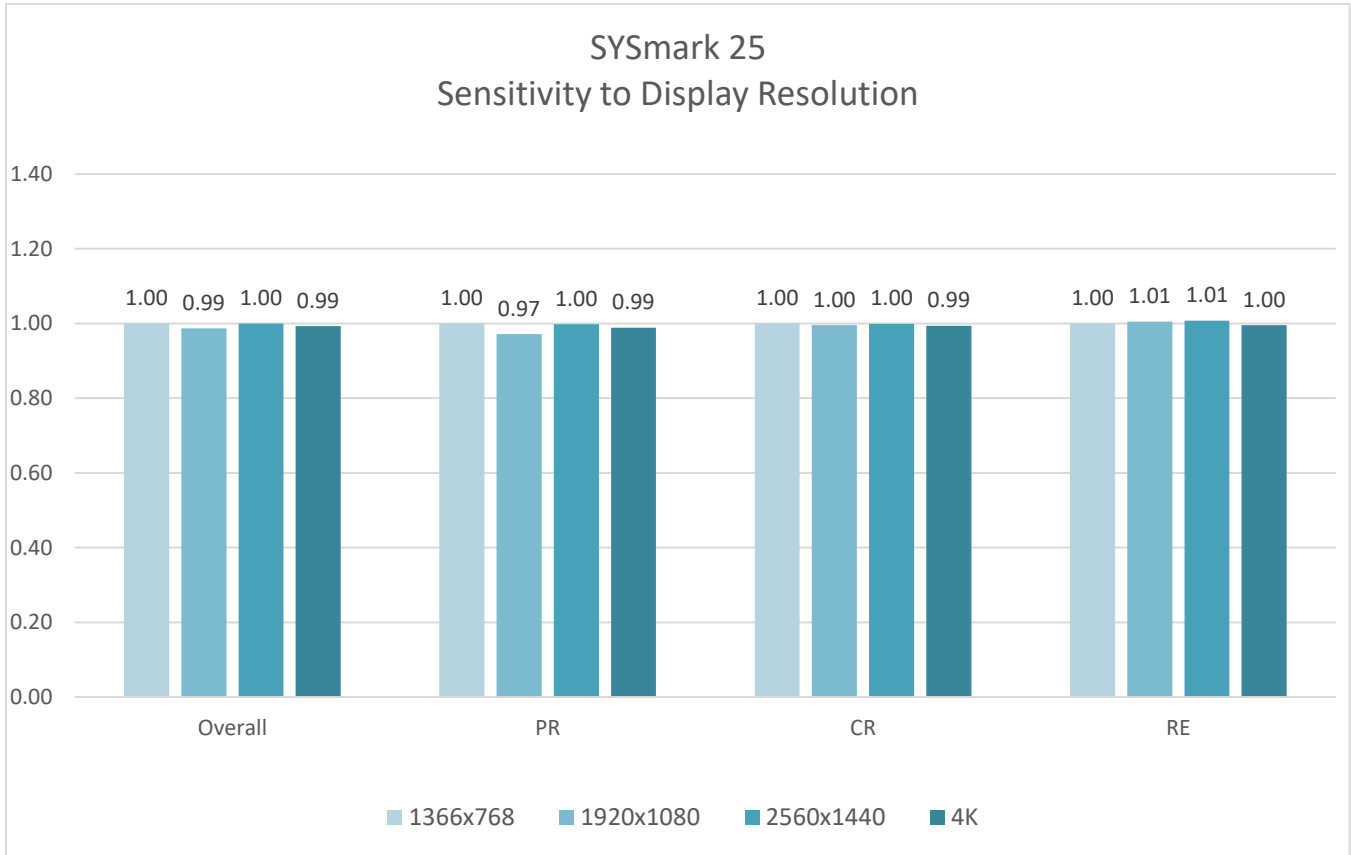


**Figure 8: Display Resolution Sensitivity**

## 3.2 System Configuration Tool Items List

The configuration tool runs automatically at the start of each test and records the state each item on the system under test prior to modifying it for benchmark execution.

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

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.

**<u>Required</u>**

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.

**Disable WinSAT service**
Disables the WinSAT service

**<u>Recommended</u>**

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 SYSmark 25" based on the system's currently active power scheme. If applied, all subsequent power profile configuration changes will be applied to the newly created

power scheme. If this option is not enabled, all power profile configuration changes will be applied to the currently active power scheme.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= PowerScheme=on|off"

**Set Power Plan Type to "High Performance"**
Sets the "Power Plan Type" option (sometimes referred to as "Power Plan Personality") of the active power scheme to "High Performance". This setting tags the active power plan with an overall personality that favors performance over 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\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= PowerPlan=on|off"

**Set CPU High Performance**
Sets the minimum and maximum value for CPU performance state to 100% to prevent CPU throttling on both AC and DC power.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= HighPerformance=on|off"

**Disable Disk Defrag**
Disables the Defrag scheduled task.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= DiskDefrag=on|off"

**Disable Windows Error reporting**
Prevents Windows Error reporting tool from presenting error reporting windows.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.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\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= DisableLockScreen=on|off"

**Disable Windows Pop-ups**
Disables all pop up notifications (Balloon tips) in the systray.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= DisablePopUps=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\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= SystemSleep=on|off"

**Disable Windows Sidebar/Gadgets**
Turns off Gadgets.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= WindowsSideBar=on|off"

**Disable Desktop Slide Show**
Prevents the desktop background from changing.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= DesktopSlideShow=on|off"

**Disable Windows Defender**
Sets Windows Defender to disabled. If Tamper Protection is turned on, Windows 10 will prevent the configuration tool from altering this setting. A warning will be presented to the user prior to the start of the run to allow the user to turn off Tamper Protection manually, if desired.

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= WindowsDefender=on|off"

**Disable Windows Firewall**
Configures the Windows firewall to allow all inbound/outbound traffic on Windows 10.
"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc=
DisableWindowsFirewall=on|off"

**Set Font Smoothing**
Turns on Windows font smoothing
"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= SetFontSmoothing=on|off"

<u>**Optional**</u>

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 Hard Disk Timeout**
Prevents the hard disk from going to sleep
"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= HardDiskTimeout=on|off

**Disable System Restore**
Disables Windows system restore
"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.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\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc= LaptopLidClose=on|off

**Enable Dark Mode**
Enables Dark Mode on systems which support it. This setting will be turned 'On' on launch if the System Mode and App Mode are both set to use Dark theme.
This setting will be reported for both SYSmark and OS in the results. Benchmark setting will be reported as 'Enabled', if dark mode setting is enabled otherwise it will be reported as 'Disabled'. OS setting will be reported as 'Enabled' if both System Mode and App Mode are set to use Dark theme, 'Disabled' if both System Mode and App Mode are set to use Light theme, and 'Custom' if System Mode and Dark Mode are set differently. The OS Custom Mode settings will be explained in the report.
"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc=EnableDarkMode=on|off

<u>**System configuration from command line**</u>

When running SYSmark 25 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 parameters for individual settings are provided in the description for each item in the previous section.

 Example:

"C:\Program Files (x86)\BAPCo\Sysmark25\bin\SYSmark 25.exe" -p=test_project -sc=WindowsDefender=Off

The above command will execute the benchmark in a project called 'test_project', run the defaults of one iteration plus the conditioning run. The WindowsUpdate option in the configuration tool will be set to 'Off' meaning the Windows Update service will not be disabled during the test.

For cases where users do not want to set any system configuration items, all of the system configuration items must be specified as set to 'Off' on the command line. Configuration items listed as Required cannot be disabled, and therefore do not have a corresponding command line parameter.

# APPENDIX A: Application Program Versions

The following applications are installed and used by SYSmark 25 version 1.0.0.24:

- Adobe® Acrobat® Pro DC
- Adobe® Photoshop® CC (2019)
- Adobe® Premiere Pro® CC (2019)
- Adobe® Photoshop® Lightroom® Classic CC
- Audacity® 2.3 installer
- AutoIt 3.3
- Corel® WinZip 21
- Google® Chrome® 81
- Microsoft® Excel® 2019
- Microsoft® Outlook® 2019
- Microsoft® PowerPoint® 2019
- Microsoft® Word® 2019
- Shotcut 19 installer

Please note some of these applications have licensing restrictions which cause them to expire after 30 days. SYSmark 25 will warn the user prior to this expiration. Once the installation has expired, the system under test must be wiped completely, and a new instance of SYSmark 25 must be installed.

# APPENDIX B: Application Contribution

The following chart shows the approximate contribution of each application to the SYSmark 25 version 1.0.0.24 scenario ratings on the calibration system (see section 2.8).

Due to system implementation differences, this chart is accurate for the calibration system. These contributions will vary from one system to the next.
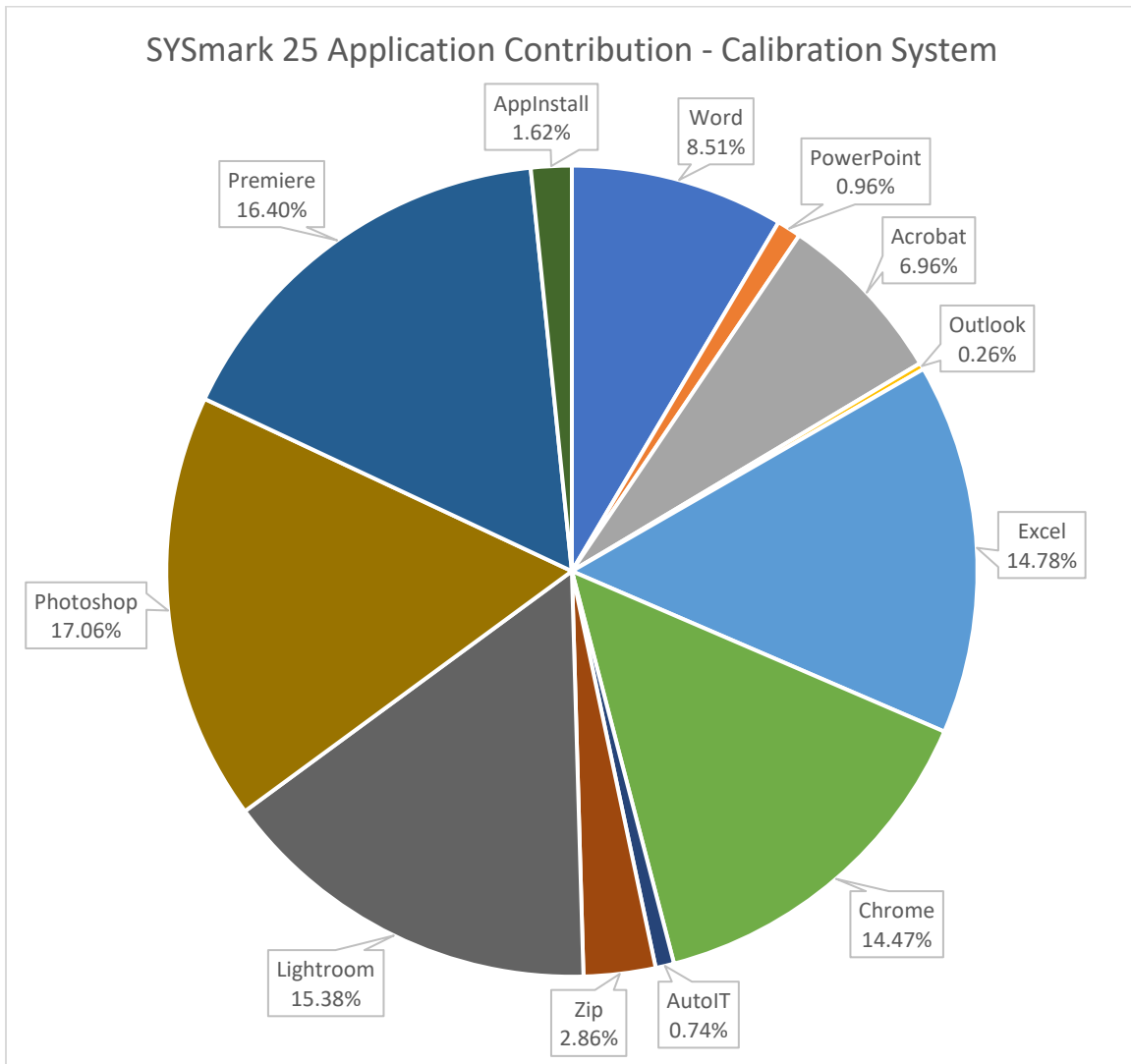


**SYSmark 25 Application Contribution - Calibration System**

- AppInstall 1.62%
- Word 8.51%
- PowerPoint 0.96%
- Acrobat 6.96%
- Outlook 0.26%
- Excel 14.78%
- Chrome 14.47%
- AutoIT 0.74%
- Zip 2.86%
- Lightroom 15.38%
- Photoshop 17.06%
- Premiere 16.40%

**Figure 1: Application Contribution to Overall Rating**

# APPENDIX C: Minimum System Requirements

SYSmark 25 has the following requirements based upon the minimum system specifications of the applications installed and used in the benchmark. BAPCo will only provide technical support for systems which meet or exceed these requirements.

- **CPU**: AMD 7000 series APU or Intel 6th generation Core CPU

- **RAM:** 8 GB

- **HDD/SSD:** 25GB of free space on the primary drive

- **Operating System:** Microsoft® Windows® 10 64-bit version 1803 (RS4) or higher

- **Resolution:** 1280x800 or 1366x768

- **Graphics:** DirectX 10 compatible, 2GB of VRAM

- **Supported Languages on Windows 10:** Brazilian Portuguese, Simplified Chinese, English (US), French, German, Italian, Japanese, Polish, Spanish (SP)

## APPENDIX D: Screenshots
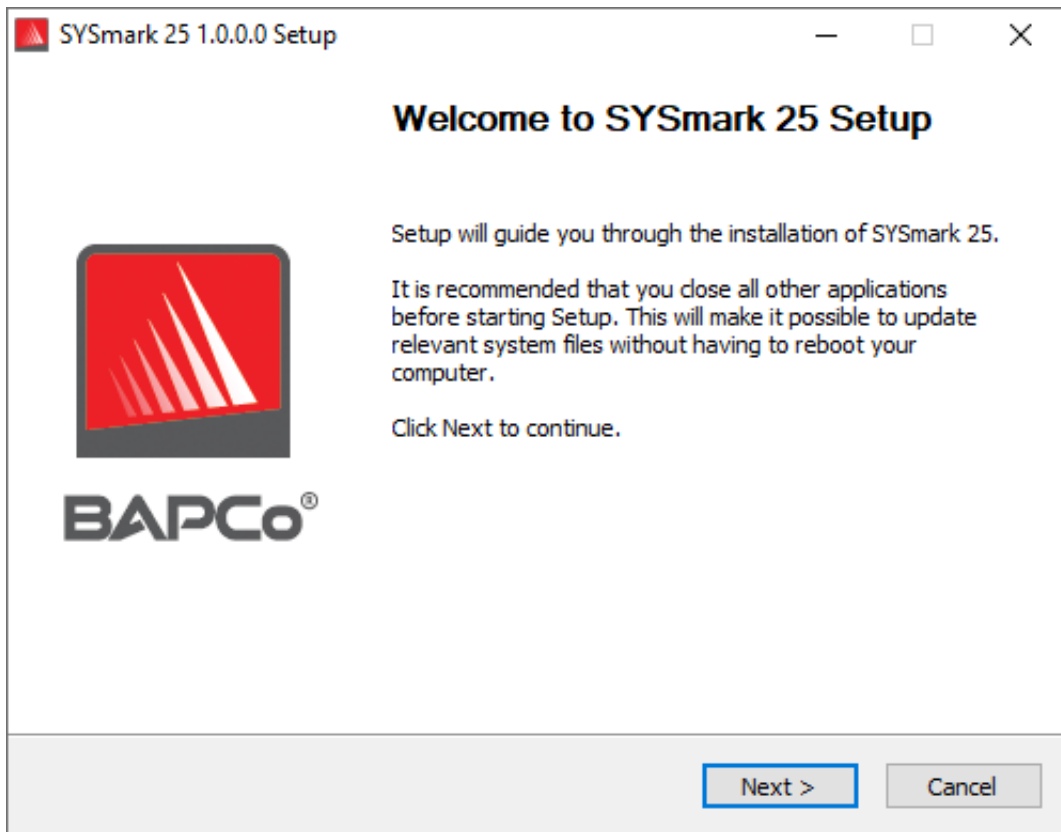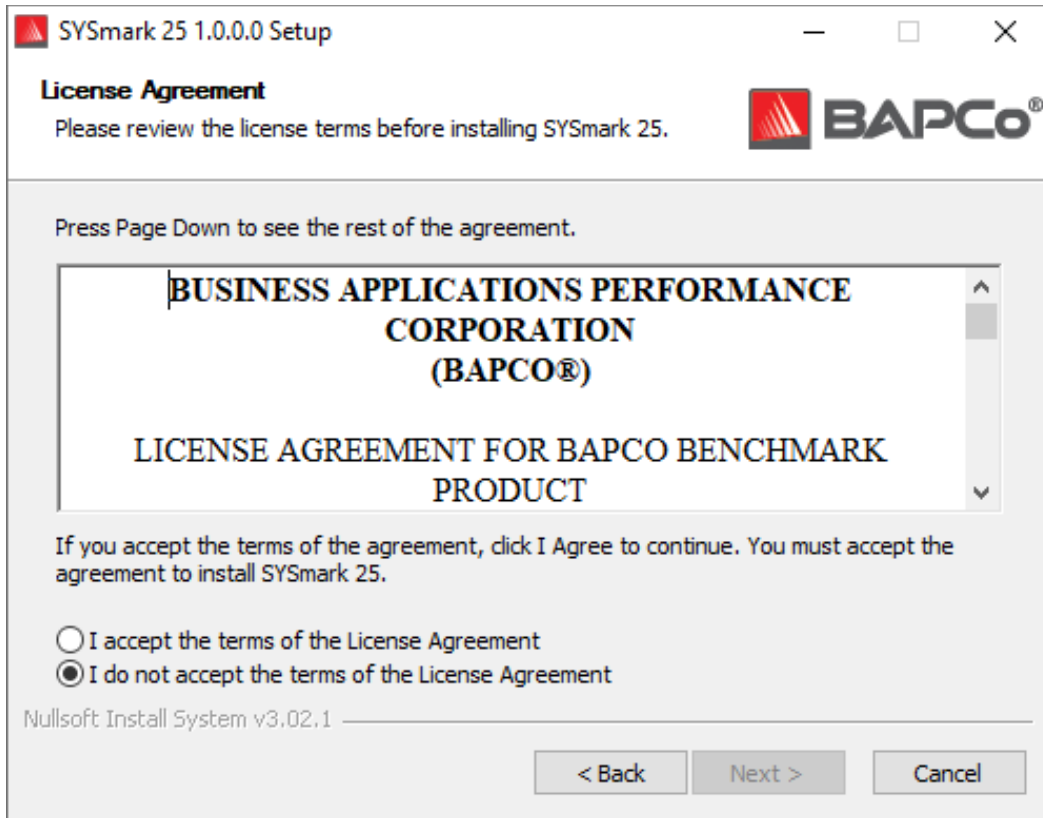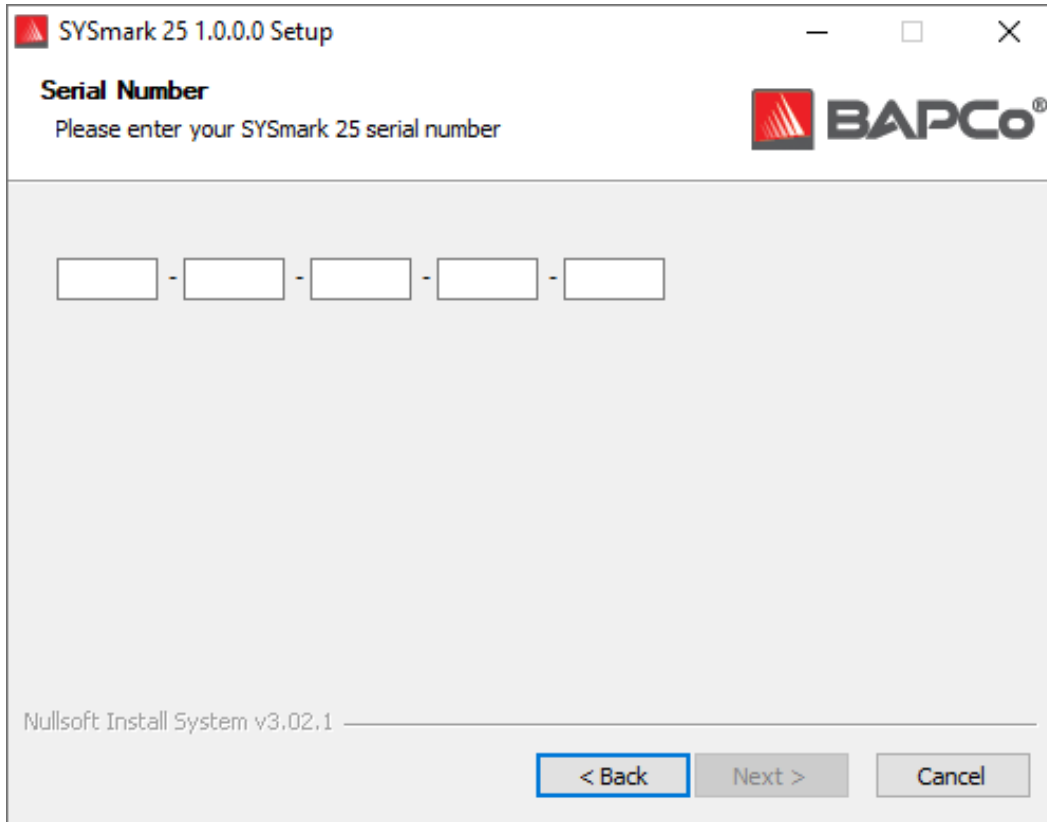


**Figure 1: SYSmark 25 installer window**

**Figure 2: SYSmark 25 EULA**

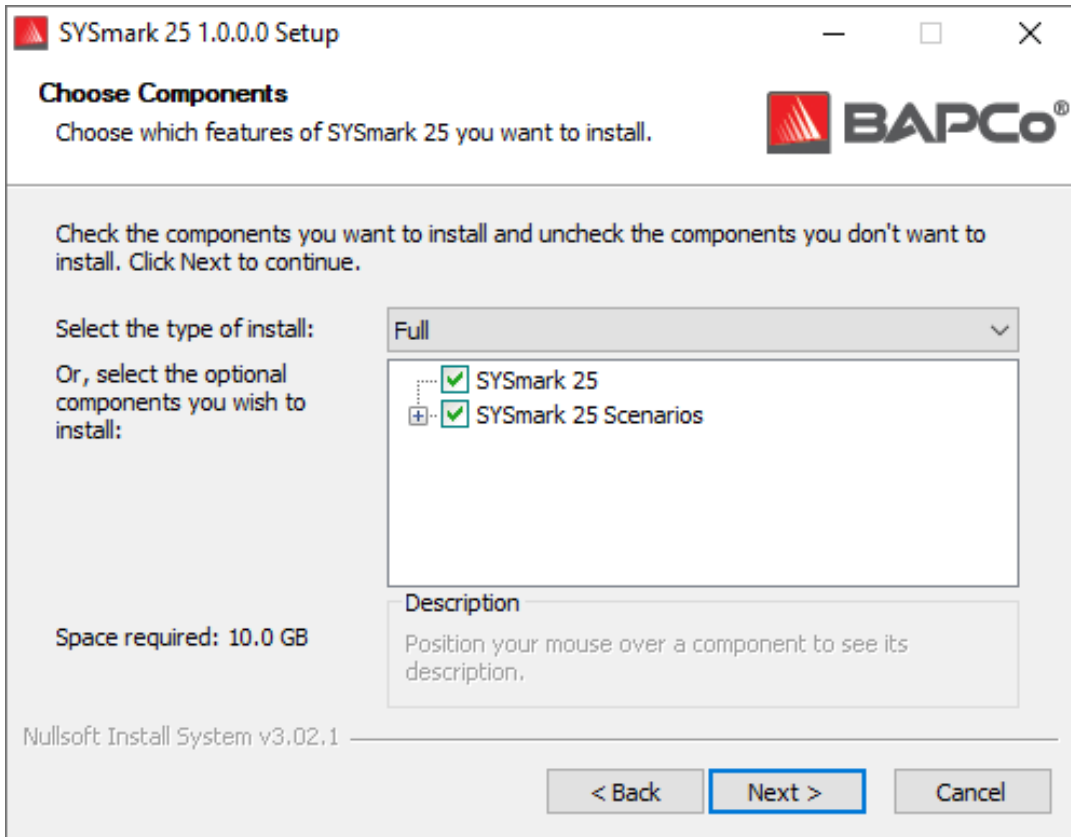**Figure 3: Enter a valid SYSmark 25 serial number to proceed with installation**

**Figure 4: Default full install of SYSmark 25**
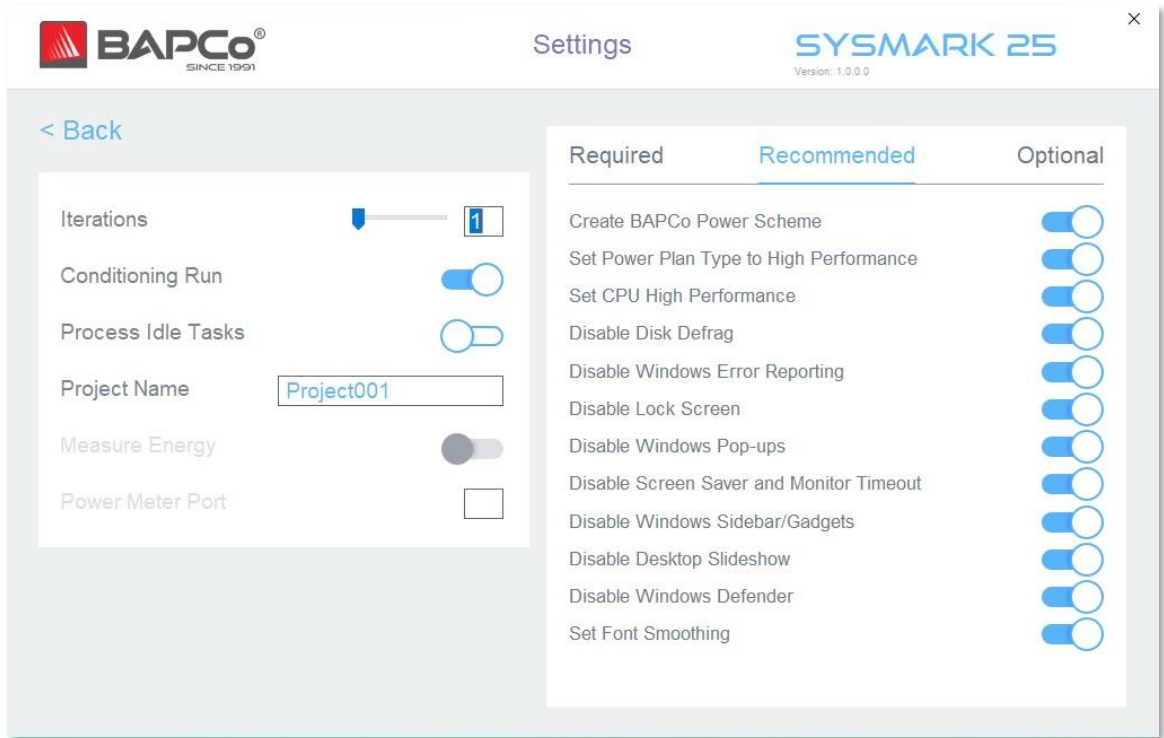


**Figure 5: SYSmark 25 main GUI interface**

**Figure 6: SYSmark 25 Settings Page**



**Figure 7: SYSmark 25 HUD**