



Consumer Security Products Performance Benchmarks

Panda Dome Free vs. Ten Competitors

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Revision History

Rev	Revision History	Date
Edition 1	Initial version of report	20 December 2024
Edition 2	Revised performance metrics list	17 January 2025

Executive Summary

PassMark Software® conducted objective performance benchmarks on eleven (11) consumer antivirus products. This report details the results and findings from our performance benchmark testing of these products.

The primary aim of this benchmark was to compare the performance of Panda Dome Free against ten competing antivirus solutions. Testing was carried out using fifteen (15) specific performance metrics.

The performance metrics utilized in this evaluation were initially part of a broader set of benchmarks conducted by PassMark. The results presented in this report represent a subset selected by WatchGuard to align with their evaluation criteria and comparison framework.

The performance metrics utilized in this evaluation are as follows:

- Scan Time
- Memory Usage during System Idle
- Memory Usage during Initial Scan
- Browse Time
- File Copy, Move and Delete
- File Compression and Decompression
- PE Scan Time
- MS Word Document Launch Time
- MS Excel Document Launch and Macro Execution Time

Overall Score

PassMark Software assigned a score to each product based on its performance ranking across all metrics compared to other products within the same category. The table below presents the overall scores of the tested products, with a maximum score of 100 representing an ideal product that achieves the highest possible performance in each selected test metric.

Antivirus products are ranked according to their overall scores:

Product Name	Overall Score
ESET HOME Security Essential	74
Panda Dome Free	65
McAfee Total Protection	65
Microsoft Defender	59
Avira Free Security	58
Avast Free Antivirus	57
AVG Internet Security	55
Kaspersky Standard	52
Norton Antivirus Plus	48
Bitdefender Total Security	35
F-Secure Internet Security	34

Products and Versions

For all products, we tested the full retail release of the most current and publicly available versions of each antivirus solution. The names and versions of the products are as follow:

Manufacturer	Product Name	Version	Test Date
WatchGuard Technologies, Inc.	Panda Dome Free	22.03.00	November 2024
Microsoft Corporation	Microsoft Defender	4.18.24090.11	November 2024
Gen Digital Inc.	Norton Antivirus Plus	24.10.9535	October 2024
Kaspersky Lab	Kaspersky Standard	21.19.7.527	October 2024
McAfee Corp.	McAfee Total Protection	16.0 R124	October 2024
Bitdefender	Bitdefender Total Security	27.0.42.214	October 2024
Gen Digital Inc.	Avast Free Antivirus	24.10.9535	October 2024
Gen Digital Inc.	Avira Free Security	1.1.104.1294	November 2024
ESET, spol. s r.o.	ESET HOME Security Essential	18.0.12.0	November 2024
F-Secure Corporation	F-Secure Internet Security	19.8	November 2024
Gen Digital Inc.	AVG Internet Security	24.11.9615	November 2024

Performance Metrics Summary

The metrics outlined below were carefully selected to offer a comprehensive and realistic assessment of how antivirus software can affect system performance from the end-user's perspective. These metrics evaluate the impact of the antivirus software on common, everyday tasks performed by users.

All testing methods employed by PassMark Software can be duplicated by third parties within the same environment to yield comparable benchmark results. Detailed methodologies used in our tests are documented in "*Appendix 2 – Methodology Description*" of this report.

Benchmark 1 – Scan Time

All antivirus solutions are designed to detect viruses and various malware forms by scanning files on the system. This benchmark measures the time interval required to scan a collection of clean files. The sample file set has a total size of 982 MB, consisting of typical files found on end-user devices, including media files, system files, and Microsoft Office documents.

Benchmark 2 – Memory Usage during System Idle

This benchmark tracks the memory (RAM) consumption of the antivirus software while the system is idle. The total memory usage is calculated by identifying all antivirus processes and measuring their memory allocation. Observing how much memory is consumed during idle periods provides valuable insights into the resource demands of the antivirus software.

Benchmark 3 – Memory Usage during Initial Scan

This metric evaluates the memory consumption of the antivirus software during an active scan. The total memory usage is calculated by identifying all antivirus processes and measuring the memory consumption for each during the scanning operation.

Benchmark 4 – Browse Time

It is common for security products to scan incoming data for malware as it downloads from the internet or intranet. This behavior can adversely affect browsing speed. This metric evaluates the time required to browse a set of popular websites sequentially loaded from a local server in a user's browser window.

Benchmark 5 – File Copy, Move and Delete

This benchmark measures the time taken to copy, move, and delete a sample set of files. The sample set includes various file formats that a Windows user is likely to encounter regularly, encompassing documents (e.g., Microsoft Office documents, Adobe PDFs, ZIP files), media formats (e.g., images, videos, and music), and system files (e.g., executables, libraries).

Benchmark 6 – File Compression and Decompression

This benchmark evaluates the time required to compress and decompress files across various formats, including documents, videos, and images.

Benchmark 7 – PE Scan Time

All security solutions incorporate functionality to detect viruses and various forms of malware via file scanning on the system. This particular metric evaluates the time necessary to scan a designated set of Portable Executable (PE) files. Our sample set encompasses a total size of 2.02 GB, comprising .exe files (820 MB), .dll files (920 MB), and .sys files (329 MB). This benchmark provides insights into the efficiency of security solutions in handling executable formats critical for system performance.

Benchmark 8 – MS Word Document Launch Time

This benchmark evaluates the influence of security software on system responsiveness and performance. Specifically, it measures the time required to open a large mixed media document (8.11 MB) using Microsoft Word. To account for potential caching effects introduced by the operating system, both the initial launch time and subsequent launch times are recorded. The final result is calculated as an average of these two measurements, providing a comprehensive perspective on how security solutions may affect the user experience while working with resource-intensive documents.

Benchmark 9 – MS Excel Document Launch and Macro Execution Time

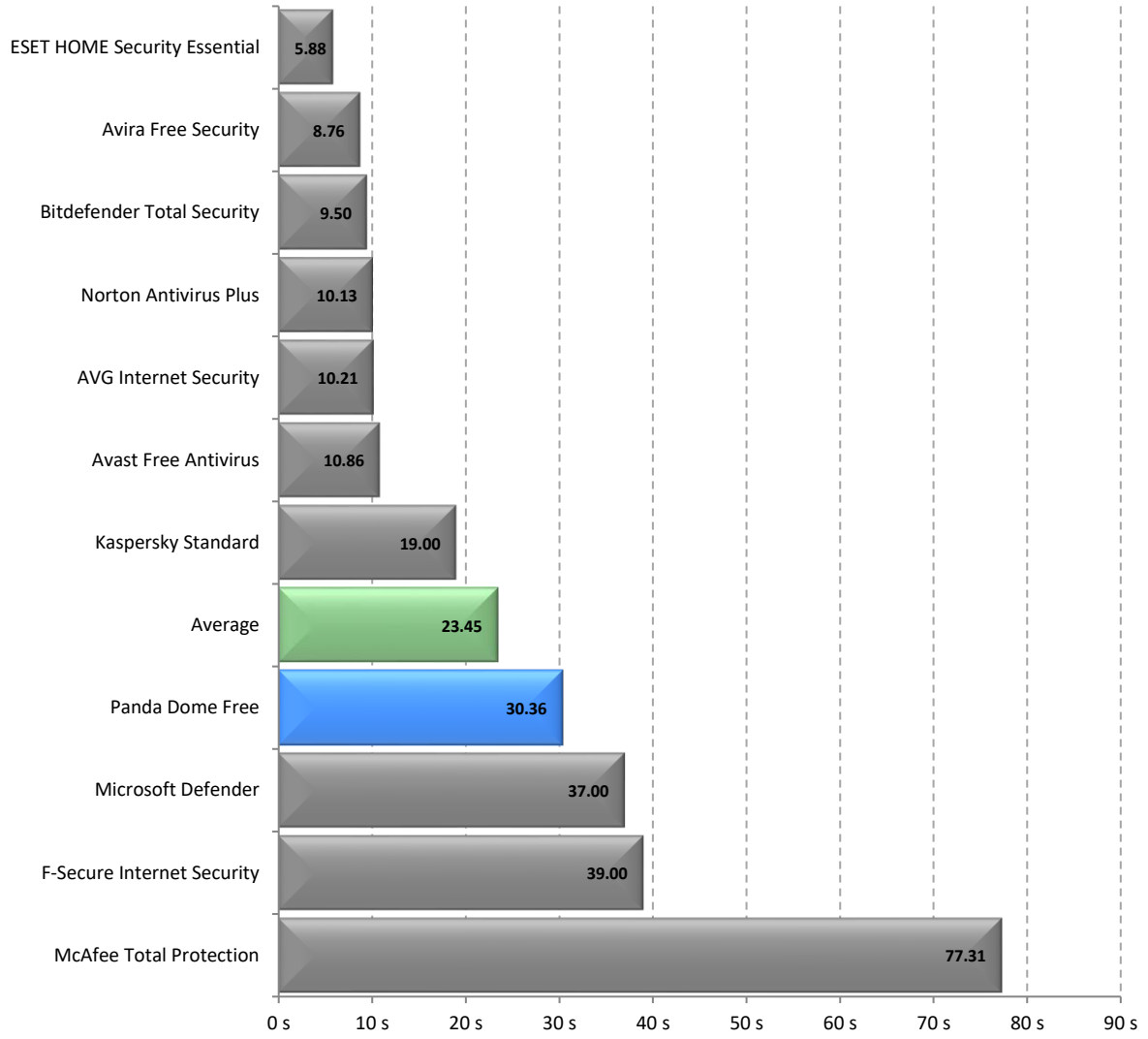
This benchmark measures the time required to open an Excel document and execute a macro that performs a series of operations. The test is conducted five times with a reboot occurring between each run to ensure consistent results. The final measurement reflects the average of these five trials. This benchmark is particularly relevant for users who rely on macros for complex calculations or data manipulation within Excel, as it highlights the responsiveness of the software under the influence of security applications.

Test Results

The following charts present the test results for each performance metric, with Panda Dome Free's results highlighted in blue for clarity, while the averages are indicated in green to facilitate easy comparison.

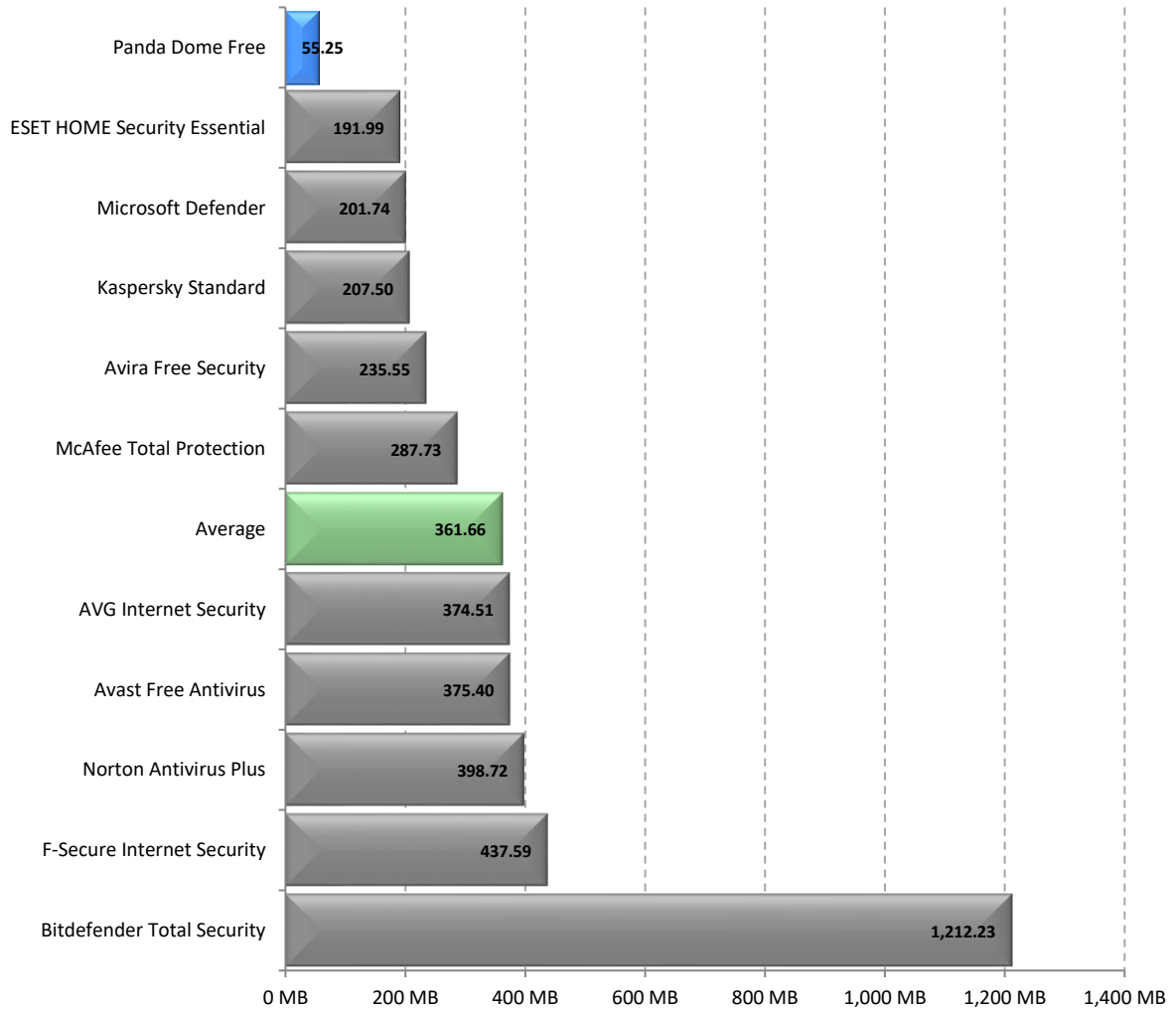
Benchmark 1 – Scan Time

The following chart compares the average time required to perform an on-demand scan on a sample dataset containing 6,166 files with a total size of 982 MB. Lower scan times indicate better performance.



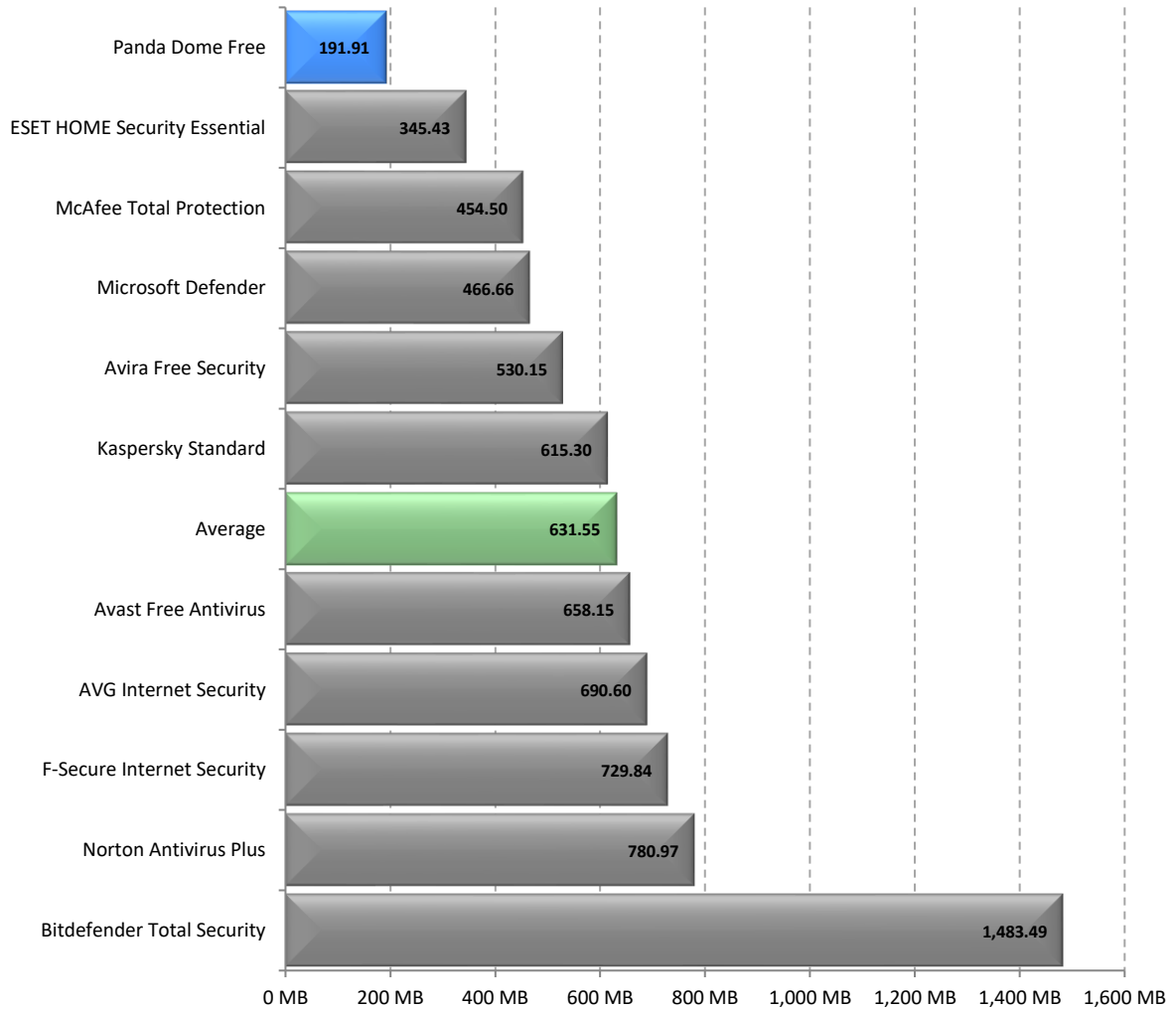
Benchmark 2 – Memory Usage during System Idle

The following chart compares the average RAM usage of antivirus products during system idle. This average is calculated from ten memory snapshots taken approximately 60 seconds apart after a reboot. Products with lower idle RAM usage are considered better performers in this category.



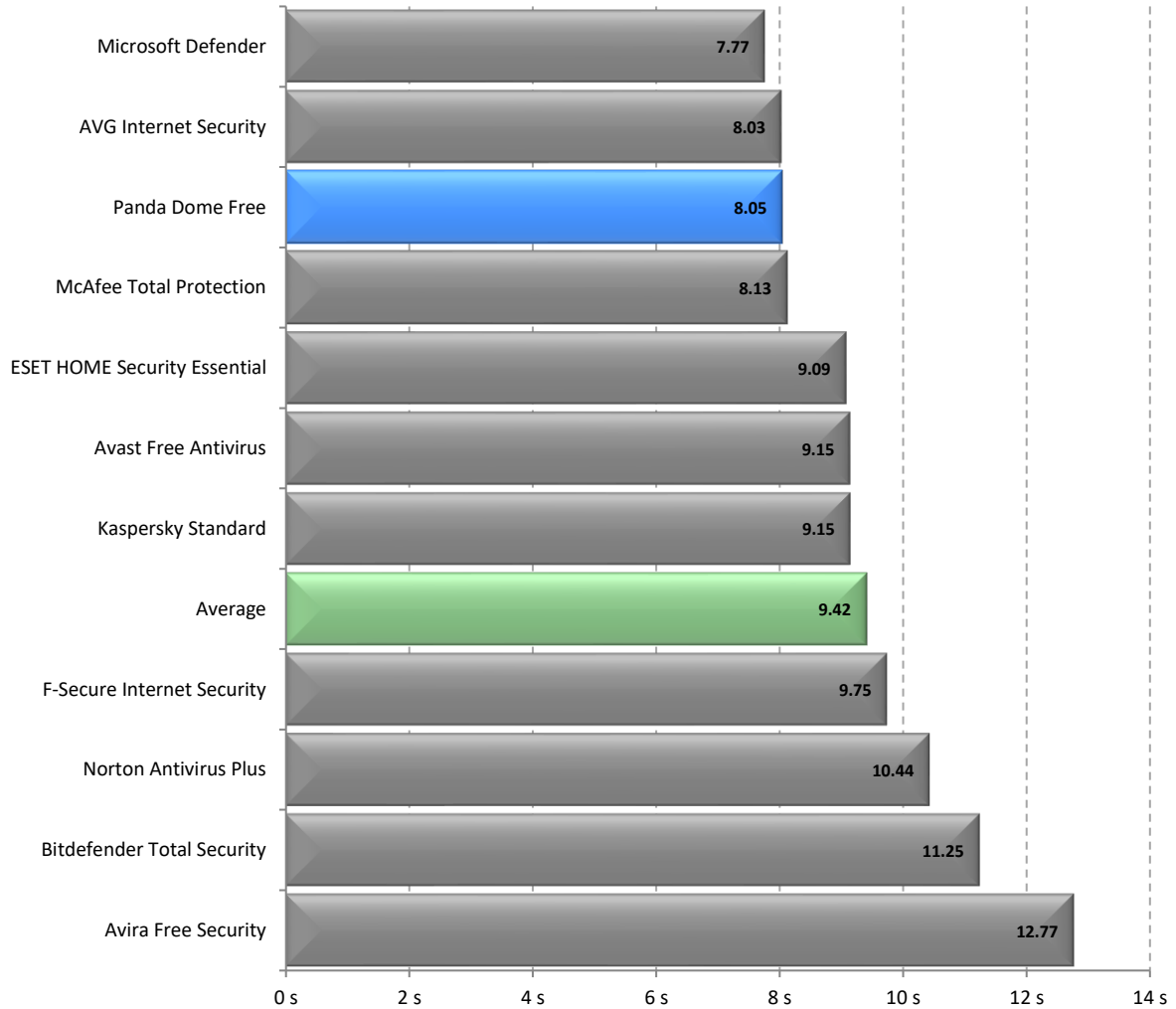
Benchmark 3 – Memory Usage during Initial Scan

The following chart compares the average RAM usage of antivirus products during an initial scan of the system drive. The average is calculated from ten memory snapshots taken at five-second intervals. Products with lower memory usage during a scan are considered better performers in this category.



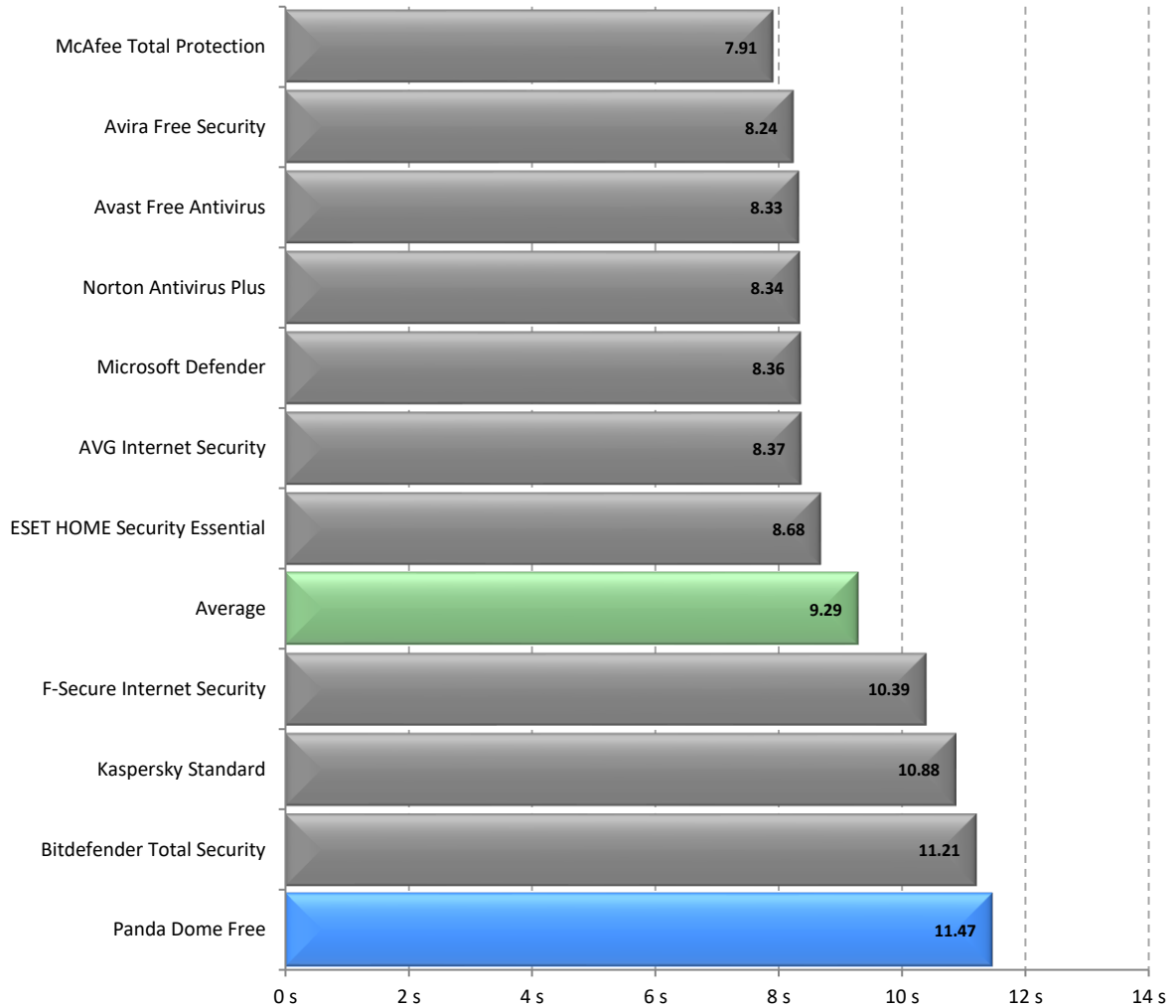
Benchmark 4 – Browse Time

The following chart compares the average time required for the MS Edge browser to load a set of popular websites hosted on a local server. Products with shorter browsing times are considered better performers in this category.



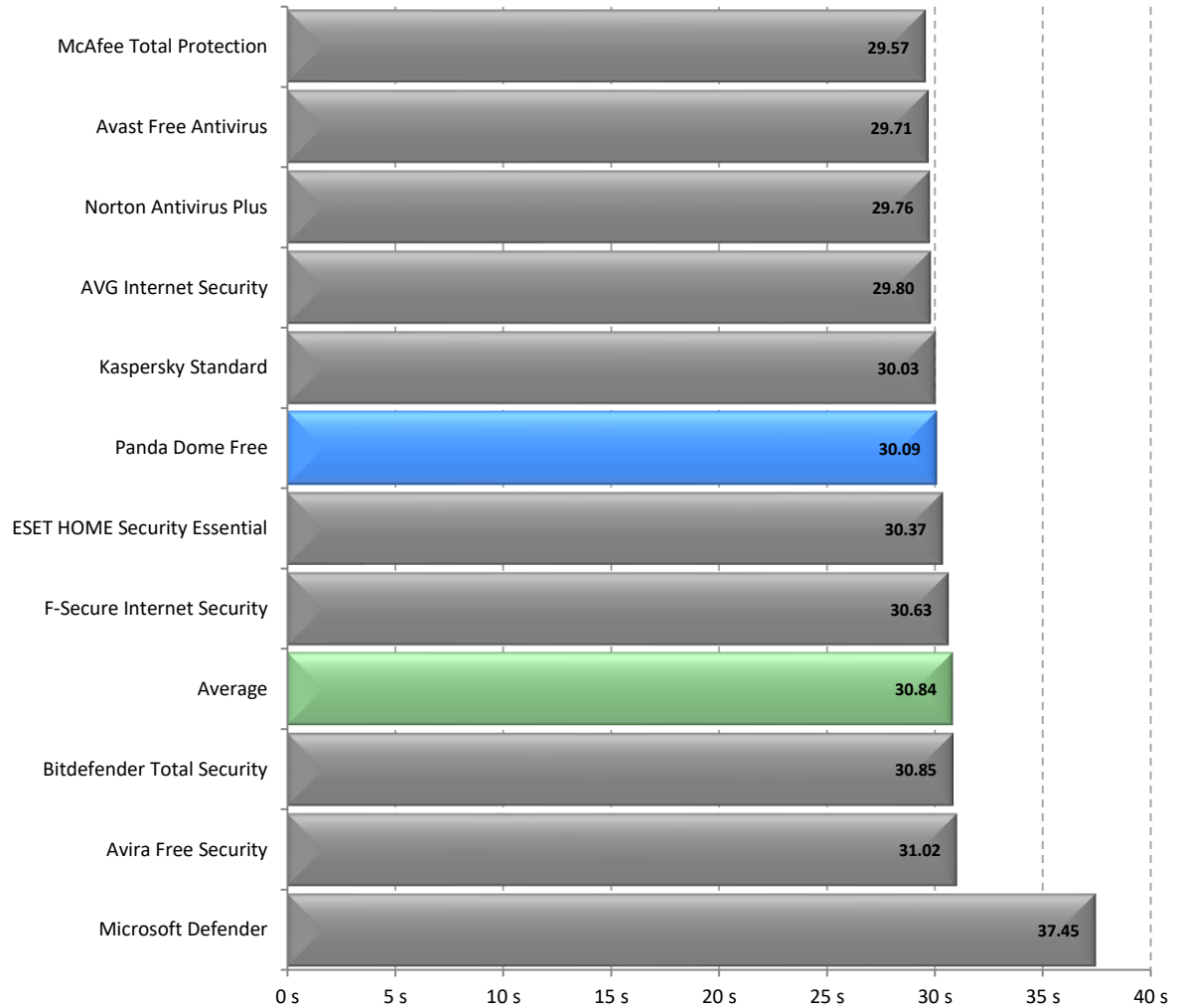
Benchmark 5 – File Copy, Move and Delete

The following chart compares the average time required to copy, move, and delete multiple sets of sample files for each tested antivirus product. Products with shorter times are considered better performers in this category.



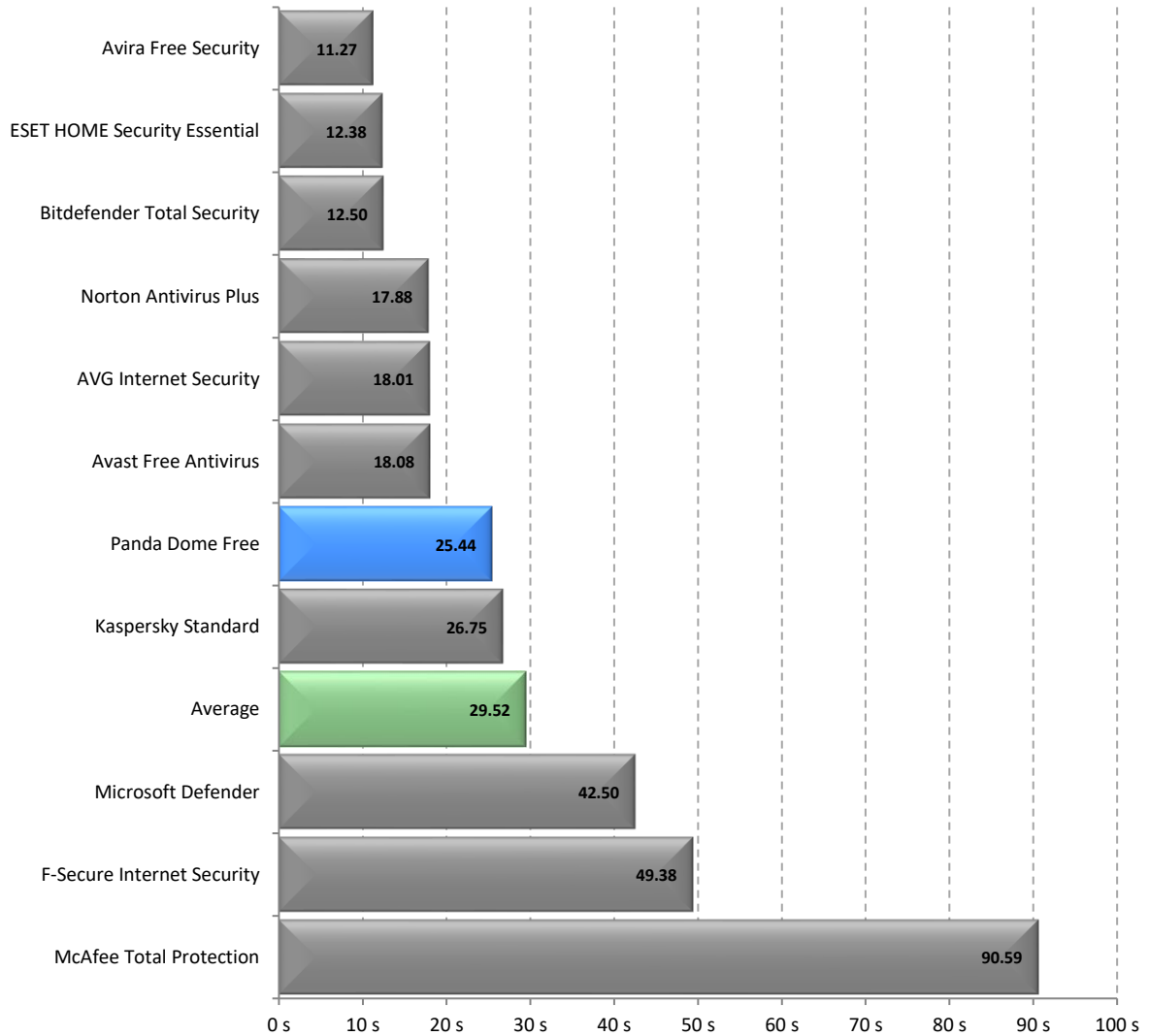
Benchmark 6 – File Compression and Decompression

The following chart compares the average time required to compress and decompress sample files for each tested security product. Products with shorter times are considered better performers in this category.



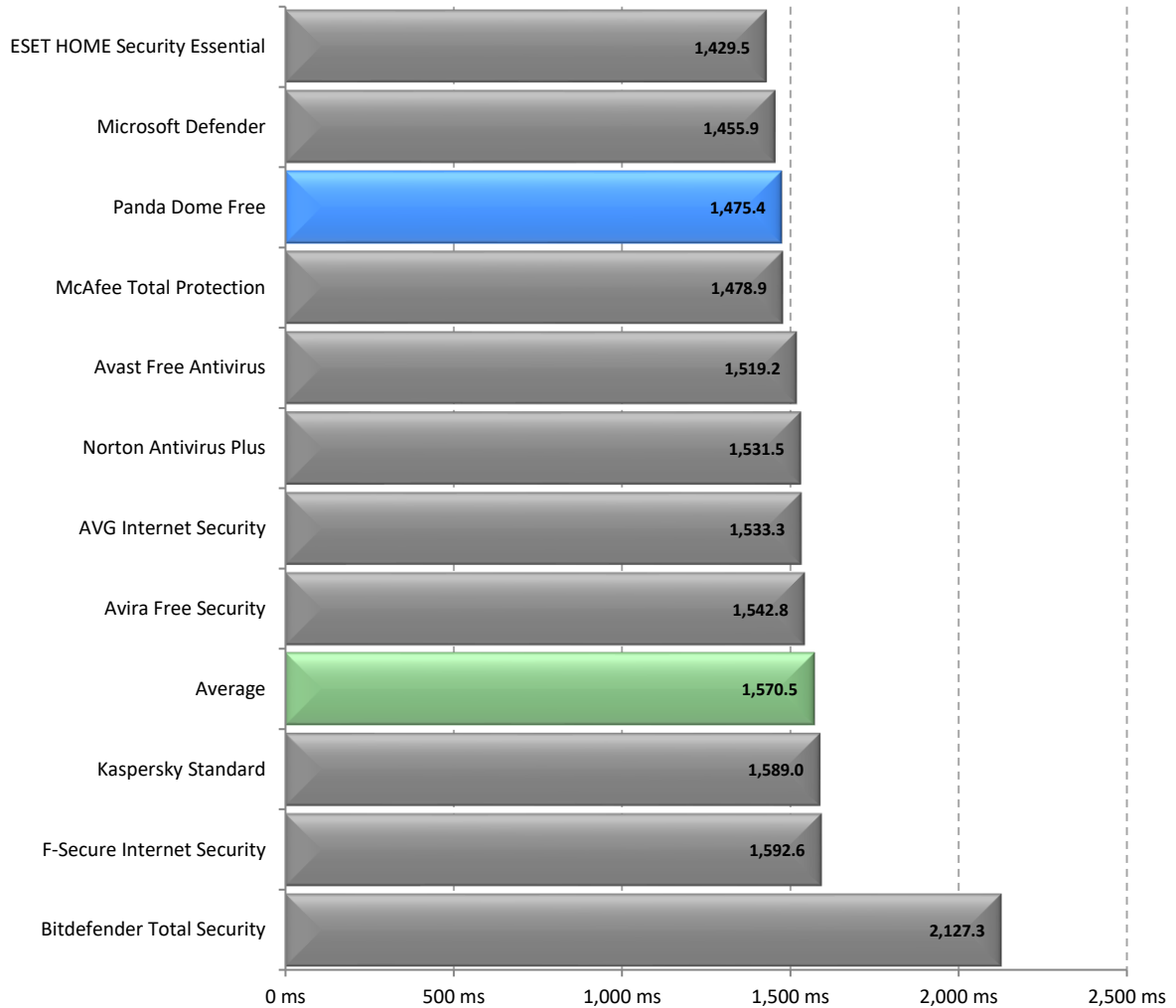
Benchmark 7 – PE Scan Time

The following chart presents a comparison of the average time required to scan a set of portable executable files for each tested security product. Products with shorter scan times are considered to have better performance in this category.



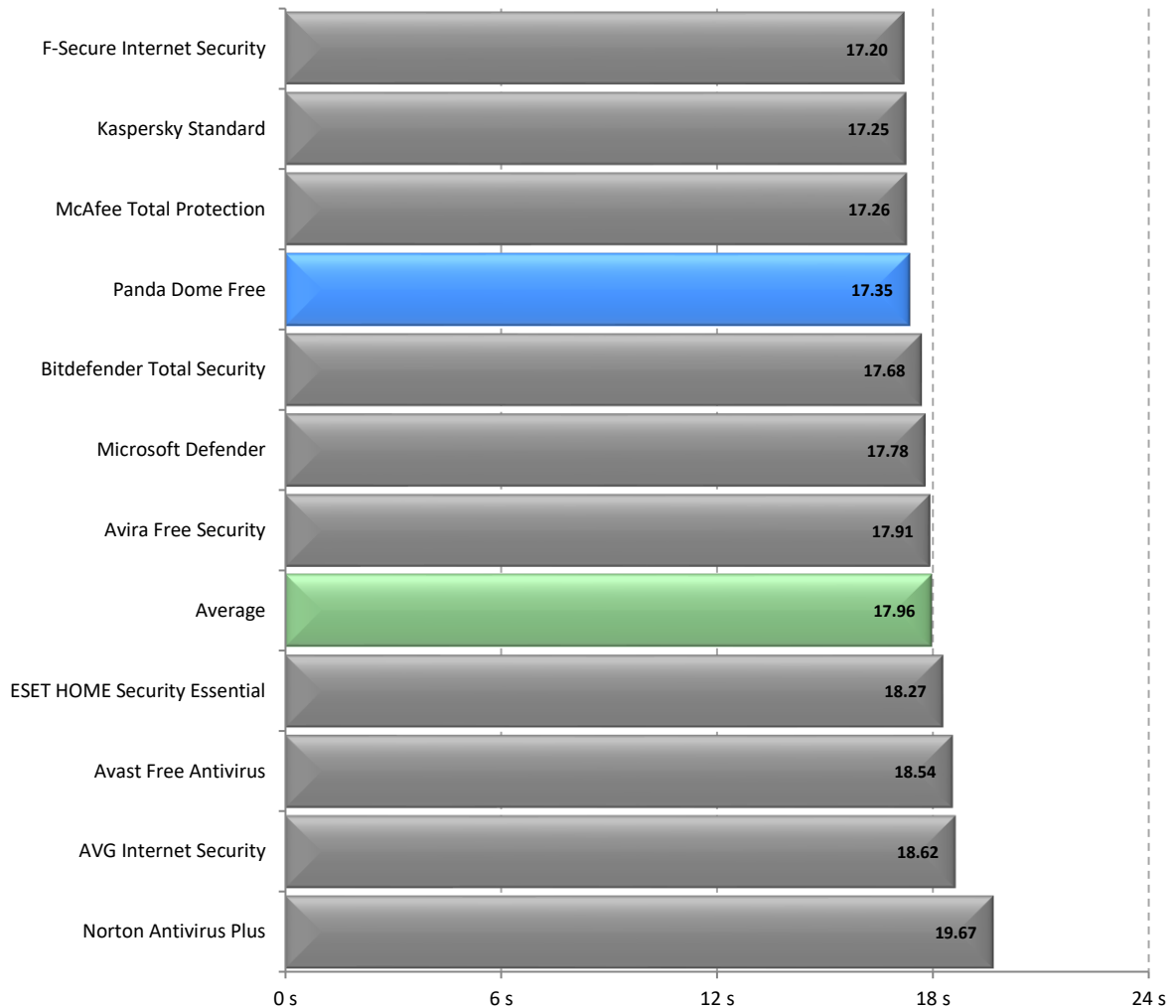
Benchmark 8 – MS Word Document Launch Time

The following chart compares the average time required to launch Microsoft Word and open a sample document. Products with shorter launch times are considered to perform better in this category.



Benchmark 9 – MS Excel Document Launch and Macro Execution Time

The following chart compares the average time required to launch Microsoft Excel and execute a macro. Products with shorter times are considered to perform better in this category.



Disclaimer and Disclosure

This report exclusively addresses product versions that were available at the time of testing. The tested versions are detailed in the “*Products and Versions*” section of this report. It is important to note that the products evaluated are not an exhaustive list of all options available within these highly competitive product categories.

Disclaimer of Liability

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Disclosure

The production of this report was funded by WatchGuard Technologies, Inc. The selection of products and metrics included in the report was determined by WatchGuard.

Trademarks

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Appendix 1 – Test Environment

PassMark Software configured the test environment with the following hardware specifications:

Testing Machine

Motherboard:	ASUS PRIME Z690-A
CPU:	Intel Core i3-12100 CPU @ 3.30GHz
Video Card:	ASUS Dual Radeon RX 6600 XT OC
RAM:	Crucial 32GB DDR5-4800
Main Boot Drive:	Samsung 980 PRO PCIe 4.0 NVMe SSD 250GB
2nd Drive:	Samsung SSD 850 PRO 512GB
3rd Drive:	Crucial BX500 480GB SSD
Network:	1Gbps (Connected via Gigabit Ethernet cable)
O/S:	Windows 11 Pro Version 22H2 (OS Build 22621.1105)

For network tests, PassMark Software utilized a server with the following specifications:

Testing Server

Motherboard:	Intel S1200BTL Server Motherboard
CPU:	Intel Xeon E3-1220 V2 @ 3.10 GHz
Video Card:	Intel Integrated Graphics Card
RAM:	8GB (2x4GB) ECC RAM, 1333 MHz
Hard Drive:	SSD 128GB
Network:	1Gbps (Connected via Gigabit Ethernet cable)
O/S:	Windows Server 2012 Standard

Appendix 2 – Methodology Description

Windows 11 Image Creation

A bootable version of Macrium Reflect (backup and cloning software) was used to create a “clean” baseline image prior to testing. The goal was to minimize the baseline image’s footprint and reduce potential variations caused by external operating system factors.

Before testing each product, the baseline image was restored to ensure all products were installed and tested on the same “clean” machine.

The steps to create the baseline Windows 11 image were as follows:

1. Install and activate **Windows 11 Pro** Edition.
2. Remove the Windows login password.
3. Change User Account Control settings to “Never Notify”.
4. Disable *SysMain* to ensure consistent results.
5. Install *HTTP Watch* for Browse Time testing.
6. Install *Windows Assessment and Deployment Kit* for Boot Time testing.
7. Install OSForensics for Installation Size testing.
8. Install Windows Updates.
9. Disable SysMain from Services.
10. Disable Windows Automatic Updates.
11. Create a baseline system image using Macrium Reflect.

Benchmark 1 – Scan Time

This benchmark measures the time required for each antivirus product to scan a standardized set of sample files. The sample set was identical across all tests and consisted of a mix of system and Office files. In total, the dataset included 6,166 files with a combined size of 982 MB. A detailed breakdown of the file types and quantities in the sample dataset is provided below:

File Format	Number	Total Size
DLL	2589	490 MB
EXE	694	101 MB
SYS	332	23.3 MB
GIF	302	567 KB
DOC	281	64.2 MB
WMF	185	1.78 MB
PNG	149	1.93 MB
HTM/HTML	126	946 KB
CAT	111	7.25 MB
NLS	80	6.63 MB
JPG	70	1.09 MB
INI	59	1.76 MB
ICO	58	58.2 KB
MOF	43	6.12 MB

File Format	Number	Total Size
FRA	3	880 KB
IQY	3	830 bytes
ISP	3	601 bytes
ITA	3	930 KB
MB	3	4.36 MB
MML	3	771 KB
MMW	3	946 KB
NLD	3	1.11 MB
RAR	3	1.91 MB
ROM	3	54.1 KB
SIG	3	19.8 KB
SVE	3	993 KB
TTF	3	580 KB
ACS	2	3.8 MB

AX	39	4.48 MB
XLS	38	3.62 MB
CFG	36	141 KB
POT	36	2.37 MB
IME	35	5 MB
DRV	31	1.19 MB
TXT	31	366 KB
CHM	30	6.28 MB
OCX	30	6.12 MB
CPL	29	4.42 MB
MFL	29	2.62 MB
INF	26	1.54 MB
TLB	25	2.17 MB
DOT	24	1.55 MB
HLP	22	3.44 MB
IMD	20	18 MB
PY	20	79.2 KB
[NO EXTENSION]	19	3.29 MB
MSC	18	752 KB
VBS	18	838 KB
XML	18	574 KB
RTF	16	62.1 MB
ECF	15	15.6 KB
INC	15	27.3 KB
COM	14	282 KB
DAT	14	1.83 MB
LOG	14	4.53 MB
TSP	14	1.22 MB
XSL	14	44.3 KB
H	12	56.5 KB
TBL	13	606 KB
AW	12	2.59 MB
FAE	12	1.02 MB
JS	12	429 KB
SCR	12	2.5 MB
VSD	12	1.67 MB
ZIP	11	25.2 MB
[HIDDEN FILES]	11	-
PNF	10	1 MB
ACM	9	836 KB
ICM	9	192 KB
LEX	9	10.3 MB
PPT	9	4.46 MB
MANIFEST	8	5.96 KB
UCE	8	240 KB
ACG	7	780 KB
OLB	7	1.34 MB
WAV	7	5.03 MB
WIZ	7	1.11 MB
BIN	6	25 MB
GPD	6	112 KB
CNT	5	4.15 KB
DUN	5	2.46 KB

C	2	28.5 KB
CMD	2	1.6 KB
LO_	2	128 KB
LXA	2	1.19 MB
MAP	2	3.72 KB
MDB	2	516 KB
MMF	2	1.92 KB
MSI	2	1.65 MB
NT	2	4.16 KB
OBE	2	13.9 KB
ODC	2	386 bytes
POL	2	488 bytes
RLL	2	112 KB
TAB	2	160 KB
TSK	2	2.25 KB
XLA	2	79 KB
ACL	1	37 KB
BMP	1	234 KB
BTR	1	1.25 MB
BUD	1	93 KB
CHK	1	8 KB
CHS	1	1.65 KB
CHT	1	1.65 KB
CNV	1	52 KB
CPI	1	124 KB
DATA	1	5.99 MB
DB	1	17.5 KB
DBL	1	2.13 KB
DHS	1	138 bytes
DICT	1	18 KB
DIZ	1	428 bytes
DLS	1	3.28 MB
DPC	1	414 bytes
ENG	1	751 bytes
GRA	1	182 KB
HOL	1	269 KB
HTC	1	28 KB
HXX	1	6.55 KB
ICS	1	375 bytes
IMG	1	66.2 KB
JPN	1	2.01 KB
KOR	1	2 KB
LOCAL	1	0 bytes
MOD	1	2.03 KB
MST	1	3.99 MB
NVU	1	2.74 KB
OPS	1	2.26 KB
PAT	1	42 bytes
PRF	1	6.62 KB
PRO	1	20.7 KB
RAM	1	64 bytes
RAT	1	3.09 KB
RSP	1	4.19 KB

MPP	5	1.83 MB
PIP	5	12.5 KB
SAM	5	305 KB
ADM	4	1.64 MB
BAT	4	22.4 KB
CPX	4	6.46 KB
FON	4	61.3 KB
SCP	4	8.53 KB
SEP	4	6.79 KB
CSS	3	11.4 KB
DEU	3	1.45 MB
DTD	3	22.6 KB
ENU	3	999 KB
ESN	3	815 KB

SCF	1	75 bytes
SDB	1	1.03 MB
SDF	1	888 bytes
SLL	1	471 KB
SPD	1	1.6 MB
SQL	1	748 KB
SVG	1	77.5 KB
THA	1	697 bytes
TPL	1	10.5 KB
TRM	1	4 KB
VXD	1	81 bytes
WMA	1	2.5 MB
WMV	1	649 KB
WSC	1	39.5 KB
Total	6166	982 MB

The scan was initiated by right-clicking the dataset folder and selecting the “Scan Now” option. To record the scan times, we used the product’s built-in scan timer or reporting system. When these tools were unavailable, scan times were measured manually using a stopwatch.

For each product, five scans were conducted, with the machine rebooted before each scan to eliminate any caching effects by the operating system. Historically, many products have shown significant differences between the initial scan time (first scan) and subsequent scan times (scans 2 to 5), likely due to caching mechanisms that store information about recently scanned files.

To account for this behavior, we calculated the average subsequent scan time based on scans 2 to 5. The final result for this test is the average of the initial scan time and the subsequent scan average.

Benchmark 2 – Memory Usage during System Idle

The *PerfLog++* utility was used to record system process memory usage at boot and then at one-minute intervals for 15 minutes. This process was performed once per product, generating 15 samples, with the first sample (taken at boot) discarded.

Since PerfLog++ records memory usage for all processes, not just those of the anti-malware product, isolating the relevant processes was necessary. To achieve this, *Process Explorer* was run immediately after PerfLog++ completed memory usage logging to identify and isolate the anti-malware product’s processes from other system processes.

Benchmark 3 – Memory Usage during Initial Scan

The *PerfLog++* utility was used to record system memory usage during a malware scan. For details about the PerfLog++ utility and the method of calculating memory usage, please refer to the metric “Memory Usage during System Idle” above.

Since some products cache scan locations, reasonable precautions were taken to ensure the antivirus software did not scan the C:\ drive prior to this test. A manual scan of the C:\ drive was initiated simultaneously with the PerfLog++ utility, which recorded memory usage every five seconds over a 50-second period.

Benchmark 4 – Browse Time

We used JavaScript to sequentially load a list of 108 popular websites from a local server. The test included front pages of high-traffic websites across categories such as shopping, social, news, finance, and reference.

For each page in the sample, a few lines of JavaScript were added to trigger the loading of the next website. Start and end times were recorded to calculate the total browse time.

The test was conducted using *Microsoft Edge* and repeated five times. The final result represents the average browse time across all five iterations.

Benchmark 5 – File Copy, Move and Delete

This test measures the time required for the system to copy, move, and delete samples of files in various formats. A detailed breakdown of file types and quantities of the sample dataset is as follows:

File Format	Number	Total Size
DOC	24	91.6 MB
DOCX	12	48.8 MB
PPT	9	126 MB
PPTX	9	74.4 MB
XLS	12	51.5 MB
XLSX	12	14.6 MB
PDF	219	323 MB
ZIP	8	84.5 MB
7Z	2	1.66 MB
JPG	1045	135 MB
GIF	27	82.4 MB
PNG	5	483 KB
MOV	7	54.7 MB
RM	1	5.39 MB
AVI	24	130 MB
WMV	5	43.9 MB
MP3	84	356 MB
EXE	138	87.12 MB
DLL	625	213.6 MB
AX	2	36 KB
CPL	4	4.02 MB
CPX	4	8.56 KB
DRV	20	302 KB
ICO	2	210 KB
MSC	2	81.2 KB
NT	2	3.28 KB
ROM	4	71.4 KB
SRC	4	4.28 MB
SYS	4	88.12 KB
TLB	6	264 KB
TSK	2	2.24 KB
UCE	2	44.8 KB
Total	2329	1.89 GB

The test was conducted five times, with the test machine rebooted between each iteration to eliminate potential caching effects. The final result represents the average time across all five trials.

Benchmark 6 – File Compression and Decompression

This test evaluates the time required to compress and decompress a sample set of files. The *CommandTimer.exe* tool was used to measure the time taken by 7zip.exe to compress the files into a *.zip archive and then decompress the created *.zip file.

The sample set consisted of 1,316 files totaling 1.15 GB. A detailed breakdown of the file types, quantities, and sizes in the sample set is provided in the following table:

File Type	Number	Total Size
Document Files	78	97.9 MB
Image Files	1073	113 MB
Video Files	65	568 MB
Music Files	100	395 MB
Total	1316	1.15 GB

The test was performed five times, with the test machine rebooted between each iteration to eliminate potential caching effects. The final result represents the average compression and decompression speed across all five trials.

Benchmark 7 – PE Scan Time

This test measured the on-demand scan times of a file set consisting exclusively of executable files (.exe, .dll, and .sys). Five scans of the sample file set were conducted, with a machine restart between each scan to eliminate potential caching effects. The scan durations were obtained either from the security product's scan logs or, when logs were unavailable, manually timed using a stopwatch. Scans were initiated by right-clicking on the folder to be scanned.

A breakdown of the sample file set is as follows:

File Format	Number	Total Size
SYS	2171	329 MB
DLL	2037	920 MB
EXE	2134	820 MB
Total	6342	2.02 GB

To calculate the results, the average of the four subsequent scan times was determined. The final result represents the average of this subsequent scan time and the initial scan time. To calculate the results, the average of the four subsequent scan times was determined. The final result represents the average of this subsequent scan time and the initial scan time.

Benchmark 8 – MS Word Document Launch Time

The average launch time of the Word interface was measured using *AppTimer*. This included the time required to launch the Word application and open an 8.11 MB Word document.

For each product, a total of 15 samples were collected across five sets of three Word launches. The test machine was rebooted before each set to eliminate operating system caching effects. During analysis, the first launch in each set was separated to create two distinct datasets: one for initial launches after reboot and another for subsequent launches.

The average of the subsequent launch times was calculated to determine an average subsequent launch time. The final result represents the average of this subsequent launch average and the initial launch time.

Benchmark 9 – MS Excel Document Launch and Macro Execution Time

This test measured the time required to open an Excel document and execute an Excel macro. The macro performed various operations, including reading data from the file system, performing mathematical calculations, and writing data back to the spreadsheet. The test was automated using a Windows PowerShell script.

A total of five samples were collected, with the system rebooted between each test to eliminate operating system caching effects. The final result represents the average time across all five samples.