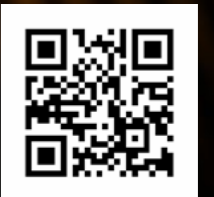


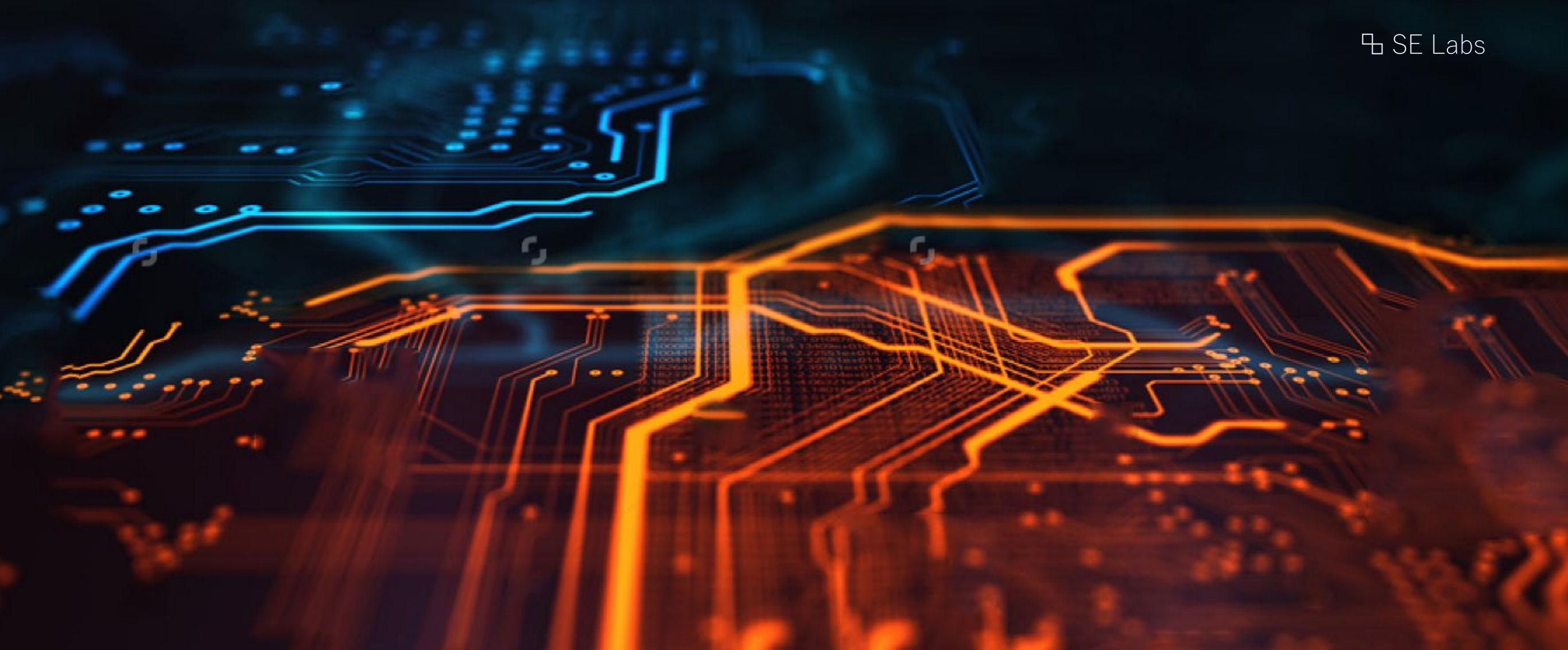
SE Labs

INTELLIGENCE-LED TESTING

HOME ANTI- MALWARE PROTECTION

OCT - DEC 2018





SE Labs tested a variety of anti-malware (aka ‘anti-virus’; aka ‘endpoint security’) products from a range of well-known vendors in an effort to judge which were the most effective.

Each product was exposed to the same threats, which were a mixture of targeted attacks using well-established techniques and public email and web-based threats that were found to be live on the internet at the time of the test.

The results indicate how effectively the products were at detecting and/or protecting against those threats in real time.

MANAGEMENT**Director** Simon Edwards**Operations Director** Marc Briggs**Office Manager** Magdalena Jurenko**Technical Director** Stefan Dumitrascu**TESTING TEAM**

Thomas Bean

Dimitar Dobrev

Liam Fisher

Gia Gorbald

Pooja Jain

Ivan Merazchiev

Jon Thompson

Dave Togneri

Jake Warren

Stephen Withey

IT SUPPORT

Danny King-Smith

Chris Short

PUBLICATION

Steve Haines

Colin Mackleworth

Website www.SELabs.uk**Twitter** @SELabsUK**Email** info@SELabs.uk**Facebook** www.facebook.com/selabsuk**Blog** blog.selabs.uk**Phone** 0203 875 5000**Post** ONE Croydon, London, CR0 0XT

SE Labs is BS EN ISO 9001 : 2015 certified for
The Provision of IT Security Product Testing.

SE Labs is a member of the Microsoft Virus Information
Alliance (VIA); the Anti-Malware Testing Standards
Organization (AMTSO); and the Messaging, Malware
and Mobile Anti-Abuse Working Group (M3AAWG).

AMTSO Standard reference:

<https://tinyurl.com/ycbrxmcd>

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INTRODUCTION

Can You Trust Security Tests?

Clear, open testing is needed and now available

A year ago we decided to put our support behind a new testing Standard proposed by the Anti-Malware Testing Standards Organization (AMTSO). The goal behind the Standard is good for everyone: if testing is conducted openly then testers such as us can receive due credit for doing a thorough job; you the reader can gain confidence in the results; and the vendors under test can understand their failings and make improvements, which then creates stronger products that we can all enjoy.

The Standard does not dictate how testers should test. There are [pages of detail](#), but I can best summarise it like this: Say what you are going to do, then do it. And be prepared to prove it.

(Indeed, a poor test could still comply with the AMTSO Standard, but at least you would be able to understand how the test was conducted and could then judge its worth with clear information and not marketing hype!)

We don't think that it's unreasonable to ask testers to make some effort to prove their results. Whether you are spending £30 on a copy of a home anti-virus product or several million on a new endpoint upgrade project, if you are using a report to help with your buying decision you deserve to know how the test was run, whether or not some vendors were at a disadvantage and if anyone was willing and able to double-check the results.

Since the start of 2018 we put our endpoint reports through the public pilot and then, once the Standard was officially adopted, through the full public process. Our last reports were judged to comply with the AMTSO Standard and we've submitted this report for similar assessment.

At the time of writing we don't know if the reports from this round of testing comply. To find out if they did, please check the AMTSO reference link at the bottom of page three of this report.

If you spot a detail in this report that you don't understand, or would like to discuss, please contact us via our Twitter or Facebook accounts.

SE Labs uses current threat intelligence to make our tests as realistic as possible. To learn more about how we test, how we define 'threat intelligence' and how we use it to improve our tests please visit our website and follow us on Twitter.

This test report was funded by post-test consultation services provided by SE Labs to security vendors. Vendors of all products included in this report were provided with early access to results and the ability to dispute details for free. SE Labs has submitted the testing process behind this report for compliance with the AMTSO Standard v1.0.

Executive Summary

Product Names

It is good practice to stay up to date with the latest version of your chosen endpoint security product. We made best efforts to ensure that each product tested was the very latest version running with the most recent updates to give the best possible outcome.

For specific build numbers, see **Appendix C: Product Versions** on page 17.

| EXECUTIVE SUMMARY | | | |
|-------------------------------|--------------------------------|--------------------------------|---------------------------|
| Products Tested | Protection Accuracy Rating (%) | Legitimate Accuracy Rating (%) | Total Accuracy Rating (%) |
| Kaspersky Internet Security | 100% | 100% | 100% |
| Microsoft Windows Defender | 100% | 100% | 100% |
| Norton Security | 98% | 100% | 99% |
| ESET Internet Security | 97% | 100% | 99% |
| Trend Micro Internet Security | 97% | 98% | 98% |
| McAfee Internet Security | 90% | 100% | 97% |
| Avira Free Security Suite | 91% | 97% | 95% |
| F-Secure Safe | 96% | 92% | 93% |
| Avast Free Antivirus | 80% | 100% | 93% |
| AVG Antivirus Free Edition | 76% | 100% | 92% |
| G-Data Internet Security | 80% | 96% | 91% |
| Quick Heal Internet Security | 68% | 100% | 90% |
| K7 Antivirus Premium | 73% | 96% | 89% |
| Webroot Antivirus | 55% | 98% | 84% |

Products highlighted in green were the most accurate, scoring 85 per cent or more for Total Accuracy. Those in yellow scored less than 85 but 75 or more. Products shown in red scored less than 75 per cent.

For exact percentages, see **1. Total Accuracy Ratings** on page 6.

■ The endpoints were generally effective at handling general threats from cyber criminals...

Most products were largely capable of handling public web-based threats such as those used by criminals to attack Windows PCs, tricking users into running malicious files or running scripts that download and run malicious files.

■ .. and targeted attacks were prevented in many cases.

Many products were also competent at blocking more targeted, exploit-based attacks. However, while some did very well in this part of the test, others were very much weaker. Products from Avast, G-Data, K7, Webroot and Quick Heal were notably weaker than the competition.

■ False positives were not an issue for most products

Most of the endpoint solutions were good at correctly classifying legitimate applications and websites. The vast majority allowed all of the legitimate websites and applications. F-Secure's was the least accurate in this part of the test.

■ Which products were the most effective?

Products from Kaspersky Lab, Microsoft, Symantec (Norton), ESET, Trend Micro and Avira achieved extremely good results due to a combination of their ability to block malicious URLs, handle exploits and correctly classify legitimate applications and websites.

1. Total Accuracy Ratings

Judging the effectiveness of an endpoint security product is a subtle art, and many factors are at play when assessing how well it performs. To make things easier we've combined all the different results from this report into one easy-to-understand graph.

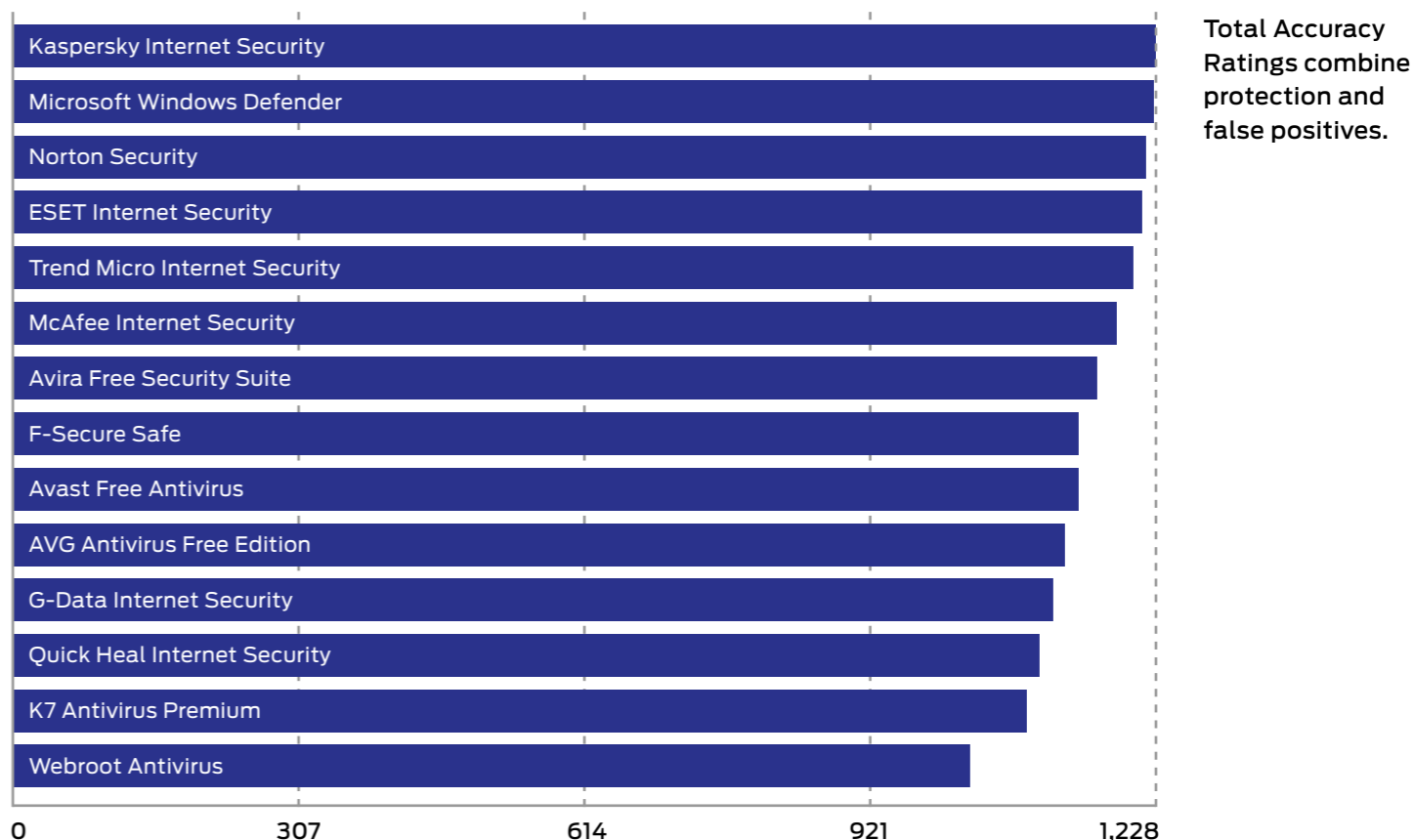
The graph below takes into account not only each product's ability to detect and protect against threats, but also its handling of non-malicious objects such as web addresses (URLs) and applications.

Not all protections, or detections for that matter, are equal. A product might completely block a URL, which stops the threat before it can even start its intended series of malicious events. Alternatively, the product might allow a web-based exploit to execute but prevent it from downloading any further code to the target. In another case malware might run on the target for a short while before its behaviour is detected and its code is deleted or moved to a safe 'quarantine' area for future analysis. We take these outcomes into account when attributing points that form final ratings.

For example, a product that completely blocks a threat is rated more highly than one that allows a threat to run for a while before eventually evicting it. Products that allow all malware infections, or that block popular legitimate applications, are penalised heavily.

Categorising how a product handles legitimate objects is complex, and you can find out how we do it in **5. Legitimate Software Ratings** on page 12.

| TOTAL ACCURACY RATINGS | | | |
|-------------------------------|-----------------------|--------------------|-------|
| Product | Total Accuracy Rating | Total Accuracy (%) | Award |
| Kaspersky Internet Security | 1,228 | 100% | AAA |
| Microsoft Windows Defender | 1,226 | 100% | AAA |
| Norton Security | 1,219 | 99% | AAA |
| ESET Internet Security | 1,216 | 99% | AAA |
| Trend Micro Internet Security | 1,203 | 98% | AAA |
| McAfee Internet Security | 1,188 | 97% | AAA |
| Avira Free Security Suite | 1,165 | 95% | AAA |
| F-Secure Safe | 1,146 | 93% | AA |
| Avast Free Antivirus | 1,146 | 93% | AA |
| AVG Antivirus Free Edition | 1,130 | 92% | AA |
| G-Data Internet Security | 1,116 | 91% | AA |
| Quick Heal Internet Security | 1,101 | 90% | AA |
| K7 Antivirus Premium | 1,087.5 | 89% | A |
| Webroot Antivirus | 1,031 | 84% | B |



Home Anti-Malware Protection Awards

The following products win SE Labs awards:

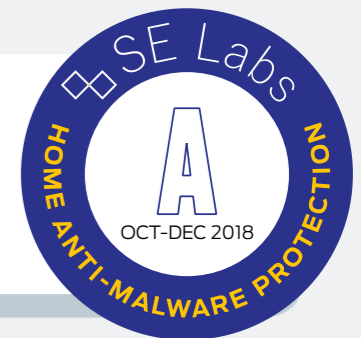
- **Kaspersky** Internet Security
- **Microsoft** Windows Defender
- **Norton** Security
- **ESET** Internet Security
- **Trend Micro** Internet Security
- **McAfee** Internet Security
- **Avira** Free Security Suite



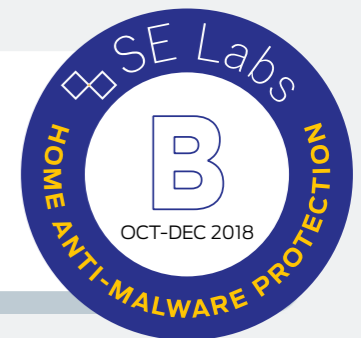
- **AVG** Antivirus Free Edition
- **F-Secure** Safe
- **G-Data** Internet Security
- **Avast** Free Antivirus
- **Quick Heal** Internet Security



- **K7** Antivirus Premium



- **Webroot** Antivirus



2. Protection Ratings

The results below indicate how effectively the products dealt with threats. Points are earned for detecting the threat and for either blocking or neutralising it.

■ Detected (+1)

If the product detects the threat with any degree of useful information, we award it one point.

■ Blocked (+2)

Threats that are disallowed from even starting their malicious activities are blocked. Blocking products score two points.

■ Neutralised (+1)

Products that kill all running malicious processes 'neutralise' the threat and win one point.

■ Complete Remediation (+1)

If, in addition to neutralising a threat, the product removes all significant traces of the attack, it gains an additional one point.

■ Persistent Neutralisation (-2)

This result occurs when a product continually blocks a persistent threat from achieving its aim, while not removing it from the system.

■ Compromised (-5)

If the threat compromises the system, the product loses five points. This loss may be reduced to four points if it manages to detect

the threat (see Detected, above), as this at least alerts the user, who may now take steps to secure the system.

Rating Calculations

We calculate the protection ratings using the following formula:

Protection Rating =
(1x number of Detected) +
(2x number of Blocked) +
(1x number of Neutralised) +
(1x number of Complete remediation) +
(-5x number of Compromised)

The 'Complete remediation' number relates to cases of neutralisation in which all significant traces of the attack were removed from the target. Such traces should not exist if the threat was 'Blocked' and so Blocked results imply Complete remediation.

These ratings are based on our opinion of how important these different outcomes are. You may have a different view on how seriously you treat a 'Compromise' or 'Neutralisation without complete remediation'. If you want to create your own rating system, you can use the raw data from **4. Protection Details** on page 11 to roll your own set of personalised ratings.

Targeted Attack Scoring

The following scores apply only to targeted attacks and are cumulative, ranging from -1 to -5.

■ Access (-1)

If any command that yields information about the target system is successful this score is applied. Examples of successful commands include listing current running processes, exploring the file system and so on. If the first command is attempted and the session is terminated by the product without the command being successful the score of Neutralised (see above) will be applied.

■ Action (-1)

If the attacker is able to exfiltrate a document from the target's Desktop of the currently logged in user then an 'action' has been successfully taken.

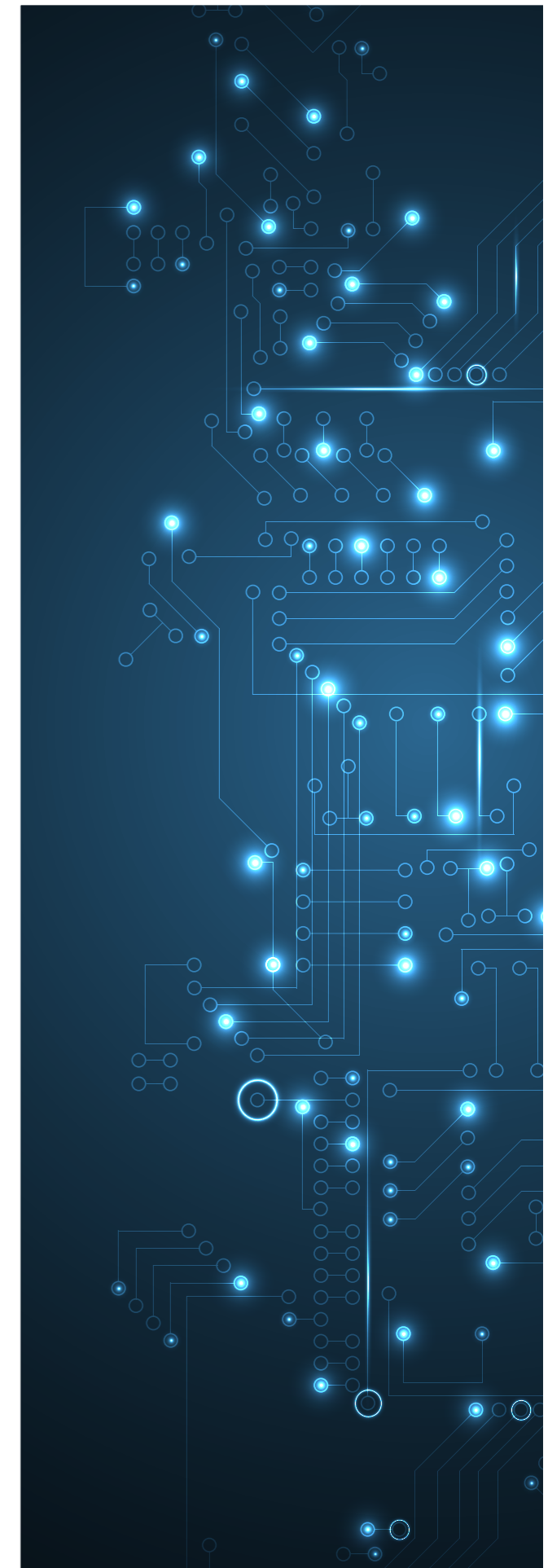
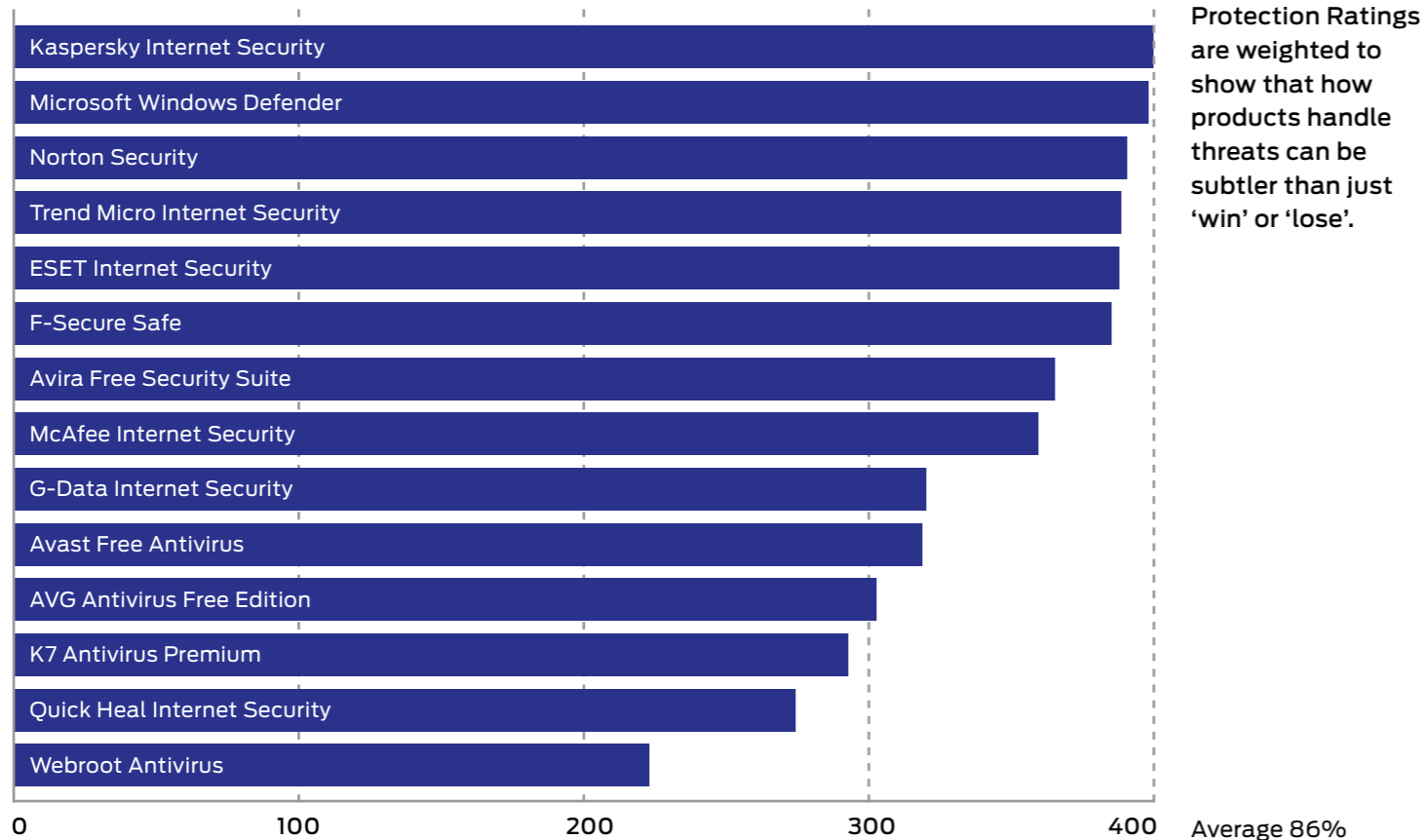
■ Escalation (-2)

The attacker attempts to escalate privileges to NT Authority/System. If successful, an additional two points are deducted.

■ Post-Escalation Action (-1)

After escalation the attacker attempts actions that rely on escalated privileges. These include attempting to steal credentials, modifying the file system and recording keystrokes. If any of these actions are successful then a further penalty of one point deduction is applied.

| PROTECTION RATINGS | | |
|-------------------------------|-------------------|-----------------------|
| Product | Protection Rating | Protection Rating (%) |
| Kaspersky Internet Security | 400 | 100% |
| Microsoft Windows Defender | 398 | 100% |
| Norton Security | 391 | 98% |
| Trend Micro Internet Security | 389 | 97% |
| ESET Internet Security | 388 | 97% |
| F-Secure Safe | 385 | 96% |
| Avira Free Security Suite | 365 | 91% |
| McAfee Internet Security | 360 | 90% |
| G-Data Internet Security | 320 | 80% |
| Avast Free Antivirus | 318 | 80% |
| AVG Antivirus Free Edition | 302 | 76% |
| K7 Antivirus Premium | 292 | 73% |
| Quick Heal Internet Security | 273 | 68% |
| Webroot Antivirus | 221 | 55% |

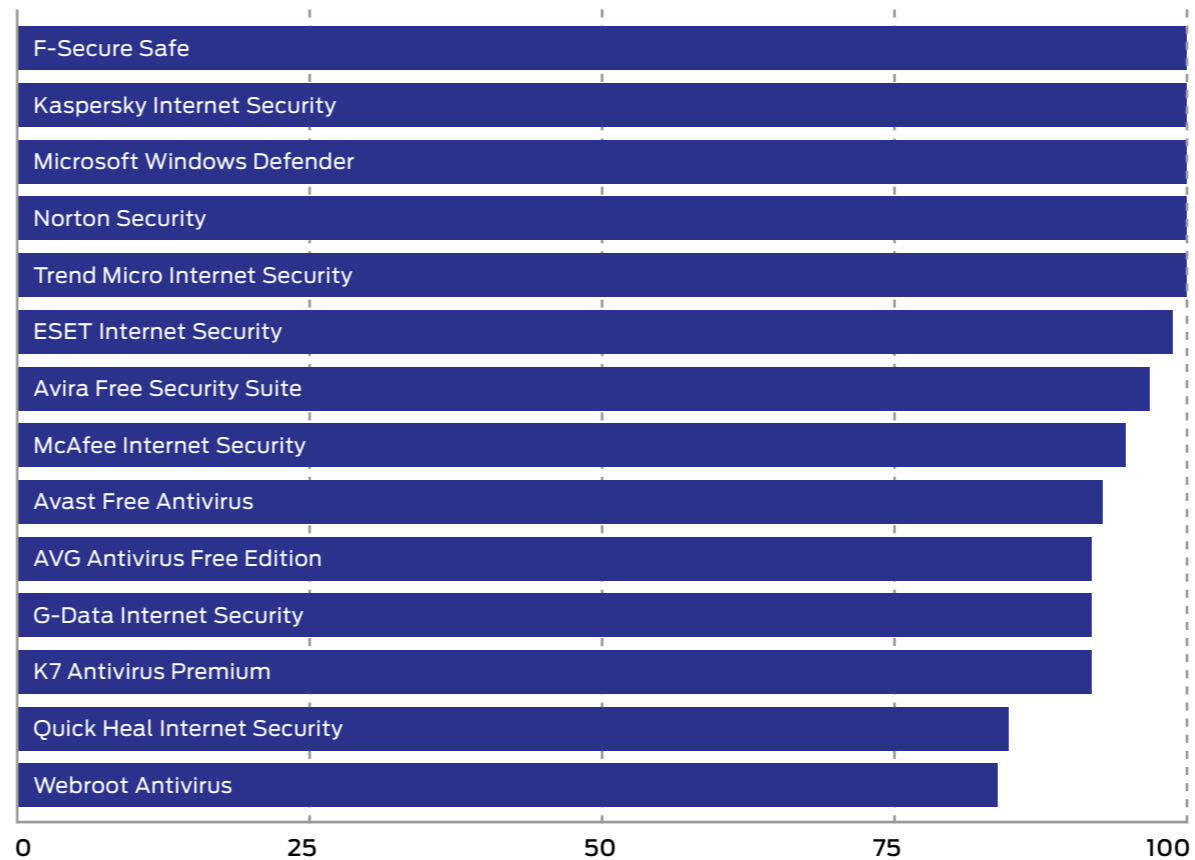


3. Protection Scores

This graph shows the overall level of protection, making no distinction between neutralised and blocked incidents.

For each product we add Blocked and Neutralised cases together to make one simple tally.

| PROTECTION SCORES | |
|-------------------------------|------------------|
| Product | Protection Score |
| F-Secure Safe | 100 |
| Kaspersky Internet Security | 100 |
| Microsoft Windows Defender | 100 |
| Norton Security | 100 |
| Trend Micro Internet Security | 100 |
| ESET Internet Security | 99 |
| Avira Free Security Suite | 97 |
| McAfee Internet Security | 95 |
| Avast Free Antivirus | 93 |
| AVG Antivirus Free Edition | 92 |
| G-Data Internet Security | 92 |
| K7 Antivirus Premium | 92 |
| Quick Heal Internet Security | 85 |
| Webroot Antivirus | 84 |



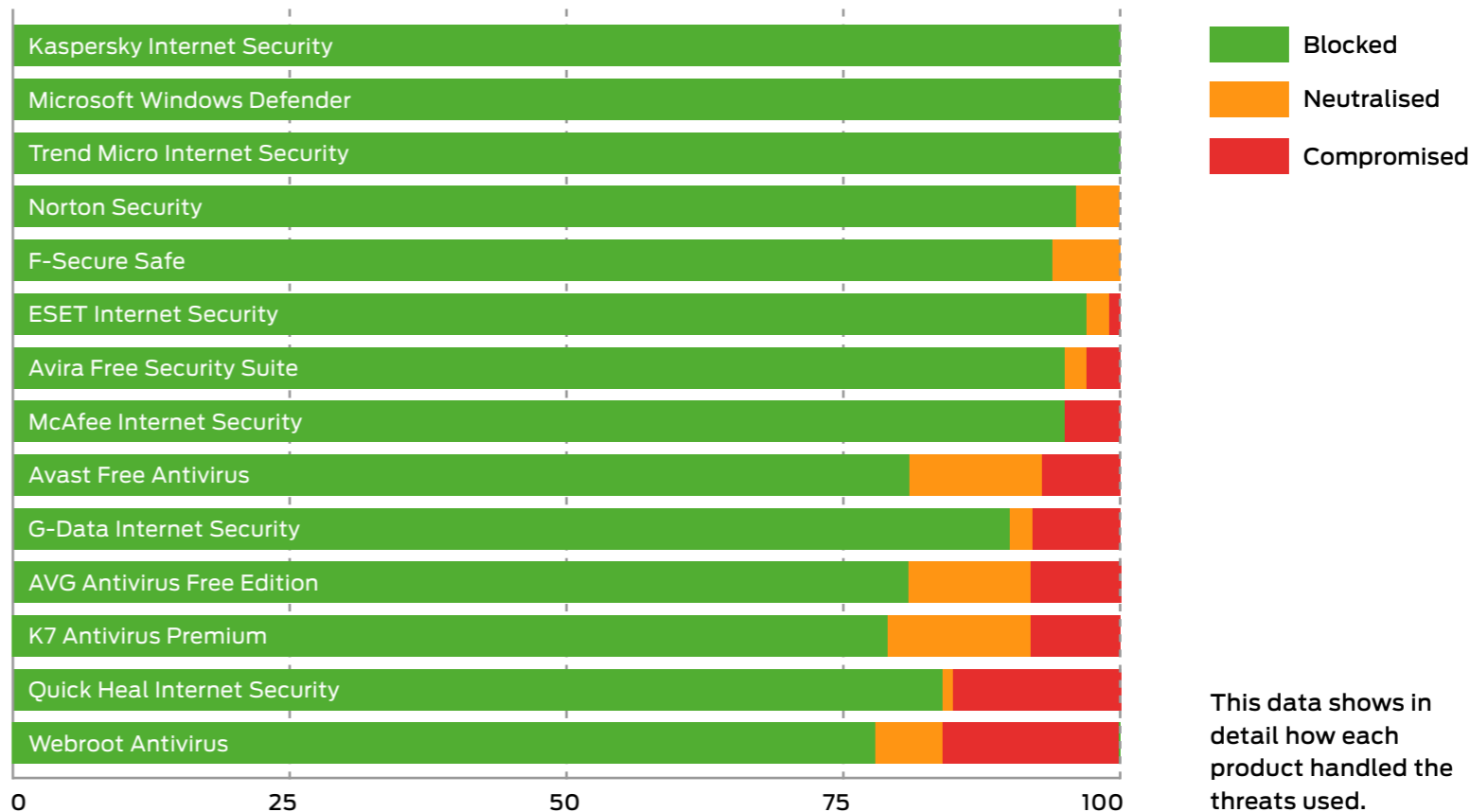
Protection Scores are a simple count of how many times a product protected the system.

4. Protection Details

These results break down how each product handled threats into some detail. You can see how many detected a threat and the levels of protection provided.

Products sometimes detect more threats than they protect against. This can happen when they recognise an element of the threat but aren't equipped to stop it. Products can also provide protection even if they don't detect certain threats. Some threats abort on detecting specific endpoint protection software.

| PROTECTION DETAILS | | | | | |
|-------------------------------|----------|---------|-------------|-------------|-----------|
| Product | Detected | Blocked | Neutralised | Compromised | Protected |
| Kaspersky Internet Security | 100 | 100 | 0 | 0 | 100 |
| Microsoft Windows Defender | 100 | 100 | 0 | 0 | 100 |
| Trend Micro Internet Security | 100 | 100 | 0 | 0 | 100 |
| Norton Security | 100 | 96 | 4 | 0 | 100 |
| F-Secure Safe | 100 | 94 | 6 | 0 | 100 |
| ESET Internet Security | 99 | 97 | 2 | 1 | 99 |
| Avira Free Security Suite | 98 | 95 | 2 | 3 | 97 |
| McAfee Internet Security | 100 | 95 | 0 | 5 | 95 |
| Avast Free Antivirus | 98 | 81 | 12 | 7 | 93 |
| G-Data Internet Security | 94 | 90 | 2 | 8 | 92 |
| AVG Antivirus Free Edition | 97 | 81 | 11 | 8 | 92 |
| K7 Antivirus Premium | 95 | 79 | 13 | 8 | 92 |
| Quick Heal Internet Security | 97 | 84 | 1 | 15 | 85 |
| Webroot Antivirus | 94 | 78 | 6 | 16 | 84 |



This data shows in detail how each product handled the threats used.

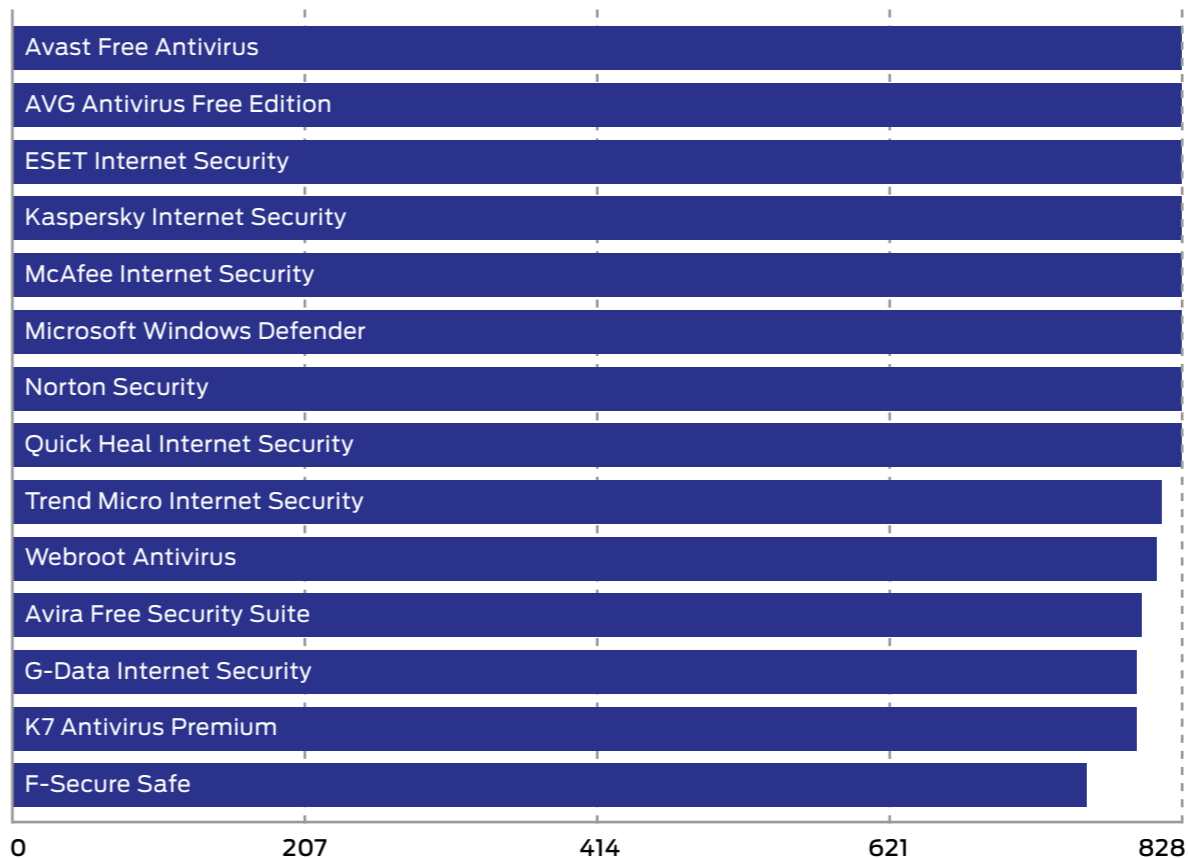
5. Legitimate Software Ratings

These ratings indicate how accurately the products classify legitimate applications and URLs, while also taking into account the interactions that each product has with the user. Ideally a product will either not classify a legitimate object or will classify it as safe. In neither case should it bother the user.

We also take into account the prevalence (popularity) of the applications and websites used in this part of the test, applying stricter penalties for when products misclassify very popular software and sites.

To understand how we calculate these ratings, see [5.3 Accuracy Ratings](#) on page 14.

| LEGITIMATE SOFTWARE RATINGS | | |
|-------------------------------|----------------------------|-------------------------|
| Product | Legitimate Accuracy Rating | Legitimate Accuracy (%) |
| Avast Free Antivirus | 828 | 100% |
| AVG Antivirus Free Edition | 828 | 100% |
| ESET Internet Security | 828 | 100% |
| Kaspersky Internet Security | 828 | 100% |
| McAfee Internet Security | 828 | 100% |
| Microsoft Windows Defender | 828 | 100% |
| Norton Security | 828 | 100% |
| Quick Heal Internet Security | 828 | 100% |
| Trend Micro Internet Security | 814 | 98% |
| Webroot Antivirus | 810 | 98% |
| Avira Free Security Suite | 800 | 97% |
| G-Data Internet Security | 796 | 96% |
| K7 Antivirus Premium | 795.5 | 96% |
| F-Secure Safe | 761 | 92% |



Legitimate Software Ratings can indicate how well a vendor has tuned its detection engine.

5.1 Interaction Ratings

It's crucial that anti-malware endpoint products not only stop – or at least detect – threats, but that they allow legitimate applications to install and run without misclassifying them as malware. Such an error is known as a 'false positive' (FP).

In reality, genuine FPs are quite rare in testing. In our experience it is unusual for a legitimate application to be classified as 'malware'. More often it will be classified as 'unknown', 'suspicious' or 'unwanted' (or terms that mean much the same thing).

We use a subtle system of rating an endpoint's approach to legitimate objects, which takes into account how it classifies the application and how it presents that information to the user. Sometimes the endpoint software will pass the buck and demand that the user decide if the application is safe or not. In such cases the product may make a recommendation to allow or block. In other cases, the product will make no recommendation, which is possibly even less helpful.

If a product allows an application to install and run with no user interaction, or with simply a brief notification that the application is likely to be safe, it has achieved an optimum result. Anything else is a Non-Optimal Classification/Action (NOCA). We think that measuring NOCAs is more useful than counting the rarer FPs.

| | None (Allowed) | Click to Allow (Default Allow) | Click to Allow/Block (No Recommendation) | Click to Block (Default Block) | None (Blocked) | |
|--------------------------|----------------|--------------------------------|--|--------------------------------|----------------|---|
| Object is Safe | 2 | 1.5 | 1 | | | A |
| Object is Unknown | 2 | 1 | 0.5 | 0 | -0.5 | B |
| Object is not Classified | 2 | 0.5 | 0 | -0.5 | -1 | C |
| Object is Suspicious | 0.5 | 0 | -0.5 | -1 | -1.5 | D |
| Object is Unwanted | 0 | -0.5 | -1 | -1.5 | -2 | E |
| Object is Malicious | | | | -2 | -2 | F |
| | 1 | 2 | 3 | 4 | 5 | |

Products that do not bother users and classify most applications correctly earn more points than those that ask questions and condemn legitimate applications.

| INTERACTION RATINGS | | | |
|-------------------------------|----------------|--------------------------------|--------------------------------|
| Product | None (Allowed) | Click to Allow (Default Allow) | Click to Block (Default Block) |
| Avast Free Antivirus | 100 | 0 | 0 |
| AVG Antivirus Free Edition | 100 | 0 | 0 |
| ESET Internet Security | 100 | 0 | 0 |
| Kaspersky Internet Security | 100 | 0 | 0 |
| Microsoft Windows Defender | 100 | 0 | 0 |
| McAfee Internet Security | 100 | 0 | 0 |
| Norton Security | 100 | 0 | 0 |
| Quick Heal Internet Security | 100 | 0 | 0 |
| Avira Free Security Suite | 98 | 0 | 2 |
| G-Data Internet Security | 98 | 0 | 2 |
| Trend Micro Internet Security | 98 | 0 | 2 |
| Webroot Antivirus | 97 | 2 | 1 |
| F-Secure Safe | 95 | 0 | 5 |
| K7 Antivirus Premium | 95 | 5 | 0 |

5.2 Prevalence Ratings

There is a significant difference between an endpoint product blocking a popular application such as the latest version of Microsoft Word and condemning a rare Iranian dating toolbar for Internet Explorer 6. One is very popular all over the world and its detection as malware (or something less serious but still suspicious) is a big deal. Conversely, the outdated toolbar won't have had a comparably large user base even when it was new. Detecting this application as malware may be wrong, but it is less impactful in the overall scheme of things.

With this in mind, we collected applications of varying popularity and sorted them into five separate categories, as follows:

1. **Very High Impact**
2. **High Impact**
3. **Medium Impact**
4. **Low Impact**
5. **Very Low Impact**

Incorrectly handling any legitimate application will invoke penalties, but classifying Microsoft Word as malware and blocking it without any way for the user to override this will bring far greater penalties than doing the same for an ancient niche toolbar. In order to calculate these relative penalties, we assigned each impact category with a rating modifier, as shown in the table above.

| LEGITIMATE SOFTWARE PREVALENCE RATING MODIFIERS | |
|---|-----------------|
| Impact Category | Rating Modifier |
| Very High Impact | 5 |
| High Impact | 4 |
| Medium Impact | 3 |
| Low Impact | 2 |
| Very Low Impact | 1 |

Applications were downloaded and installed during the test, but third-party download sites were avoided and original developers' URLs were used where possible. Download sites will sometimes bundle additional components into applications' install files, which may correctly cause anti-malware products to flag adware. We remove adware from the test set because it is often unclear how desirable this type of code is.

The prevalence for each application and URL is estimated using metrics such as third-party download sites and the data from Alexa.com's global traffic ranking system.

5.3 Accuracy Ratings

We calculate legitimate software accuracy ratings by multiplying together the interaction and prevalence ratings for each download and installation:

Accuracy rating = Interaction rating x Prevalence rating

If a product allowed one legitimate, Medium impact application to install with zero interaction with the user, then its Accuracy rating would be calculated like this:

Accuracy rating = 2 x 3 = 6

This same calculation is made for each legitimate application/site in the test and the results are summed and used to populate the graph and table shown under **5. Legitimate Software Ratings** on page 12.

5.4 Distribution of Impact Categories

Endpoint products that were most accurate in handling legitimate objects achieved the highest ratings. If all objects were of the highest prevalence, the maximum possible rating would be 1,000 (100 incidents x (2 interaction rating x 5 prevalence rating)).

In this test there was a range of applications with different levels of prevalence. The table below shows the frequency:

| LEGITIMATE SOFTWARE CATEGORY FREQUENCY | |
|--|------------|
| Prevalence Rating | Frequency |
| Very High Impact | 54 |
| High Impact | 22 |
| Medium Impact | 12 |
| Low Impact | 8 |
| Very Low Impact | 4 |
| GRAND TOTAL | 100 |

6. Conclusions

Attacks in this test included threats that affect the wider public and more closely-targeted individuals and organisations. You could say that we tested the products with 'public' malware and full-on hacking attacks. We introduced the threats in a realistic way such that threats seen in the wild on websites were downloaded from those same websites, while threats caught spreading through email were delivered to our target systems as emails.

All of the products tested are well-known and should do well in this test. While we do 'create' threats by using publicly available free hacking tools, we don't write unique malware so there is no technical reason why every vendor being tested should do poorly.

Consequently, it's not a shock to see all products handle the public threats very effectively. **Webroot Antivirus** was a little weaker than the competition here, though. Targeted attacks were also handled well by most but caused some significant problems for the products from **Avast**, **G-Data**, **K7**, **Webroot** and **Quick Heal**. **Webroot** notes that testing occurred before it released its

script and anti-exploit protection. **K7** believes that its **Total Security** product is better suited to this type of testing and would have performed more strongly.

The **Kaspersky**, **Microsoft**, **Symantec (Norton)** products blocked all of the public and targeted attacks. They also handled all of the legitimate applications correctly.

Products from **ESET**, **Trend Micro**, **McAfee** and **Avira** follow up close behind. **Trend Micro** and **Avira** each blocked two legitimate applications, while **ESET** missed one public threat and **McAfee** missed five targeted attacks.

Quick Heal Internet Security stopped only 10 of the 25 targeted attacks. **Webroot** missed a few public threats and six targeted attacks.

The leading products from **Kaspersky Lab**, **Microsoft**, **Symantec (Norton)**, **ESET**, **Trend Micro** and **Avira** win AAA awards.

Appendices

APPENDIX A: Terms Used

| TERM | MEANING |
|----------------------|--|
| Compromised | The attack succeeded, resulting in malware running unhindered on the target. In the case of a targeted attack, the attacker was able to take remote control of the system and carry out a variety of tasks without hindrance. |
| Blocked | The attack was prevented from making any changes to the target. |
| False positive | When a security product misclassifies a legitimate application or website as being malicious, it generates a 'false positive'. |
| Neutralised | The exploit or malware payload ran on the target but was subsequently removed. |
| Complete Remediation | If a security product removes all significant traces of an attack, it has achieved complete remediation. |
| Target | The test system that is protected by a security product. |
| Threat | A program or sequence of interactions with the target that is designed to take some level of unauthorised control of that target. |
| Update | Security vendors provide information to their products in an effort to keep abreast of the latest threats. These updates may be downloaded in bulk as one or more files, or requested individually and live over the internet. |

APPENDIX B: FAQs

A **full methodology** for this test is available from our website.

- The products chosen for this test were selected by SE Labs.
- The test was unsponsored.
- The test was conducted between 25th September and 25th October 2018.
- All products were configured according to each vendor's recommendations, when such recommendations were provided.
- Malicious URLs and legitimate applications and URLs were independently located and verified by SE Labs.
- Targeted attacks were selected and verified by SE Labs.
- Malicious and legitimate data was provided to partner organisations once the test was complete.
- SE Labs conducted this endpoint security testing on physical PCs, not virtual machines.
- The web browser used in this test was Google Chrome. When testing Microsoft products Chrome was equipped with the Windows Defender Browser Protection browser extension (<https://browserprotection.microsoft.com>).

Q What is a partner organisation? Can I become one to gain access to the threat data used in your tests?

A Partner organisations benefit from our consultancy services after a test has been run. Partners may gain access to low-level data that can be useful in product improvement initiatives and have permission to use award logos, where appropriate, for marketing purposes. We do not share data on one partner with other partners. We do not partner with organisations that do not engage in our testing.

Q I am a security vendor and you tested my product without permission. May I access the threat data to verify that your results are accurate?

A We are willing to share a certain level of test data with non-partner participants for free. The intention is to provide sufficient data to demonstrate that the results are accurate. For more in-depth data suitable for product improvement purposes we recommend becoming a partner.

APPENDIX C: Product Versions

The table below shows the service's name as it was being marketed at the time of the test.

| PRODUCT VERSIONS | | | |
|------------------|------------------------|---|--|
| Provider | Product Name | Build Version (start) | Build Version (end) |
| Avast | Free Antivirus | 18.2.2328 (build 18.2.3827.307) | Program version: 18.8.2356 (build 18.8.4084.408); virus definitions version: 181127-0 |
| AVG | Antivirus Free Edition | Software: 18.2.3046 | Software version: 18.8.3071 (build 18.8.4084.408), UI version: 1.0.134, Virus definitions version: 181127-2 |
| Avira | Free Security Suite | 1.2.106.18629/ 15.0.34.27 | 1.2.119.17994/ 15.0.40.12 |
| ESET | Internet Security | 10.1.235.0 | ESET Internet Security Version 12.0.27.0, Windows 10 Pro (64-bit) Version 10.0.16299 |
| F-Secure | Safe | Antivirus: 17.204.106; Family Rules: 2.204.7118.12; Common Component Framework 3.04.148 | F-Secure SAFE 17.4; Antivirus 17.215.129; Family Rules 2.215.7452.4118; Common Component Framework 3.15.612 |
| G-Data | Internet Security | Version: 25.4.0.4 | Version 25.5.0.3 |
| K7 | Antivirus Premium | Program Version: 15.1.0331; Virus Definitions: 11.5.28484; MSIE Version: 11.125.16299.0 | Program Version: 15.1.0336; Virus Definitions: 11.14.29165; MSIE Version: 11.125.16299.0 |
| Kaspersky Lab | Internet Security | 18.0.0.405 (g) | 19.0.0.1088 (c) |
| McAfee | Internet Security | Intel: 16.0, SecurityCenter: 17.4, VirusScan: 21.4, Personal Firewall: 18.4, WebAdvisor: 4.0, Anti-Spam: 18.4, parental Controls: 19.4, QuickClean and Shredder: 17.4, Vulnerability Scanner: 7.4 | McAfee Internet Security Version: 16.0 Release Name: 16.0.R14, McAfee SecurityCenter Version: 17.4 Build: 17.4.142, McAfee VirusScan Version: 21.4 Build: 21.4.135, Personal Firewall Version: 18.4 Build: 18.4.136, WebAdvisor Version: 4.0 Build: 4.0.7.208, Anti-Spam Version: 18.4 Build: 18.4.154, McAfee Parental Controls Version: 19.4 Build: 19.4.140, QuickClean and Shredder Version: 17.4 Build: 17.4.148, Vulnerability Scanner Version: 7.4 Build: 7.4.112 |
| Microsoft | Windows Defender | 4.12.17007.18022 (Antimalware Client Version) 1.263.870.0 (Antivirus Version) | Antimalware Client Version: 4.18.1810.5 Engine Version: 1.1.15400.5, Antivirus Version: 1.281.899.0 |
| Quick Heal | Internet Security | Version: 17.00 (10.0.0.45) 64-bit | Product Version: 17.00 (10.0.0.55), 64-bit |
| Symantec | Norton Security | 22.12.1.15 | Version 22.16.2.22 |
| Trend Micro | Internet Security | 12.0.1226 | 12.0.1226 |
| Webroot | Antivirus | 9.0.19.43 | 9.0.23.32 |

APPENDIX D: Attack Types

The table below shows how each product protected against the different types of attacks used in the test.

| ATTACK TYPES | | | |
|-------------------------------|--------------|-----------------|-----------|
| Product | Web-Download | Targeted Attack | Protected |
| F-Secure Safe | 75 | 25 | 100 |
| Kaspersky Internet Security | 75 | 25 | 100 |
| Microsoft Windows Defender | 75 | 25 | 100 |
| Norton Security | 75 | 25 | 100 |
| Trend Micro Internet Security | 75 | 25 | 100 |
| ESET Internet Security | 74 | 25 | 99 |
| Avira Free Security Suite | 72 | 25 | 97 |
| McAfee Internet Security | 75 | 20 | 95 |
| Avast Free Antivirus | 74 | 19 | 93 |
| AVG Antivirus Free Edition | 73 | 19 | 92 |
| G-Data Internet Security | 74 | 18 | 92 |
| K7 Antivirus Premium | 72 | 20 | 92 |
| Quick Heal Internet Security | 75 | 10 | 85 |
| Webroot Antivirus | 65 | 19 | 84 |

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