

# INTEL® GRAPHICS TECHNOLOGY SELF-TEST METHODOLOGY

## Introduction

The [Runs Great on Intel® Technology Certification](#) self-test process allows game developers to execute testing themselves and learn new quality assurance skills. Follow the process below and submit the test results for an opportunity to participate in the many [benefits](#) of the Intel® Game Dev Program.

## Hardware Required

System	Intel® HD Graphics	Iris® Plus Graphics
<b>Intel® Core™ i7 Processor</b> <small>(click SKU for details)</small>	<b>i7-8550U</b> Base Freq: 1.80GHz   Max Freq: 4.0GHz	<b>i7-6770HQ</b> Base Freq: 2.60GHz   Max Freq: 3.5GHz
<b>Intel® Graphics Technology</b>	Intel® HD Graphics 620 Base Freq: 300MHz   Max Freq: 1.15GHz	Iris® Plus graphics 580 Base Freq: 350MHz   Max Freq: 950MHz
<b>RAM</b>	2x8GB 1867MHz Dual Channel LPDDR3	2x8GB DDR4-2400
<b>Channels</b>	Dual	Dual
<b>OEM Examples</b>	Dell XPS 13 9360	Intel® NUC Kit NUC6i7KYK
<b>OEM Link</b>	<a href="http://www.dell.com/">http://www.dell.com/</a> If the 9360 is not available, then we recommend the 9370	<a href="http://www.intel.com/content/www/us/en/nuc/nuc-kit-nuc6i7kyk-features-configurations.html">http://www.intel.com/content/www/us/en/nuc/nuc-kit-nuc6i7kyk-features-configurations.html</a>
<b>Reference World of Tanks* enCore Score</b>	8211	8441
<b>Minimum Recommended Resolution</b>	1280x720	1920x1080

If you do not have the exact systems listed above, any similar system with CPU and GPU speeds within 150 MHz is sufficient.

Results on both systems not required, you can provide data on either system necessary.

## Notes on Hardware

- **Dual-Channel RAM:** Both systems should have dual-channel RAM. Memory performance, especially for graphics, can be greatly affected with single-channel RAM.
- **Game Bar and GAME DVR:** Ensure Windows 10® Game Bar and DVR are disabled, both can have an impact on performance.
  - To disable the Game Bar, head to Settings > Gaming > Game Bar. Set the “Record game clips, screenshots, and broadcast using Game bar” option here to “Off”.
  - To disable Game DVR, head to Settings > Gaming > Game DVR. Ensure the “Record in the background while I’m playing a game” option here is set to “Off”

## System Performance Check

- It is recommended to check the test system performance and ensure the results are within 5% of the reference World of Tanks\* enCore scores listed in the table above.
- Download and install World of Tanks enCore: [https://wotencore.net/3343\\_en1](https://wotencore.net/3343_en1).
  - Test **1920x1080** resolution with **medium** preset settings with **no anti-aliasing** (AA) for Iris® Plus graphics. Only change the resolution and Antialiasing setting, leave all other option at their defaults.
  - Test **1280x720** resolution with **medium** settings with **no AA** for Intel® HD Graphics. Only change the resolution and Antialiasing setting, leave all other option at their defaults.
- Click on **Test**, the benchmark will run automatically and generate a score.
- Run at least 3 tests directly after each other to detect any thermal issues with the system.

## Drivers

The latest production graphics driver is recommended, graphics drivers are available through Windows\* Update. More details available [Downloads for Graphics Drivers](#).

Note: Latest Windows updates should be installed before starting a test. No updates should be carried out during a testing.

## Game Settings

**Resolution:** The recommended resolution for games running on Intel HD Graphics is 720p (1280x720) and for Iris Plus Graphics the recommended resolution is 1080p (1920x1080).

As a starting point, testing should begin at the recommended resolution with lowest settings and resolution scaling at 100%.

Ensure Vsync is turned off. If the game is frame locked disable if possible.

If performance exceeds 30fps consider testing at higher resolution or quality setting.

The goal is to find the best game experience on the respective platform. That is the ideal combination of resolution, settings and frame rate.

## Workload

If the game includes a benchmark, use it for testing. If there is no benchmark find a repeatable & reliable location in game to test with. Below are some guidelines to help select a good scenario:

- Include indoor and outdoor settings if possible
- Do not get data in game menus and loading screens
- Ensure you can repeat the test scenario somewhat accurately
- Scenario should be 5-10 minutes in length depending if there are loading levels or checkpoints that don't allow you to measure longer
- Do not play the game through, always repeat the same section for each test run, setting and platform

## Measurement

Measure the workload at least 3 times, then calculate the median to find the performance

The **median** is the middle number. To calculate the median of any set of numbers, you need to write the numbers in order. If there is an odd number of results, the median is the middle number. If there is an even number of items in the data set, then the median is found by taking the mean (average) of the two middlemost numbers.

Prior to testing open task manager to identify any processes running in the background. Some processes may impact performance.

Run the game for 5 minutes before starting testing to ensure system is not cold.

Use PresentMon to get the data, it is a free tool developed by Intel and [available for download](#).

The frame time is called MsBetween Presents in the .csv generated by PresentMon. Frame time can be converted to frames per second (FPS) with this calculation:  $1000/\text{Frametime in ms}$

PresentMon tips:

- Use -process\_name flag for the process you want to measure
- -hotkey to trigger measurement with F11 key
- -timed [seconds] to set your measurement duration

Record the game settings by taking a screen capture of the in-game settings menu.

Provide a gameplay screenshot at each setting tested.

Get a dxdiag report for each system:

- In Windows, select **Start** and enter **dxdiag** into the search box on the taskbar. Select **dxdiag** from the results. In the tool, select **Save All Information**.

## Saving Data

The PresentMon log files must be submitted to Intel. The data will be reviewed and stored. The log files must be provided in a compressed file (.zip preferred) using the format below. No final excel report is required by Intel, just the rollup email and logs.

Collect your data and use the following data structure:

- Game Title
  - System – **Intel HD Graphics** or **Iris Graphics**.
    - DxDiag Report for the system
    - Game setting / workload folders (there can be multiple settings or workloads per system). Examples: [1280x720 Low](#), [1920x1080 Medium](#).
    - This folder contains Settings Screenshots and Gameplay screenshots. Gameplay screenshots should be named "gameplay.<extension>".
    - PresentMon logfiles in a folder called **PresentMon**.
      - PresentMon logs should follow this naming convention (case matters):
        - PresentMon-<Game Title>-<File Number(1,2, etc.)>.csv
        - Example: [PresentMon-Doom-1.csv](#).
- Example structure:

- ▼ 📁 Game Title
  - ▼ 📁 Intel HD Graphics
    - 📁 1280x720 High
    - 📁 1280x720 Low
    - 📁 1920x1080 Average
  - ▼ 📁 Intel Iris Plus Graphics
    - 📁 1920x1080 Highest
    - 📁 1920x1080 Medium
    - 📁 3840x2160 Low

## Submitting Test Results

1. Fill in the table below and copy into an email.
2. Attach the compressed file containing the results (see Saving Data section above)
3. Title the email: **Intel Game Dev Self-Test Submission for <Game Title>**
4. Send the email to [IntelGameDev\\_TestSubmission@intel.com](mailto:IntelGameDev_TestSubmission@intel.com)
5. Once submitted, the results will be reviewed, and you will be notified in 2 weeks from send date.

Game Developer:	
Game Title	
Code Level (Alpha, Beta, Gold, RTM):	
Game Build Number:	
API:	
Release Window/Date (quarter, month, or date)	
<b>Test System 1 Information</b>	
System	
CPU SKU	
GPU SKU	
System BIOS Version	
Operating System	
Operating System Version	
World of Tanks* enCore score	
<b>Test System 2 Information</b>	
System	
CPU SKU	
GPU SKU	
System BIOS Version	
Operating System	
Operating System Version	
World of Tanks* enCore score	

## Summary

Submitting your self-test results is the first step in the guided journey to create a playable game on Intel® technology. Take your game to the next level with the [Runs Great on Intel technology certification](#) program.

## Step Up Your Game in Intel® Game Dev

Access powerful developer tools and professional tutorials to help you imagine, plan, and design your next game. The [Intel® Game Developer program](#) is a resource offering free libraries, performance analyzers, and other features to help more efficiently code and optimize your game for Intel® architecture. See all the [benefits](#), including access to exclusive code samples, and get inspired by go-to-market guides written by game developers. [Join](#) the Intel Game Developer program now.