

Intel® Processor Diagnostic Tool

Help Documentation

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1 Purpose of Intel® Processor Diagnostic Tool

The purpose of the Intel® Processor Diagnostic Tool is to verify the functionality of an Intel® microprocessor. The diagnostic checks for brand identification, verifies the processor operating frequency, tests specific processor features and performs a stress test on the processor.

The diagnostic can be configured to execute with various features enabled or disabled. For more details, see [IPDT Features & Parameters](#)

2 IPDT Test System Requirements

Multiprocessor Systems

The Intel® Processor Diagnostic Tool is compatible with multiprocessor systems. Intel® Processor Diagnostic Tool supports parallel testing of multiple processors inserted into a multiprocessor system following all processor configuration rules for the platform. Please refer to your system manufacturer's documentation for configuration requirements.

However, in some specific cases it may be necessary that only one Intel® processor is tested at a time in a multi-socket system configuration.

Motherboard & Processor

It is essential that the motherboard you use to test your processor is fully compatible with your Intel® processor. Consult your motherboard manufacturer's support to ensure the motherboard supports your processor. If you are using an Intel® Motherboard please use this utility [Intel® Processors and Boards Compatibility Tool](#)

Motherboard BIOS

It is essential that the motherboards BIOS is at the minimum BIOS revision specified to support your Intel® processor. Consult your motherboard manufacturer's support to ensure the BIOS revision is at the correct revision.

Motherboard Architecture

IPDT is only compatible with motherboards built using Intel® Architecture.

Over-Clocking

Over-Clocking should be disabled while running Intel® Processor Diagnostic Tool.

Power Management

Some power management features (e.g. [Intel SpeedStep® technology](#)) throttle or reduce the operating frequency of components within the system. These types of power management features may result in very low tested frequency results. This does not mean that the processor is operating at degraded performance levels. It means that the enabled power management feature is optimizing the efficiency of the processor, either to save power or reduce heat within the system.

We recommend you disable any power management features such as Intel SpeedStep® technology and configure your system to its optimal power management settings, when running Intel® Processor Diagnostic Tool. For instructions on how to disable these power management features, please contact your system manufacturer.

Operating Systems

The Windows® version of the Intel® Processor Diagnostic Tool is compatible with the following operating systems:

- Windows 11® 64 Bit (all versions)
- Windows 10® 64 Bit (all versions) – except Windows® RT
- Windows Server 2022® Standard/Datacenter
- Windows Server 2019® Standard/Datacenter
- Windows Server 2016® Standard/Datacenter
- Windows Server 2012® R2 Standard/Enterprise

3 Acronyms

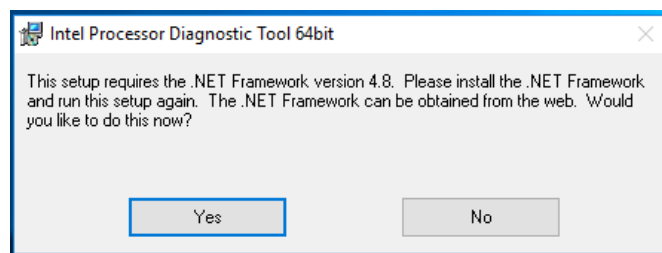
Acronym	Definition
CPU	Central Processing Unit
GUI	Graphical User Interface
QPI	QuickPath Interconnect
IMC	Integrated Memory Controller
IPDT	Intel® Processor Diagnostic Tool
MSR	Model Specific Register
OS	Operating System

4 Software Required

The following software is required to run IPDT in the Windows® environment and must be installed prior to installation of IPDT.

- Microsoft® .NET Framework Version 4.8 Redistributable Package (x86_x64). Click [here](https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48) to download or copy the following URL into the browser <https://dotnet.microsoft.com/en-us/download/dotnet-framework/net48>.

Additional support information about the .NET 4.8 Runtime is available [here](#) from Microsoft®. The IPDT Installer program will check for the presence of this minimum prerequisite on your system and provide the following prompt if it is necessary to update this software.

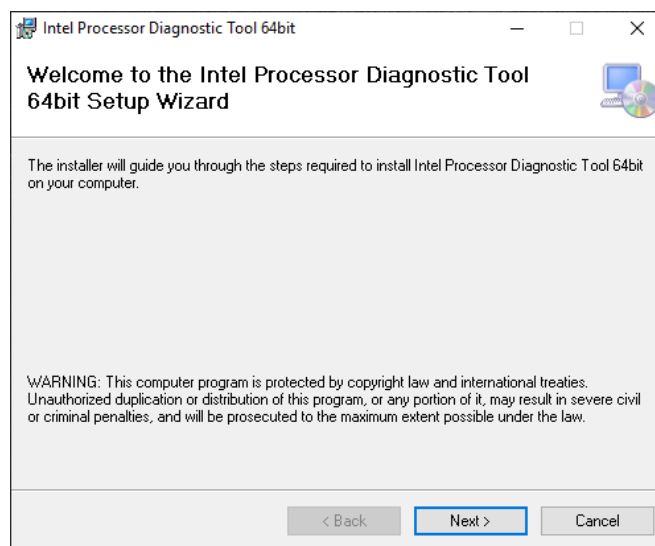


5 Installing IPDT in the Windows Environment

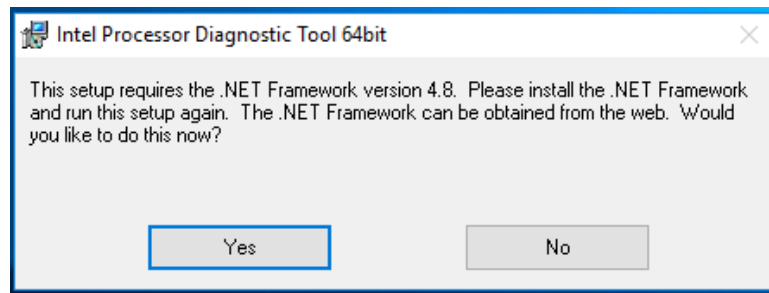
Installation Process

Copy the IPDT Installer program to the desktop or other preferred location. Double-click on it and the dialog box below will be shown.

Click Next button to continue to the IPDT prerequisite check.

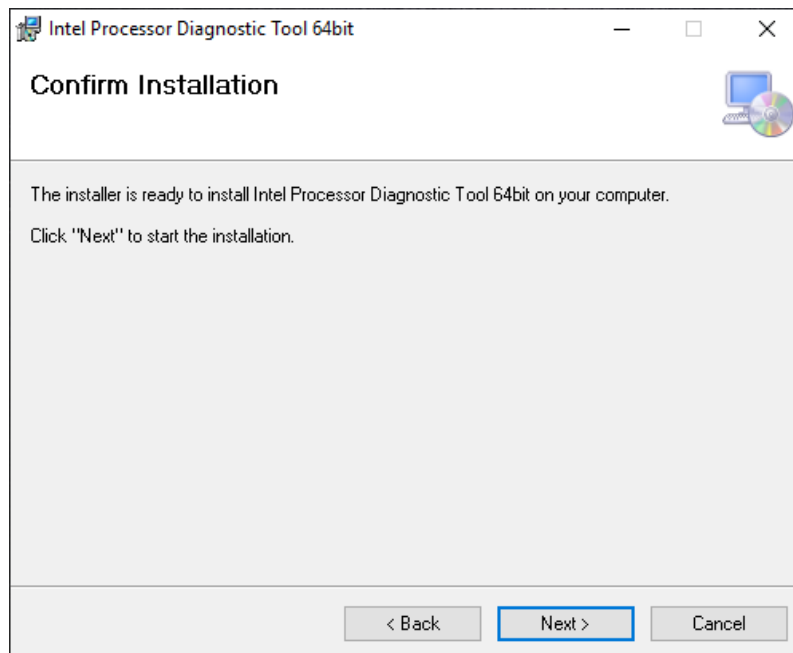


If you require .NET 4.8 prerequisite, and with active internet connection provided, the Setup program will download the .NET web installation package from Microsoft® site by selecting Yes.

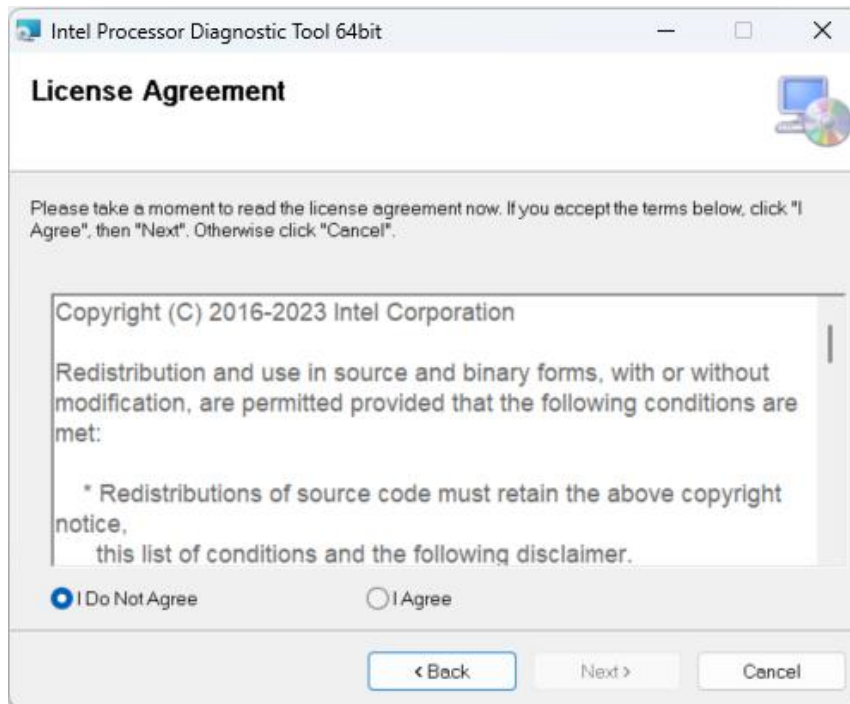


If you do not have an active internet connection you may use the offline installer (IPDT_Installer_4.5_64bit_offline.zip).

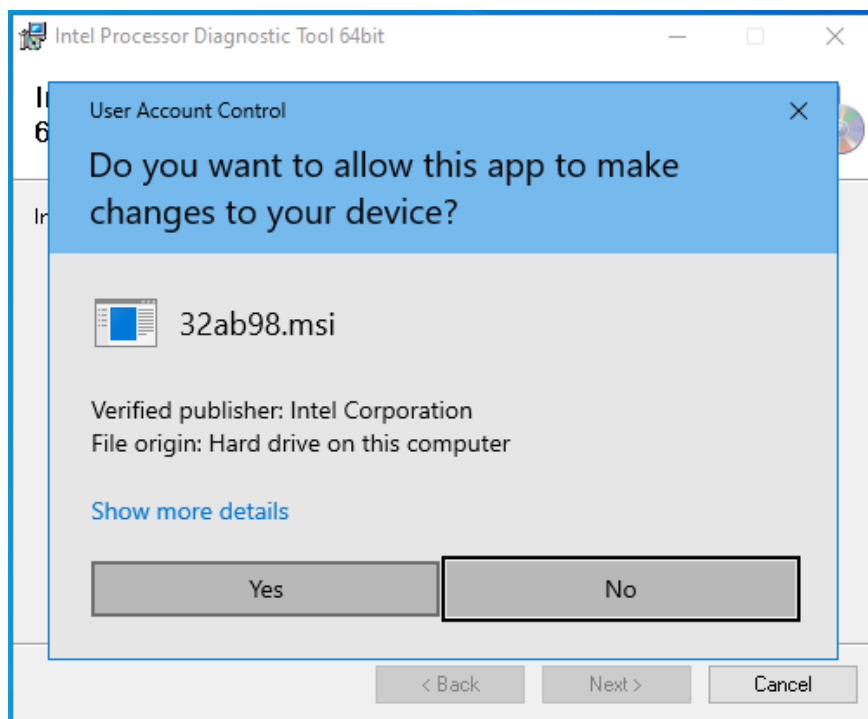
After prerequisite check is successful the following Confirmation message will be displayed. Select Next button to continue installation.



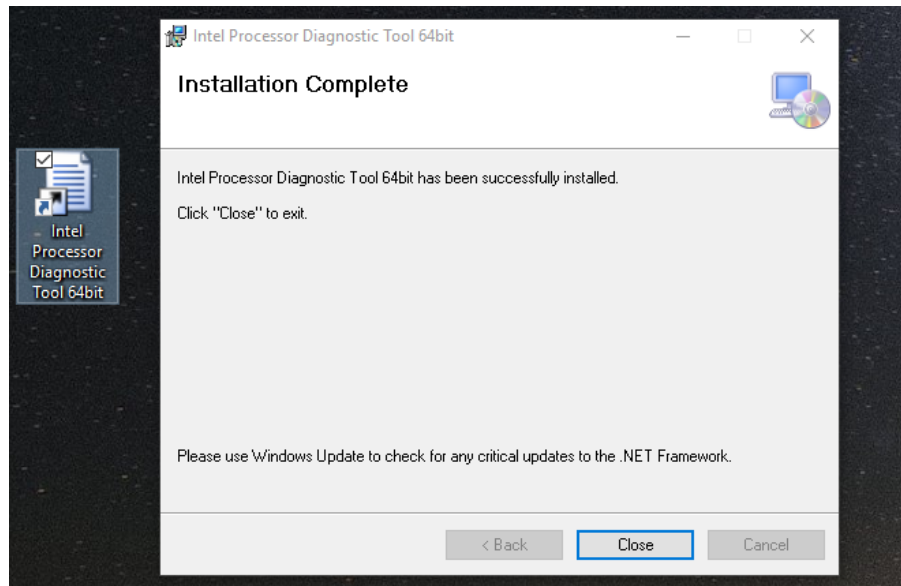
Read complete License Agreement and follow instructions as indicated in message box below. You must accept the terms of this license agreement in order to continue with the installation.



The following User Account Control message will allow IPDT Setup to continue by selecting Yes button.

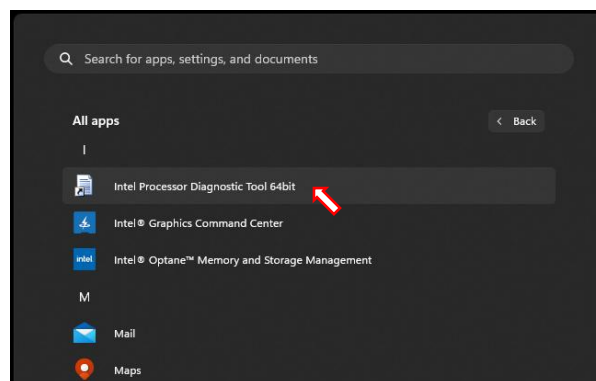


Setup will indicate completion of installation as illustrated below, and an application shortcut will be added to the desktop.

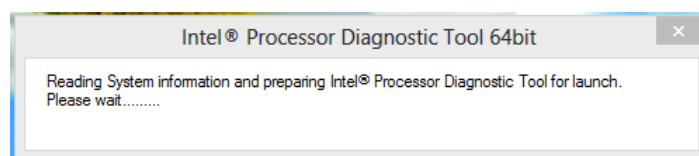


6 Running IPDT from GUI

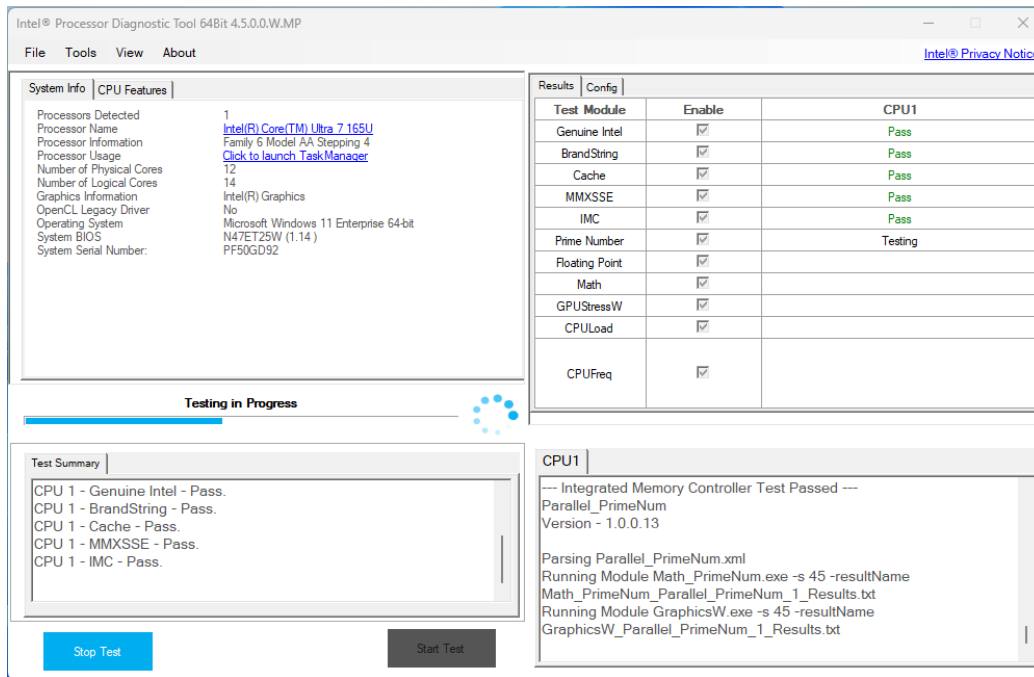
IPDT can be launched by either using the desktop shortcut or selecting "Intel Processor Diagnostic Tool 64bit" from the Apps Menu.



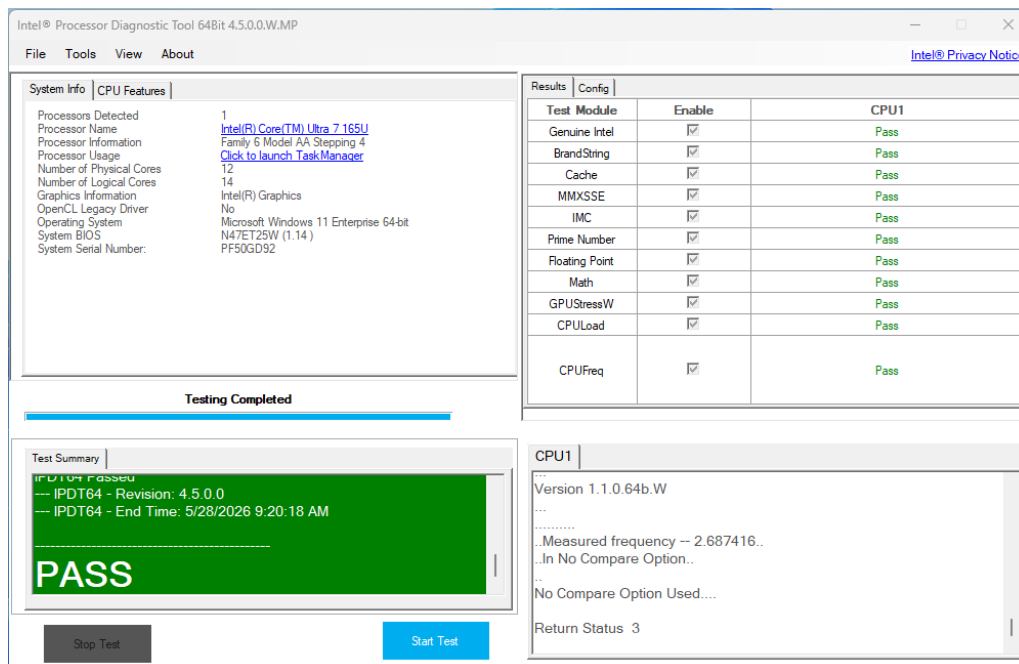
When launched IPDT will display the message below momentarily as it detects system configuration.



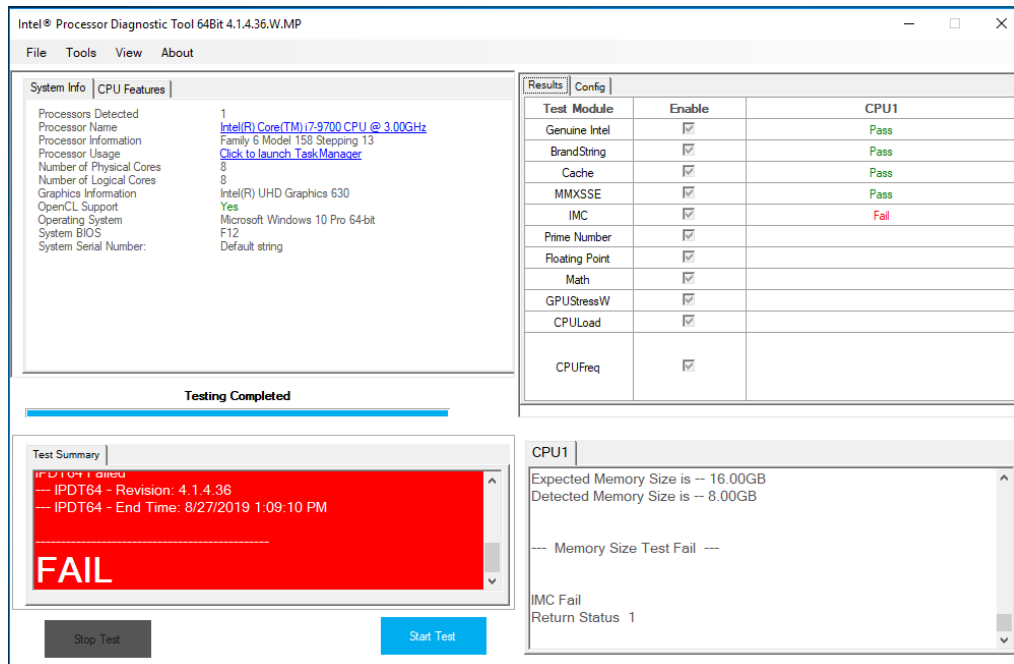
IPDT will then begin execution of the diagnostic using the default configuration based on the CPU model.



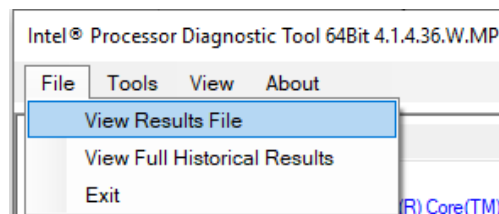
System information is shown in the top left window.
 Test Summary window with progress bar is shown in the bottom left window.
 Test Results and configuration settings are shown in the top right window.
 Detailed test output is shown in the bottom right window.
 When IPDT completes, the Testing Status will display either a PASS or FAIL.



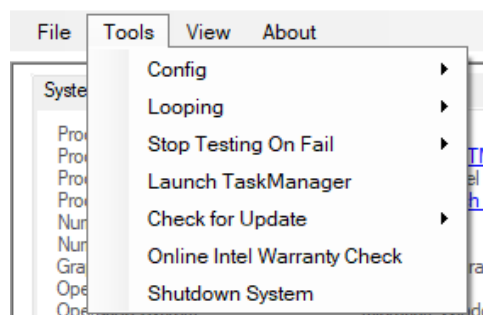
The FAIL screen is shown below.



At the top of the IPDT GUI Window is a Menu Bar. The "File" Menu allows you to open the TestResults.txt file using Notepad, and allows you to exit IPDT. You may also view the full historical test results file to show all IPDT test results from each subsequent test run. See below:



The "Tools" menu will allow you to open Config menu, turn off/on Looping, Check for Update, Launch Task Manager and Shutdown System. See below:



Tools → Config menu is only available when IPDT is not executing tests.
Tools → Config → Reset to Defaults. This will reset your Features & Parameters to default values.

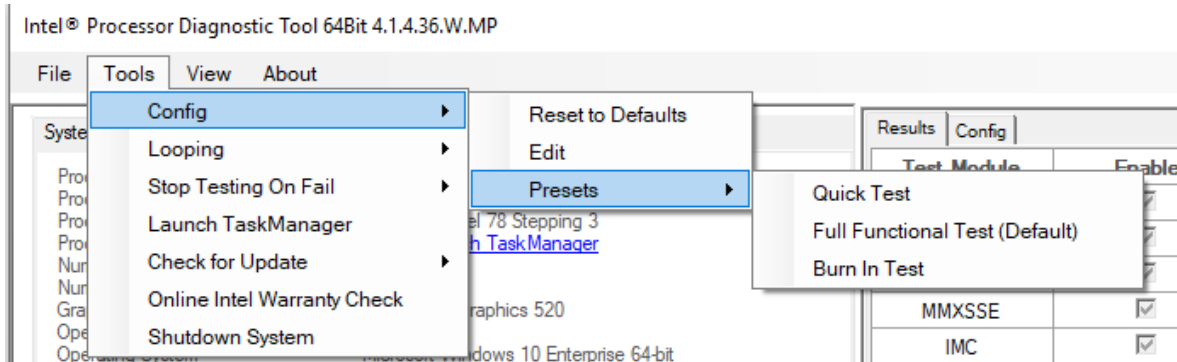
Tools → Config → Edit. This will allow you to edit and Enable/Disable test modules.

Tools → Config → Presets allows you to set IPDT to 3 preset settings of operation

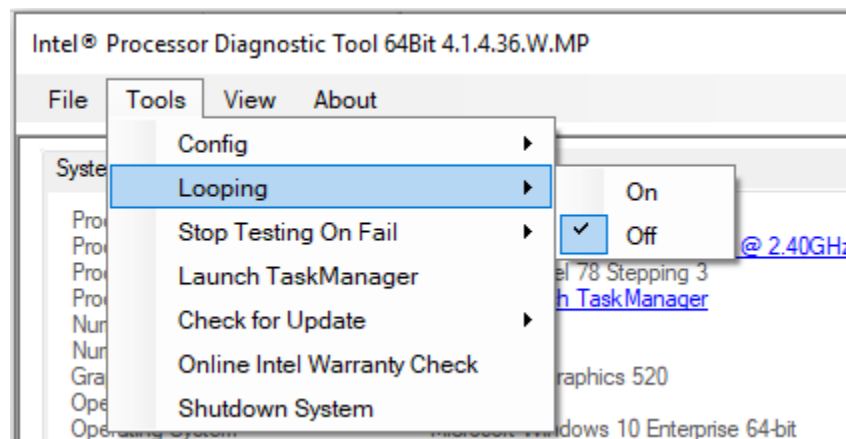
Presets → Quick Test sets all IPDT features to disabled. Run Genuine Intel, Brand String and Frequency Test only.

Presets → Full Functional Test enables all IPDT features and runs IPDT stress tests for total time of approximately 4 minutes. This is the default IPDT setting.

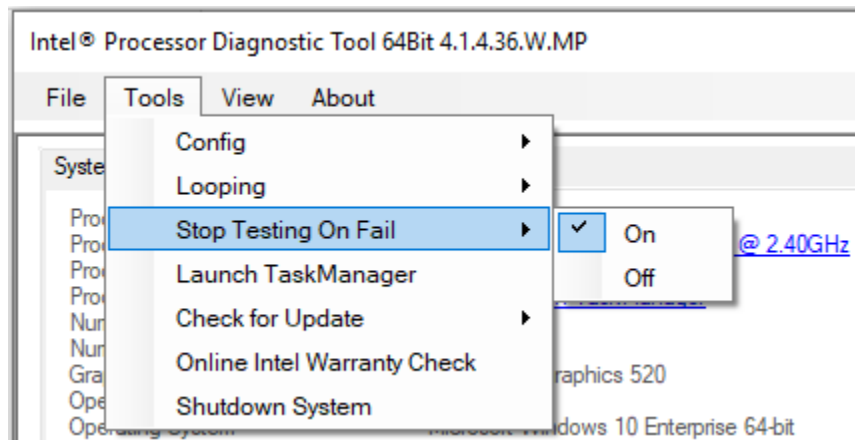
Presets → Burn-In Test enables all IPDT features and runs IPDT stress tests for approximately 3 hours. You may also turn on looping with this Burn-In setting.



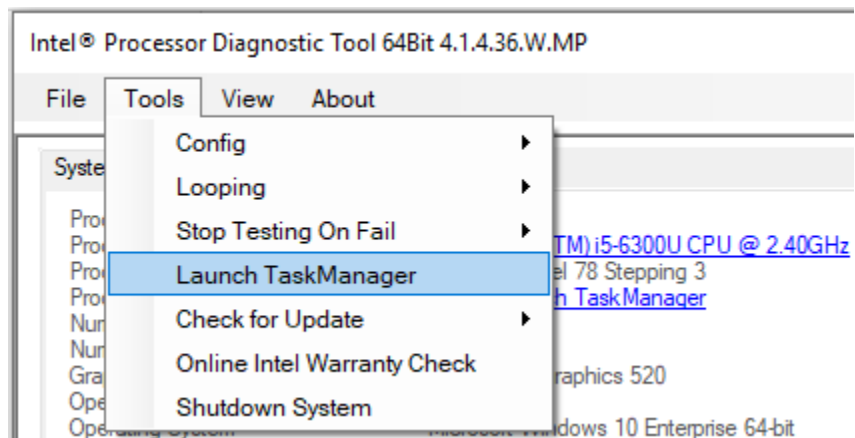
Tools → Looping → On or Off. Set to ON, this will loop/test IPDT continuously until you turn Looping to OFF. "Stop Testing on Fail" will halt on a failure by default. See below.



Tools → "Stop Testing On Fail" will allow you to set IPDT to stop when a failure is detected (default) or continue test loop after a failure if set to "Off".

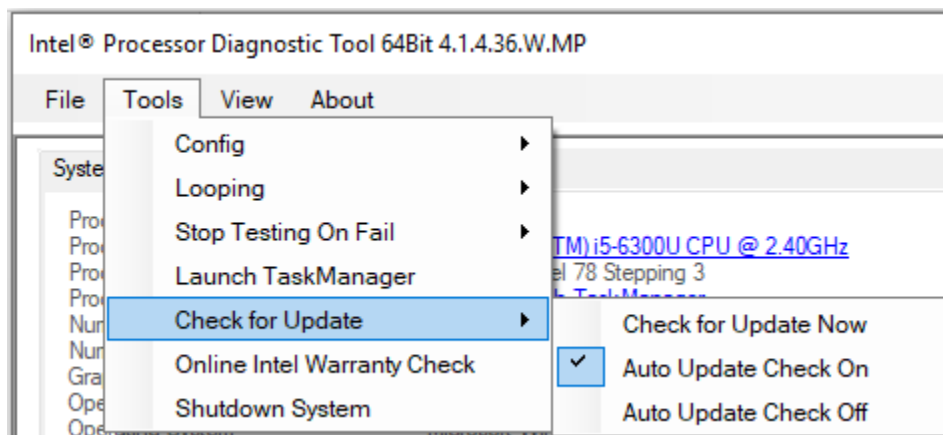


Tools → “Launch Task Manager” will launch your systems Task Manager, where you can view the systems performance while IPDT is running.



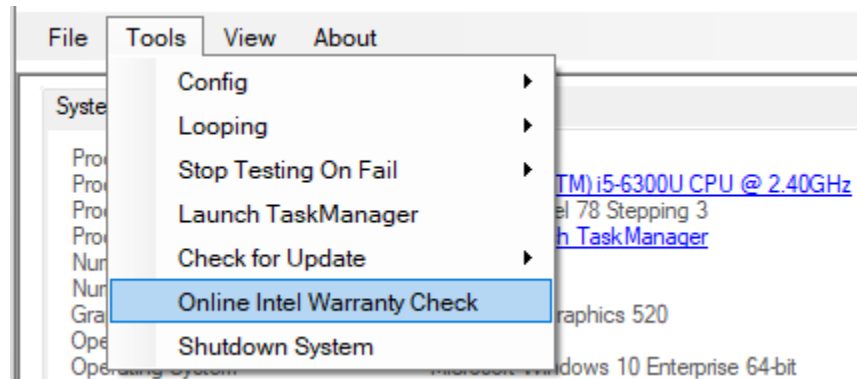
Tools → Check for Update → “Check for Update Now” will check your version of IPDT against the latest IPDT version online and display a message if your version of IPDT is lower.

Tools → Check for Update → “Auto Update Check On” will enable IPDT to check its version online every time IPDT is launched. “Auto Update Check Off” will turn off IPDT checking online when IPDT launches.

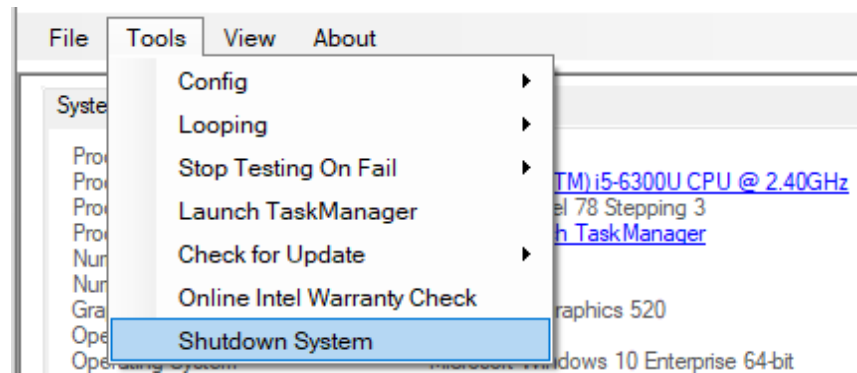


The Intel® Processor Diagnostic Tool - Help

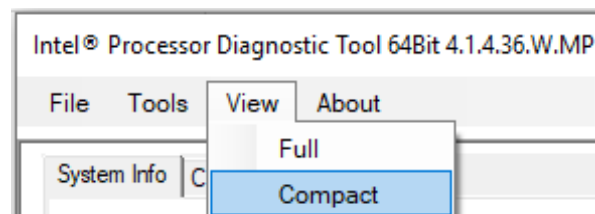
Tools → “Online Warranty Check” will bring you directly to Intel’s online warranty support page where you can check Intel Processor warranty information.



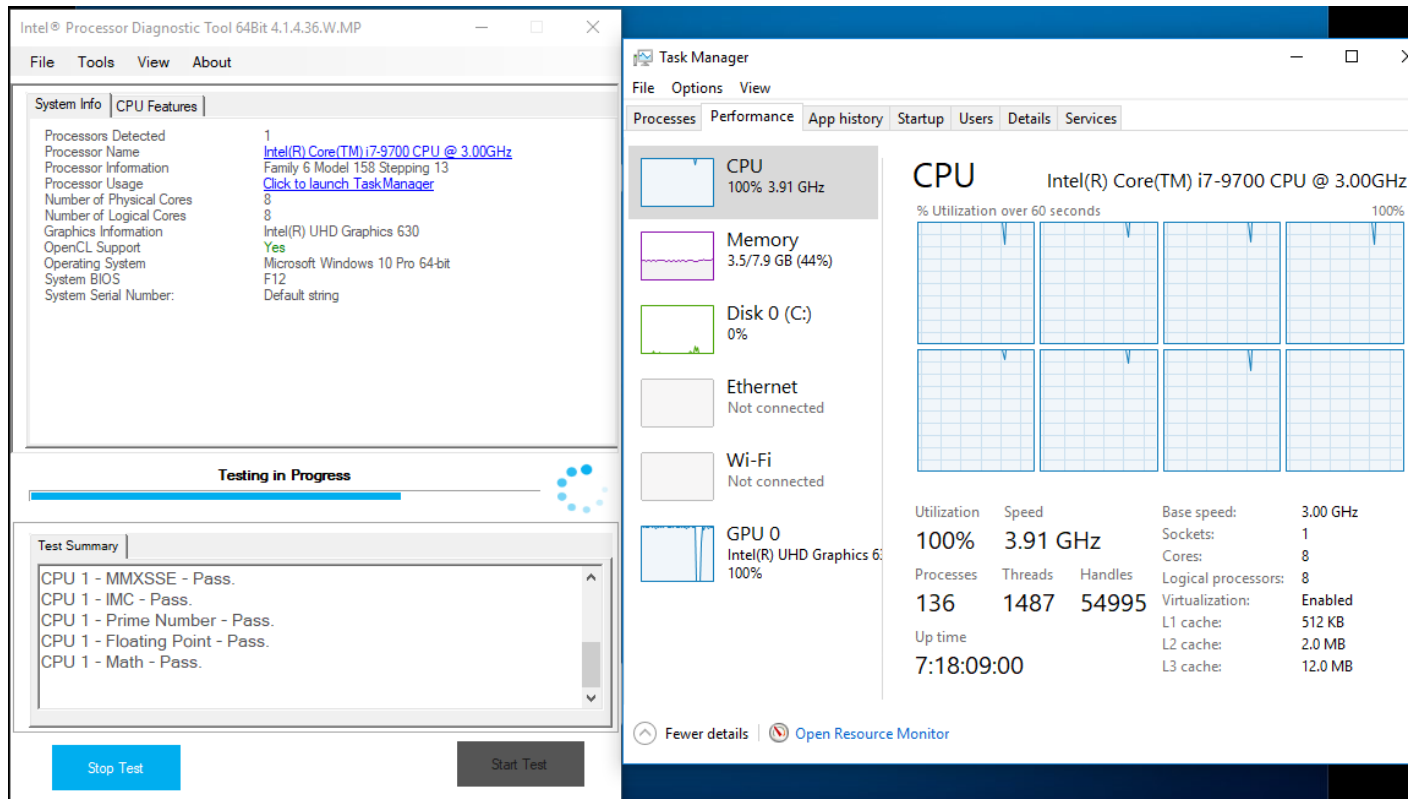
Tools → “Shutdown System” will shut down your system. A warning message is displayed to confirm that you really want to power off your system.



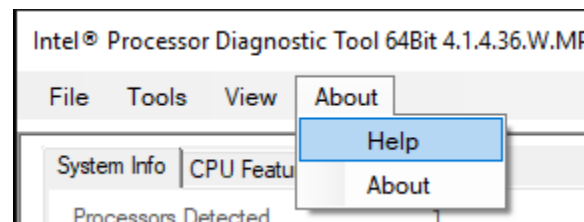
View → “Full”. This will display the full IPDT view which is the default.



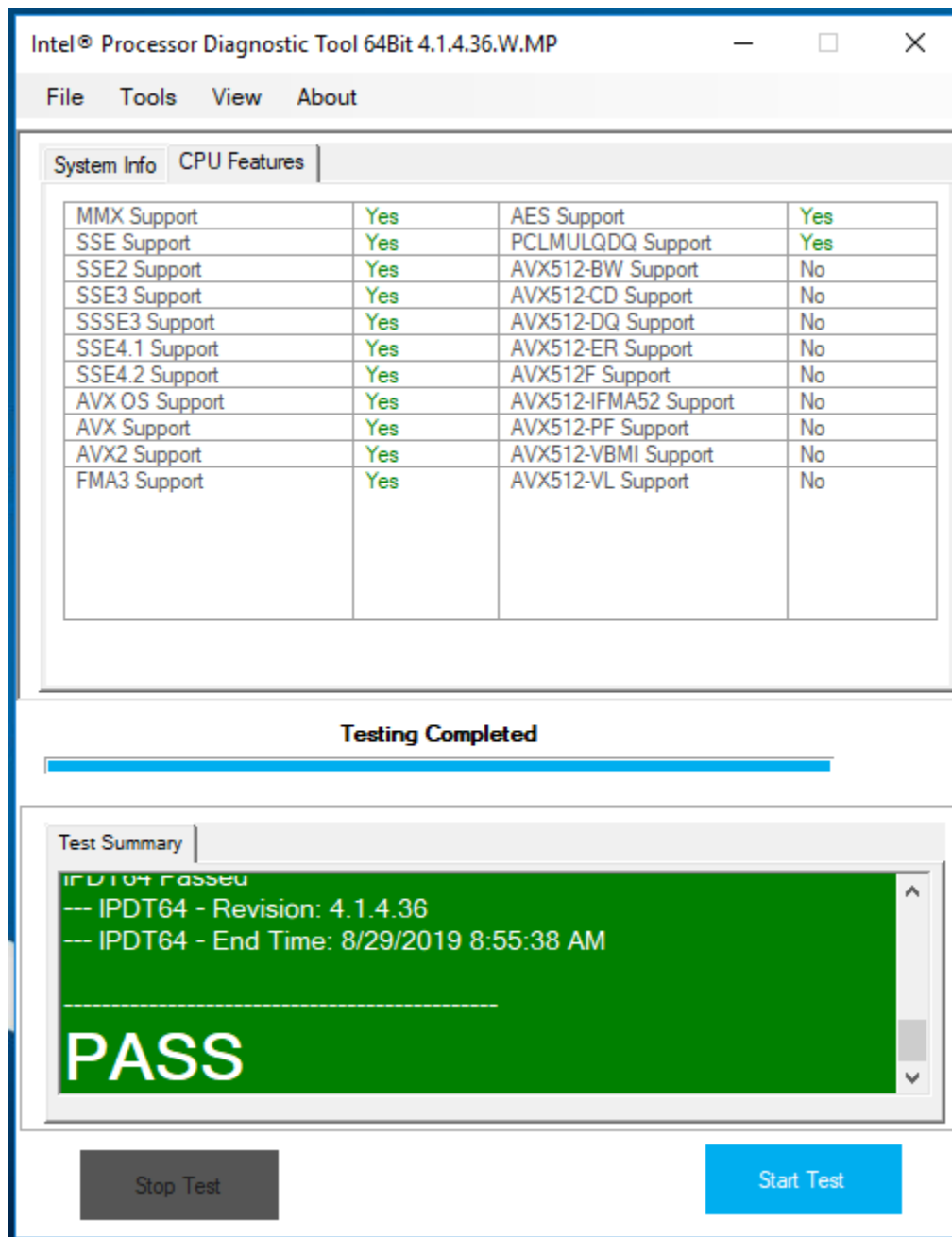
View → “Compact”. Will display a compact view of IPDT. Useful when running IPDT while viewing Task Manager. See below for compact IPDT view.



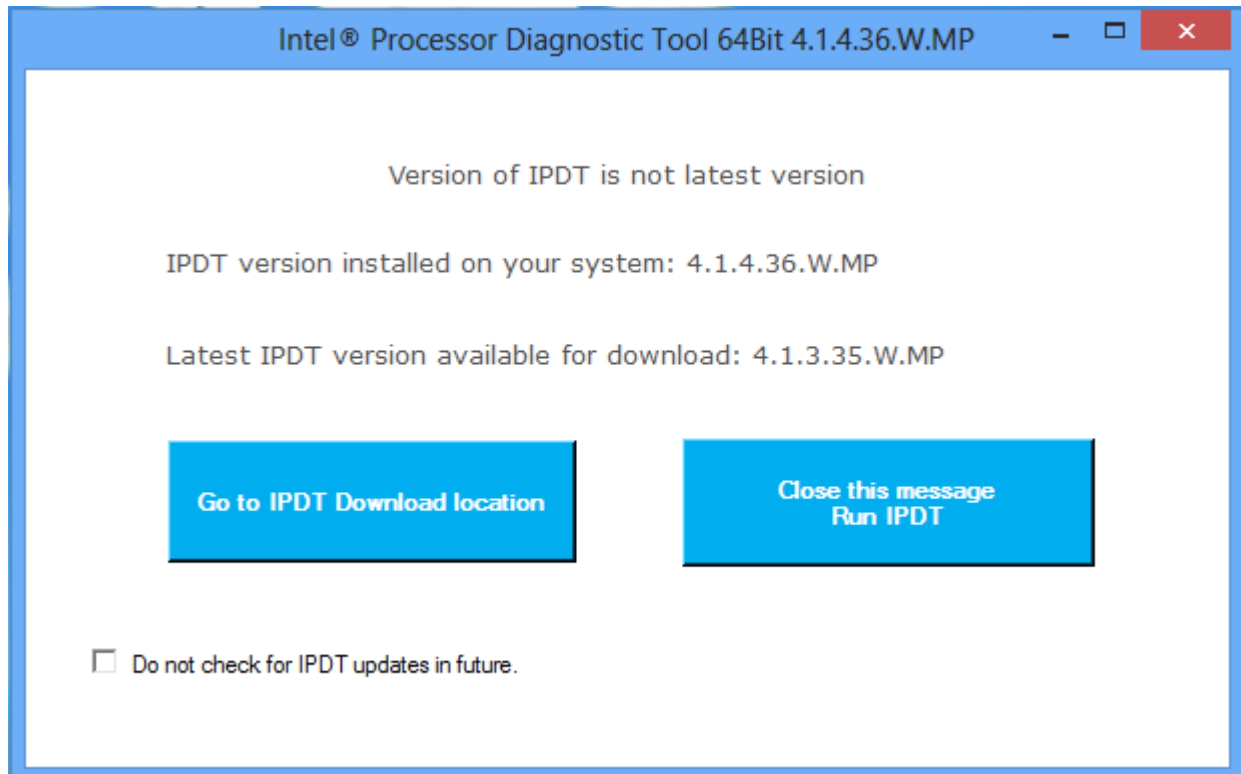
About → “Help” Menu opens this IPDT Help document. See below.



The CPU Features tab will display all the features supported by your processor.



When IPDT is launched it will automatically check if an updated version of IPDT exists at downloadcenter.intel.com



If you would like to update your version of IPDT simply click on the option "Go to IPDT Download location". This will take you to the download location of the latest version of IPDT on downloadcenter.intel.com website.

If you do not wish to download the latest version of IPDT at this time, simply select the option "Close this message Run IPDT". IPDT will check for the latest version on subsequent launches of IPDT.

If you would like to turn off the automatic checking for updated versions of IPDT on future launches, simply tick the box "Do not check for IPDT updates in future".

7 Running IPDT in a Multi-Processor System

The 64bit version of IPDT can test multiple Intel Processors installed in a multi-Processor capable system. IPDT will automatically detect if you have multiple Intel Processors installed and run the IPDT test modules on each processor.

The screenshot displays the Intel Processor Diagnostic Tool (IPDT) 64-bit interface. The window title is "Intel® Processor Diagnostic Tool 64Bit 4.1.4.36.W.MP". The interface is divided into several sections:

- System Info | CPU Features:** Displays system details for two processors. Processor 1 is an Intel(R) Xeon(R) Platinum 8160 CPU @ 2.10GHz, Family 6 Model 85 Stepping 4. Processor 2 is an ASPEED Graphics Family(WDDM). The operating system is Microsoft Windows Server 2016 Standard 64-bit.
- Results | Config:** A table showing test results for two CPUs. All tests passed.
- Testing Completed:** A blue progress bar indicating the test is finished.
- Test Summary:** A green box with the text "PASS" and "IPDT64 Passed".
- Stop Test / Start Test:** Buttons at the bottom of the test summary section.
- CPU1 | CPU2:** A section showing detailed test results for each CPU, including version, frequency, and a frequency check result.

Test Module	Enable	CPU1	CPU2
Genuine Intel	☒	Pass	Pass
BrandString	☒	Pass	Pass
Cache	☒	Pass	Pass
MMXSSE	☒	Pass	Pass
IMC	☒	Pass	Pass
Math	☒	Pass	Pass
FMA3	☒	Pass	Pass
Math	☒	Pass	Pass
FMA3	☒	Pass	Pass
CPUload	☒	Pass	Pass
CPUFreq	☒	Pass	Pass

Test Summary

IPDT64 Passed
--- IPDT64 - Revision: 4.1.4.36
--- IPDT64 - End Time: 8/27/2019 7:07:53 AM

PASS

Stop Test Start Test

CPU1 | CPU2

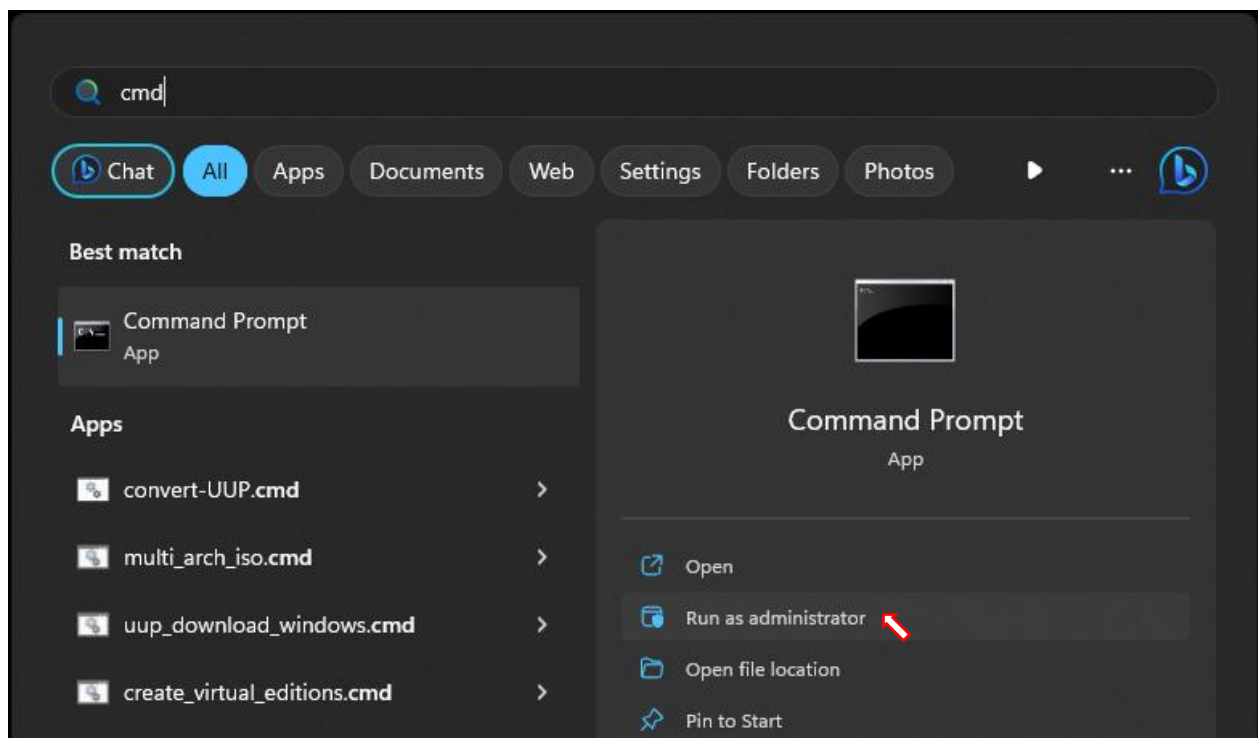
Version 1.0.1.64b.W
...
...Expected Frequency -- 2.10
...Measured frequency -- 2.09331
...
FrequencyCheck Passed....

8 Running IPDT Test Modules from command line

Individual IPDT Test Modules may be launched directly using the standalone IPDT Test Modules .exe executables located in the C:\Programs Files\Intel Corporation\Intel Processor Diagnostic Tool (64bit)\ folder.

This allows for IPDT Test Modules to be easily integrated into a 3rd party diagnostic or to be run manually from a command window.

To run IPDT Test Modules from a command window:
Open a Command Prompt Window, right click and select "Run as administrator" as indicated below.



The following IPDT Test Modules may be run in command line:

Run <ModuleName.exe> -h to view the specific command line options for each IPDT Test Module, example: Genintel.exe -h

IPDT Test Module	Description	Command line switches
Genintel.exe	Checks if Processor is a Genuine Intel Processor	-h -c
Brandstring.exe	Checks the brand string of the processor	-h -c
Math_FP.exe	Floating Point Test	-h -nc -s -errstop -c
Math_PrimeNum.exe	Prime Number Test	-h -nc -s -errstop -c
Cache.exe	Processor Cache Test	-h -pa -c
MMXSSE.exe	MMX and SSE Test	-h -pa -c
AVX.exe	AVX Test	-h -pa -s -c
FMA3.exe	FMA Test	-h -pa -s -c
IMC.exe	Integrated Memory Test	-h -nc -skipsize -skipstress -c -expsize -sizedol
GraphicsW.exe	Visual Graphics GPU Test	-h -hrs -m -s -c
GPUSstressW.exe	GPU Stress Test for 64bit OS only	-h -hrs -m -s -c
dgemm.exe	CPU Load Test	-h -hrs -m -s -c
FrequencyCheck.exe	CPU Frequency Test	-h -c -nc

-h = help	-skipsize = Skip IMC Size Test
-nc = No Compare. Skip comparison test.	-expsize = Set IMC Expected Memory Size
-hrs = Hours -m= Minutes -s = Seconds	-skipstress = Skip IMC Memory Stress
-pa = Pause app on completion.	-sizedol = IMC Memory Size tolerance %
-c = Use color display. Red for Fail. Green for Pass. Yellow for indeterminate.	-errstop = toggles Stop-on-Error option

9 IPDT Configuration

You can configure IPDT from the Tools → Config → Edit menu.

IPDT may only be configured after IPDT testing has been stopped or has completed testing.

Test Modules can be enabled or disabled. Parameters can be changed in value.

See [here](#) for more description on each IPDT feature and parameter.

Click on each Test Module to get an output of the -h (help) for that module.

Please note: Running IPDT with settings other than the default settings could possibly give a result that may not indicate a genuine fault with your Intel Processor.

The screenshot displays the Intel Processor Diagnostic Tool (IPDT) 64Bit 4.1.4.36.W.MP interface. The window is divided into several sections:

- System Info | CPU Features:** Displays system information including Processors Detected (1), Processor Name (Intel(R) Core(TM) i7-8565U CPU @ 1.80GHz), Processor Information (Family 6 Model 142 Stepping 11), Processor Usage (Click to launch Task Manager), Number of Physical Cores (4), Number of Logical Cores (8), Graphics Information (Radeon T 540X), OpenCL Support (No. Non-Intel GPU Detected. Graphics tests are disabled), Operating System (Microsoft Windows 10 Home 64-bit), System BIOS (INWHL357.0028.2019.0408.2051), and System Serial Number (BTIN921001SP).
- Testing Completed:** A blue bar indicating the test has finished.
- Test Summary:** Shows the test results, including "IPDT64 Passed", "IPDT64 - Revision: 4.1.4.36", "IPDT64 - End Time: 8/29/2019 10:46:35 AM", and a large green "PASS" banner.
- Results | Config:** A table showing the configuration for various test modules. The table has two columns: "Test Module" and "Parameters".
- CPU1:** Displays CPU-specific information, including Memory Size Tolerance (0.5), Expected Memory Size (8.00GB), and Detected Memory Size (8.00GB). It also shows subtest results for Memory Size Test and Integrated Memory Controller Stress Test.

Test Module	Parameters
genintel.exe	
brandstring.exe	
cache.exe	
mmxsse.exe	
imc.exe	-expsize 8.00GB -sizetol 0.005
Parallel_Module.exe	-config Parallel_PrimeNum_i7-8 -s 20 -nographics

10 IPDT Features & Parameters

Test Module	Genuine Intel Test
Description and Options	Module Executable = GenIntel.exe GenIntel.exe reads the General Specific Register and compares it to "GenuineIntel". If the read value matches the expected value, the test will pass. Possible options are as follows: -h = Help or Usage (this message) Example: GenIntel.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: GenIntel.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: GenIntel.exe -resultName GenIntel_results_01.txt -c = If present, this option will display text in various colors Example: GenIntel.exe -c

Test Module	Brand String Test
Description and Options	Module Executable = BrandString.exe BrandString.exe reads the brand string parts from the CPU and compares them against parts from a configuration file. If all expected parts from the configuration file are found in the parts from the CPU, the test will pass. Possible options are as follows: -h = Help or Usage (this message) Example: BrandString.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: BrandString.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: BrandString.exe -resultName BrandString_results_01.txt -c = If present, this option will display text in various colors Example: BrandString.exe -c

Test Module	Floating Point Test
Description and Options	Math_FP.exe performs floating point mathematic operation. Possible options are as follows: -h = Help or Usage (this message) Example: Math_FP.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: Math_FP.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: Math_FP.exe -resultName Math_FP_results_01.txt -c = If present, this option will display text in various colors Example: Math_FP..exe -c -nc = Skip the result, will display only. Example: Math_FP.exe -nc -errstop = Stop on error, default is continue on error. Example: Math_FP.exe -errstop -s [d] = Time in seconds to perform the test default is 2 seconds. Example: Math_FP.exe -s 5 Dependencies: DetectUtils64.dll or DetectUtils.dll libiomp5md.dll

Test Module	Prime Number Generation Test
Description and Options	Module Executable = Math_PrimeNum.exe Math_PrimeNum.exe checks how fast the CPU can search for prime number. Possible options are as follows: -h = Help or Usage (this message) Example: Math_PrimeNum.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: Math_PrimeNum.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: Math_PrimeNum.exe -resultName Math_PrimeNum_results_01.txt -avx = The AVX switch allows for selection of AVX instruction set to use for test execution up to Max AVX supported by CPU: 0 = No AVX, 1 = AVX, 2 = AVX2, 3 = AVX512. Example: Math_PrimeNum.exe -avx 0 -c = If present, this option will display text in various colors Example: Math_PrimeNum.exe -c -nc = Skip the result, will display only. Example: Math_PrimeNum.exe -nc -errstop = Stop on error, default is continue on error. Example: Math_PrimeNum.exe -errstop -s [d] = Time in seconds to perform the test default is 2 seconds. Example: Math_PrimeNum.exe -s 5 Dependencies: DetectUtils64.dll or DetectUtils.dll libiomp5md.dll

Test Module	Visual Graphics Test – GraphicsW
Description and Options	Module Executable = GraphicsW.exe The purpose of GraphicsW.exe is to exercise the GPU device on the Intel processor. It is developed to run on Intel core processors supporting OpenGL version 2.1 and higher. Possible options are as follows: -h = Help or Usage (this message) Example: GraphicsW.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: GraphicsW.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: GraphicsW.exe -resultName GraphicsW_results_01.txt -s = Run GraphicsW for x number of seconds. Example: GraphicsW.exe -s 15 -m = Run GraphicsW for x number of minutes. Example: GraphicsW.exe -m 10 <Esc> = Escape key will terminate execution of GraphicsW.exe. Dependencies: IMG768.bmp Intel Graphics Driver

Test Module	GPU Stress Test
Description and Options	Module Executable = GPUSstressW.exe The purpose of GPU Stress is to add a mathematical load to the GPU device on the Intel processor. GPUSstressW is developed to run on Intel 6th generation core processors and newer. Note: this module is only supported on 64bit OS. Possible options are as follows: -h = Help or Usage (this message) -info = Information switch publishes parallel information for the control program. Format: "parallel:(yes or no) socket:(yes or no) core:(yes or no)" Example: GPUSstressW.exe -info "parallel:yes socket:yes core:yes" -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: GPUSstressW.exe -resultName GPUSstressW_results_0001.txt -c = If present, this option will display text in various colors -hrs = hours option ... Use: GPUSstressW.exe -hrs <integer value> Indicating the number of hours GPUSstressW should run -m = minutes option ... Use: GPUSstressW.exe -m <integer value> Indicating the number of minutes GPUSstressW should run -s = seconds option ... Use: GPUSstressW.exe -s <integer value> Indicating the number of seconds GPUSstressW should run Example: GPUSstressW.exe -s 45 In this example, GPUSstressW will run for 45 seconds. Dependencies: Intel 6th Generation Core Processor or Newer with Integrated Graphics Windows DCH Drivers for Intel Graphics NBODY.exe libmmd.dll svml_dispmd.dll pi_level_zero.dll sycl6.dll

Test Module	CPU Load Test
Description and Options	Module Executable = dgemm.exe CPU Load test stresses the processor using Intel® Math Kernel Library (MKL) For Matrix Multiply algorithm to load all processor cores in parallel. The test will detect the presence and utilize the highest level of the following features on your Intel processor: - AVX512 (Advanced Vector Extensions 512), - AVX2 (Advanced Vector Extensions 2), - AVX (Advanced Vector Extensions), or - SSE4.2 (Streaming SIMD Extensions 4.2). Note: AVX capability is first detected on your Intel Processor and then your Operating System is checked to see if it supports running AVX. Minimum Operating System versions that support AVX: Windows 7 SP1, Windows Server 2008 R2 SP1 Possible options are as follows: -h = Help or Usage (this message) -info = Information switch publishes parallel information for the control program. Format: "parallel:(yes or no) socket:(yes or no) core:(yes or no)" Example: dgemm.exe -info "parallel:yes socket:yes core:yes" -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: dgemm.exe -resultName CPU_Load_results_0001.txt -c = If present, this option will display text in various colors -hrs = hours option ... Use: dgemm.exe -hrs <integer value> Indicating the number of hours CPU Load should run -m = minutes option ... Use: dgemm.exe -m <integer value> Indicating the number of minutes CPU Load should run -s = seconds option ... Use: dgemm.exe -s <integer value> Indicating the number of seconds CPU Load should run Example: dgemm.exe -s 45 In this example, CPU Load will run for 45 seconds. Dependencies: DetectUtils64.dll or DetectUtils.dll libiomp5md.dll

Test Module	CPU Frequency Test
Description and Options	Module Executable = FrequencyCheck.exe FrequencyCheck.exe compares the value between measured CPU frequency and expected CPU frequency as stamped in the product Brand String. Options are as follows: -h = Help or Usage (this message) Example: FrequencyCheck.exe -h -info = Information switch publishes parallel information using the following scheme: "parallel:yes socket:yes core:yes" Example: FrequencyCheck.exe -info -resultName = The resultName switch provides a way to name the results file as desired. This is for the convenience of the control program. Example: FrequencyCheck.exe -resultName FrequencyLog_01.txt -c = If present, this option will display text in various colors Example: FrequencyCheck.exe -c -nc = Skip the comparison test between expected and measured CPU frequency Example: FrequencyCheck.exe -nc

	Test Results File Name
Description	The output Test Results file is called TestResults.txt. A full listing of all subsequent test results is stored in TestResults_Full.txt

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