# Lenovo Diagnostics UEFI Embedded/Bootable v04. 08.000

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# Objective

This document describes what is necessary to run the Lenovo Diagnostics UEFI Embedded/Bootable tests.

## Install and Run the UEFI diagnostics

#### Note

No installation is required for the Lenovo Diagnostics UEFI Embedded.

# Download the Lenovo Diagnostics UEFI Bootable and Create a Bootable USB Flash Drive Using Windows GUI

#### 1. Save the UEFI Diagnostics image and Bootable Generator:

- 1. Go to www.Lenovo.com/diags
- 2. Click on "Downloads"
- 3. Under "Lenovo Diagnostics UEFI Bootable", click on "Create Bootable USB with UEFI Diagnostics"
- Download UEFI Diagnostics zip file. Save the file. (If your system has an Atom CPU, then click on "Lenovo UEFI Diagnostics Bootable USB for Atom CPU based Tablet – ThinkPad 10" instead.)
- 5. Download Bootable Generator Zip file
- 2. Run the Bootable Generator application.
  - 1. Insert a USB flash drive
  - 2. Go to the folder where you saved the bootable generator and double click on it
  - 3. Double click "BootableGenerator.exe"
  - 4. Your flash drive name will appear under "Select a device". Click to select it. If you want to, you can type a new name for the device.
  - 5. Click on "Search". Click on the image name that you saved in step 1, letter d.
  - 6. Click on "Generate".
  - 7. A message will appear, warning that all existing files on the flash drive will be erased if you continue. If you are OK with that, then press "Yes" to continue.

#### **Run the UEFI Diagnostics**

#### Run the Lenovo Diagnostics UEFI Bootable from a Bootable Flash Drive

- 1. Create the Bootable flash drive, as explained in sections 1 and 2.
- 2. If Secure Boot is enabled in BIOS, disable it.
- 3. Insert the flash drive.
- 4. Restart the machine, then immediately press F12.
- 5. On the boot menu, select your usb flash drive, and press Enter.
- 6. The UEFI diagnostics menu will display on your screen.

#### Home

The Home screen for Lenovo Diagnostics UEFI is shown in the next figure.



The Home screen is displayed right after the machine is booted from a USB flash drive containing the application. The Home screen provides options to run all available tests for devices installed in the machine, options to see detailed information about these devices, and option to exit the application. The Home screen is composed of:

- Application Header Bar
- Screen Title Bar
- Two main sections (Diagnostics and Tools)
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title Bar helps the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

Additionally, the Home screen has two main sections: Diagnostics and Tools. The Diagnostics section provides options to run all installed tests; and the Tools section provides options of using extra tools.

The currently selected option is outlined in red. The user can change the selected option by using the arrow keys () and to enter the selected option by pressing SPACE or ENTER.

Diagnostics options, sub-options and their descriptions are subsequently described:

- Run All: It allows you to run all tests in one single execution.
  - Quick: It executes the modules' quick diagnostics.
  - Extended: It executes the modules' extended diagnostics.
  - Restrict prior selection to unattended tests: It restricts the prior selection to execute only tests that do not require human intervention.

- · Battery: It selects and runs battery diagnostics.
- CPU
  - Quick: It selects and runs CPU quick diagnostics.
  - Extended: It selects and runs CPU extended diagnostics.
- Display: It selects and runs display diagnostics.
- Fan: It selects and runs fan diagnostics.
- Keyboard: It selects and runs keyboard diagnostics.
- Memory
  - Quick: It selects and runs memory quick diagnostics.
    - Extended: It selects and runs memory extended diagnostics.
- Motherboard: It selects and runs motherboard diagnostics.
- Mouse: It selects and runs mouse diagnostics.
- Optical: It selects and runs optical diagnostics.
- PCI Express: It selects and runs PCI express diagnostics.
- RAID: It selects and runs RAID diagnostics.
- Storage: It selects and runs storage diagnostics.

Tools options are:

- System Information: On its main screen, it displays machine, BIOS and processor information, as well as a menu that it is possible to retrieve information from other devices modules.
- Bad Block Recovery: It allows to recover bad blocks on storage devices.
- Hardware Diagnostic Events: It exhibits diagnostic events retrieved from the hardware.

#### Run the Lenovo Diagnostics UEFI Embedded

- 1. Boot the system, then immediately press:
  - F10 for Think systems
  - F11 for Idea systems
- 2. The UEFI diagnostics menu will be displayed on your screen.

#### Home

The Home screen for Lenovo Diagnostics UEFI is shown in the next figure.



The Home screen provides options to run all available tests for devices installed in the machine, options to see detailed information about these devices, and option to exit the application. The Home screen is composed of:

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  - Extended: It executes the modules' extended diagnostics.
  - Restrict prior selection to unattended tests: It restricts the prior selection to execute only tests that do not require human intervention.
- CPU
  - Quick: It selects and runs CPU quick diagnostics.
  - Extended: It selects and runs CPU extended diagnostics.
- Memory
  - Quick: It selects and runs memory quick diagnostics.
  - Extended: It selects and runs memory extended diagnostics.
- Motherboard: It selects and runs motherboard diagnostics.

· Storage: It selects and runs storage diagnostics.

Tools options are:

- System Information: On its main screen, it displays machine, BIOS and processor information, as well as a menu that it is possible to retrieve information from other devices modules.
- Bad Block Recovery: It allows to recover bad blocks on storage devices.

#### **Hierarchical Diagnostics**

The hierarchical diagnostics functionality is a feature which conducts hierarchic sorted tests, in the way that the more independent is a module, the more its tests take precedent in the tests hierarchy.

That allows the identification of modules' failures that precede a specific module being diagnosed, where its corresponding tests have firstly failed.

After testing a specific module, in the case of at least one failure has occurred, the following popup will be displayed.

LENOVO	Diagnostics UEFI		Time 02:43 - Ver	rsion 04.08.0
		DISPLAY		
		DIAGNOSTICS EXECUTION		
Fin	al Result Code:			1
015		HIERARCHICAL DIAGNOSTICS		
	One or more tests have dependencies/modules?	e failed, do you want to di	agnose correlated	
	No [Esc]		Yes	
	L			]
			Stop Test	s (Esc)
Navigation	[Arrows]			Hone [Esc.
	Hierarc	hical Diagnostics Confirmation F	Рорир	

When choosing Yes, the application will test the correlated modules, as the following figure demonstrates it by using a Display test failure example.



#### Battery

The battery module only works on Thorpe 64 bit system.

The system allows the user to access the battery diagnostics from the Home screen, Diagnostics, Battery.

LENOVO	Diagnostics UEFI			TIME 11:00 - VERSION 04.08.0
		HOH	IE	
	DIA	SNOSTICS		TOOLS
BATTERY	[0]	CPU [1]		SYSTEM INFORMATION (F1)
DISPLAY	[2]	FAN [3]		BAD BLOCK RECOVERY [F3]
MEMORY	[4]	MOTHERBOARD [5	1	
MOUSE C	6]	OPTICAL [7]		
PCI EXP	RESS [8]	STORAGE [9]		
		RUN ALL	[R]	
Navigatio	n [Arrows]	Enter [Space]		Exit [Eso
		Hoi	ne	

After the user enters the Battery option, the application will display the battery devices available in the system. If there is more than one battery device installed, the menu Device Selection is displayed, as shown in the next figure.

LENOVO	Diagnostics UEFI			Time	17:30	- Version	04.08.0
		Bf	TTERY				
		DEVICE	SELECTION				
	[X] Select /	Deselect All	Options		]		
	[ X ] 213-SANYO [ X ] 63-SMP						
		Cont	`irm [C]				
Navigation	[Arrows] Ente	er [Space]				Ex	it Œsc
		Battery D	evice Selection				

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, where all the tests are initially selected to be tested.

LENOVO	Diagnostic	s UEFI			Time	17:30 -	Version	04.08.0
			BATTERY 1:	213-SANYO				
			ALGORITHM	SELECTION				
	[X]	Select / De	eselect All Op	tions		]		
	[X] [X]							
	[ X ]	Lifespan mo	de test					
				_				
			Confir	rm [C]				
Navigation	[Arrows]	Enter	[Space]				Ex	it [Esc]
			Battery Algori	ithm Selection				

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.

LENOVO	Diagnostics	UEFI				Time	e 17:30	- Versi	ion 04	.08.0
				BATTERY						
			DIAGNOS	STICS EX	ECUTION					
	Starte Healt) Temper Lifesp Finis) RESUL1	ed at: n test: rature test pan mode te ned at: r CODE:	: st:		2018/03/27 PASSED PASSED WARNING 2018/03/27 UBA007000	17:31:21 17:31:21 -UN7X5L				
BAT	TERY: SMP									
	Starte Healt) Temper Lifesy Finis) RESUL1 Elapse	ed at: n test: cature test can mode te ned at: cODE: ed Time: 0	: st: 0:00:00		2018/03/27 PASSED PASSED WARNING 2018/03/27 UBA007000-	17:31:21 17:31:21 -UN7X5L				
							Vi	ew Log	[V]	
Navigation	[Arrows]								Home	[Esc.
			Battery Dia	agnostics	s Execution					

The Battery Diagnostics Execution screen provides information about the battery diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar ٠
- Screen Sub-title Bar •
- Diagnostic Information Section
- Instruction Footer Bar •

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application, and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- ٠ A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status: • Waiting, indicating the test is waiting to be run.

  - Progress (plus the test execution percentage), indicating the test is being run.
  - PASSED, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### CPU

The system allows the user to access the CPU diagnostics from the Home screen, Diagnostics, CPU.

After the user enters the CPU option, the CPU diagnostics type's menu will be displayed, as the following image.

LENOVO	Diagnostics	SUEFI			Time	13:22	- Version	04.08.0
			CF	°U				
			DIAGNOST	ICS TYPE				
	[ X ] [ ]	Quick Extended						
			Confir	rm [C]				
Navigation	[Arrows]	Enter	[Space]				E×	it [Esc]
			CPU Diagn	ostics Type				

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it.

After the user enters the Confirm button, the application will display the CPU devices available in the system. If there is more than one CPU device installed, the menu Device Selection is displayed, as shown in the next figure.

LENOVO	Diagnostics	UEF I							TIM	11:00	ə –	VERSION	04.08	. 0
					CP	20								
				SE	LECT	DEVI	CE							
		[ × ]	Select	/ Desel	lect í	A11 (	Options							
		[ x ] [ x ]	Genu ine Genu ine	Intel Intel	(R) ( (R) (	CPU ( CPU (	2.90GH 2.90GH	1z - 1z -	INTEL INTEL					
				Con	nfirm	[C]								
Navigation	n [Arrows]		Enter [S	pace]								Е	dit [E	3C
				CPU	Devic	e Sel	ection							

#### **CPU Quick Diagnostics**

The system allows the user to access the CPU quick diagnostics from the Home screen, Diagnostics, CPU.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access the CPU quick diagnostics, the user can use the UP/DOWN arrow key until "Quick" is focused and press SPACE key to select it.

In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, and all the tests are initially selected to be tested.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

LENOVO	Diagnostics	UEFI				TIME	11:00 -	VERSION	04.08.0
	CH	PU 1: Genuin	e Intel(R) C	PU 0000 @ 2.	.70GHz -	INTEL			
			ALGORITHM	SELECTION					
	ſ	X ] Select	∕ Deselect	All Options					
	[	X ] Regist	er Test						
	ſ	X ] BT Ins	truction Tes	t					
	ſ	X X X87 F1	oating Point	Test					
	ſ	X JMMX Te	st						
	ſ	X ] SSE Te	st						
	ſ	X ] AES Te	st						
	ſ	X]Cache	Test						
			Conf in	rm [C]					
Navigation	[Arrows]	Enter [	Space]					E	xit [Esc
			CPU Algorit	hm Selection					

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.



LENOVO	Diagnostics UEFI	Time 03:26 - Version 04.08.
		RUN ALL
	DIAGNOS	TICS EXECUTION
M	DTHERBOARD	
	Started at: Chipset Test: Finished at: RESULT CODE:	2018/12/11 03:26:39 PASSED 2018/12/11 03:26:41 UMB001000-UN7XQE
M	EMORY	
	Started at: Quick Random Pattern Test: Finished at: RESULT CODE:	2018/12/11 03:26:41 Progress [ 5% ] 0000/00/00 00:00:00
M	DTHERBOARD	
	Started at: PCT/PCTe Test	0000/00/00 00:00:00 Waiting
		Stop Tests [Esc]
Navigatio	n [Arrows]	Home EEsc
	CPU Quick I	Diagnostics Execution

**.** 

The CPU Quick Diagnostics Execution screen provides information about the CPU diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
   Waiting, indicating the test is waiting to be run.
  - Progress (plus the test execution percentage), indicating the test is being run.
  - PASSED, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### **CPU Extended Diagnostics**

The system allows the user to access the CPU extended diagnostics from the Home screen, Diagnostics, CPU.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access the CPU extended diagnostics, the user can use the UP/DOWN arrow key until "Extended" is focused and press SPACE key to select it.

In order to continue, the user has to press ENTER on the button Confirm. When the user presses ENTER, the application will run the "Stress Test", and it will take about 10 minutes to complete.

The CPU Extended Diagnostics Execution screen provides information about the CPU diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
  - A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status: • Waiting, indicating the test is waiting to be run.
    - **Progress** (plus the test execution percentage), indicating the test is being run.
    - **PASSED**, indicating the algorithm has found no problems at device.
    - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
    - FAILED, indicating the algorithm has found one or more faults.
    - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
  - Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### Display

After the user enters the Display option, the application computes the number of algorithms that can be performed by the diagnostic. If the diagnostic has more than one algorithm, Algorithm Selection screen is displayed, as shown in the figure below.

LENOVO	Diagnostic	s UEF I			Tim	e 07:04	- Version	04.08.0
		DIS	SPLAY 1: NT14	0FHM-N41 - 6	BOE			
			ALGOR I THM	SELECTION				
	[X]	Select / Des	elect All Op	tions				
	[ X ] [ X ]	Red Solid Co Blue Solid C	lor Test olor Test Color Test					
	[ X ] [ X ]	Black Solid White Solid	Color Test Color Test Color Test					
	[ X ] [ X ]	Luminance VE Geometry VES	SA Test A Test					
	[X]	Combination	est Test					
			Confir	m [C]				
Navigatio	n [Arrows]	Enter (	Space ]				Но	me [Esc
			Display Algori	ithm Selection				

The Algorithm Selection screen allows the user to select which algorithms will be tested by the application. After the user chooses at least one test and chooses the Confirm button on the Algorithm Selection screen, the Display tests start.

Before an algorithm is run, a popup containing instructions about the algorithm is displayed, as shown in the following figure. The user can press the ENTER key to proceed with the algorithm execution or can press ESC to abort the test.

LENOVO	Diagnostics UEFI	Time 08:42	- Version 04.08.0
	DIS	PLAY	
	DIAGNOSTIC	S EXECUTION	
F	nal Result Code:		
D	SPLAY		
	GEOMETRY	VESA TEST	
	Lines, rectangles and circles will sure that the geometric figures ar checking your screen, press Enter	be painted on your screen. Make e displayed correctly. After key to continue.	B
	CANCEL [ESC]	Ok	
		Stop	) Tests [Esc]
Navigatio	Arrows]		Hone [Esc

Display Test Instruction Popup

If the user chooses to proceed with the test's execution, an image pattern will be displayed on the screen, as shown in the following figure. After the user checks the screen, any key can be pressed to proceed with the test's execution.





Display Pattern Test Exhibition

After that, a popup shows up, asking the user if the pattern was correctly painted on the display. If so, the user must press the ENTER key; if not, the user must press the ESC key. This popup can be seen in the next figure.

LENOVO	Diagnostics UEFI			Time 05:03	- Version 04.08.0
		DIS	PLAY		
		DIAGNOSTICS	EXECUTION		
Fi	nal Result Code:				
DT	OBIAN				
DI	51. 11.	GEOMETRY	vesa test		
		Was your screen p	ainted correctly?		
	No	[Esc]	Yes	;	
				Stop	Tests (Esc)
Navigation	[Arrows]				Hone (Esc
		Display Test Res	ult Inquiry Popup		

This process is repeated for each selected algorithm. After the test is finished or canceled, the user can go back to the Home screen by pressing the ESC key again or to the Diagnostics Result Log screen by pressing the V key.

# Fan

After the user enters the Fan option, the application verifies the number of algorithms that can be performed by the diagnostic. If the diagnostic has only one algorithm, it will be started, as shown in the next figure.

LENOVO	Diagnostics	5 UEFI			Time	09:03 -	· Version (	04.08.0
			FA	٩				
			DIAGNOSTICS	EXECUTION				
F	inal Result C	ode:						
F	AN							
	Starte Contre Finisl RESULT	ed at: ol test: hed at: I CODE:		2018/03/27 Progress [ 0000/00/00	09:03:07 4%] 00:00:00		•	
	Elapse	ed Time:	-					
						Stop (	Tests (Esc	:]
Navigatio	n [Arrows]						Hom	ie [Esc]
			Fan Diagnosti	cs Execution				

The Fan Diagnostics Execution screen provides information about the fan diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
   Waiting, indicating the test is waiting to be run.
  - Progress (plus the test execution percentage), indicating the test is being run.
  - PASSED, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

The dual fan support was added on v04.06.000 version.

#### Keyboard

The user can choose between PS/2 or USB keyboard as is shown in the figure below.

LENOVO	Diagnostics	UEFI			Time	03:09	- Version	04.08.0
			KEYBO	IARD				
			DEVICE SH	LECTION				
	[ X ]	Select / Des	elect All Opt	tions				
	[ X ] [ X ]	PS/2 Keyboar USB Keyboard	rd I					
			Confir	m [C]				
Navigation	[Arrows]	Enter	[Space]				Но	me [Esc]
			Keyboard typ	pe selection				

After the selection of the desired keyboard, the user can select the tests for the selected keyboard type:

- PS/2 Test:
  - Description: "PS/2 Test" is a keyboard test that checks the access to PS/2 type keyboards.
  - Results: PASSED; FAILED; CANCELED; NOT APPLICABLE.
- USB Test:
  - Description: "USB Test" is a keyboard test that checks the access to USB type keyboards.
  - Results: PASSED; FAILED; WARNING<sup>1</sup>; CANCELED; NOT APPLICABLE.
  - <sup>1</sup>: This test presents similar behavior to <u>USB keyboard Test</u> from <u>Lenovo Diagnostics Windows</u>, consequently, the <u>WARNING</u> test result is given when some information is not retrieved.
  - Warning Message (when some information is not retrieved): WARNING Manufacturer or Product Name was not possible to be retrieved
- Key Test:
  - Description: "Key Test" is an attended keyboard test that the user can check whether the keys and existing LEDs are properly working for PS/2 Keyboards.
  - Results: PASSED; FAILED; CANCELED.
- USB Key Test:
  - Description: "USB Key Test" is an attended keyboard test that the user can check whether the keys and existing LEDs are properly working for USB Keyboards.
  - Results: PASSED; FAILED; CANCELED.

LENOVO	Diagnostics	5 UEFI			Time	03:10	- Version	04.08.0
			KEYBOARD 1: P	S/2 Keyboard				
			ALGORITHM	SELECTION				
	[ X ]	Select / De	select All Op	tions		]		
	[ X ]	PS72 Test Key Test						
			Confir	m [C]				
Navigation	[Arrows]	Enter	[Space]				Но	me [Esc.
			Keyboard Te	est selection				

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.

LENOVO	Diagnostics UEFI			Time 03:10	- Version 04.08.0
		KEYE	BOARD		
		DIAGNOSTICS	S RESULT LOG		
Serial m	umber:	PFOFLMCH			
BIOS Ver	sion:	N1MET 10W	(0.10)		
Machine	model:	ThinkPad	X1 Carbon 5th		
Final Re	sult Code:	U1SLU5K	HA-CV15P5		
KEYBOARD	DIAGNOSTIC   2018/12/11	03:10:48			
Result c	ode :	UKB00100	0-UN7XQE		
UDI :		Keyboard			
Display	Name:	PS/2 Key	board		
Device T	уре:	PS/2 Key	board		
			<b>FR01</b>		
		Save L	og LF2J		
Nav igat io	on [Arrows] Ente	r [Space]	Scroll	[Page Up/Down]	Home [Esc]
		USB Keyboard di	agnostic execution	7	

## Memory

## **Memory Quick Diagnostics**

The Memory Quick Diagnostics Execution screen is shown in the figure below.

LENOVO	Diagnostics	5 UEFI				Time	03:10	- Vers	ion 0	4.08.0
			ME	emory – C	<b>DICK</b>					
			DIAGN	OSTICS E	XECUTION					
F	inal Result C EMORY	ode:								
	Starte Quick Finisl <mark>RESUL</mark> I	ed at: Random Pa hed at: CODE:	ttern Test	.:	2018/12/11 Progress [ 0000/00/00	03:11:11 167 ] 00:00:00				
	Elaps	ed Time:								
				-			Stop	Tests	[Esc]	
Navigatio	n [Arrows]								Home	[Esc]
			Memory Qui	ick Diagno	ostics Executio	on				

The system allows the user to access the memory quick diagnostics from the Home screen, Diagnostics, Memory.

The Memory Quick Diagnostics Execution screen provides information about the memory diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- QR Code (QR code shown on the right side of Final Result Code and that contain the information below, concatenated with semicolon):
  - Final Result Code;
  - Serial Number;
  - Test Date (YYYYMMDD format)
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).

- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  - Waiting, indicating the test is waiting to be run.
  - Progress (plus the test execution percentage), indicating the test is being run.
     DASSED indicating the algorithm has found as problems at device.
  - PASSED, indicating the algorithm has found no problems at device.
     WARNING, when applicable, indicating the algorithm has detected sizes to the algorithm has detected sizes to the second second
  - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
  - FAILED, indicating the algorithm has found one or more faults.
  - CANCELED, indicating the algorithm has been canceled by user.
  - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### **Memory Extended Diagnostics**

The system allows the user to access the memory extended diagnostics from the Home screen, Diagnostics, Memory.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access the memory extended diagnostics, the user can use the UP/DOWN arrow key until "Extended" is focused and press SPACE key to select it.

In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, and all the tests are initially selected to be tested.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

LENOVO	Diagnostics	UEFI	Time	: 15:59 -	Version	04.08.0
		MEMORY 1: M	AIN_MEMORY			
		ALGORITHM	SELECTION			
	[X]	Select / Deselect All Op	tions			
	[ X ] [ X ] [ X ] [ X ] [ X ] [ X ] [ X ]	Advanced Integrity Test Address Test Bit High Test Bit Low Test Walking Ones Right Test Walking Ones Left Test Modulo-20 Test				
	[X]	Moving Inversions-8bit T	est			
	[ X ]	Moving Inversions–32bit	Test			
	[ X ]	Random Pattern Test				
	[ X ]	Random Number Sequence T	est			
	[X]	Block Move Test				
						[1/2]
		Confir	'm [C]		Mo	re [M]
Navigation	[Arrows]	Enter [Space]			E×	it [Esc]
		Memory Extended	Algorithm Selection			

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.



LENOVO	Diagnostics UEFI	Time	e 03:11 - U	Jersion 04.08.
	Memory -	EXTENDED		
	DIAGNOSTIC	S EXECUTION		
F	inal Result Code:			
н	EMORY			
	Started at: Advanced Integrity Test: Address Test: Bit High Test: Bit Low Test: Walking Ones Right Test: Walking Ones Left Test: Wodulo-20 Test: Moving Inversions-8bit Test: Moving Inversions-32bit Test: Random Pattern Test: Random Number Sequence Test: Block Moue Test:	2018/12/11 03:12:02 PASSED POSSED Progress [ 8% ] Waiting		
			Stop Te	sts (Esc)
Navigatio	m [Arrows]			Home (Esc
	Memory Extended D	Nagnostics Execution		

········, \_······

The Memory Extended Diagnostics Execution screen provides information about the memory diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
   Waiting, indicating the test is waiting to be run.
  - **Progress** (plus the test execution percentage), indicating the test is being run.
  - **PASSED**, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### Motherboard

After the user enters the Motherboard option, the application computes the number of algorithms that can be performed by the diagnostic. If the diagnostic has more than one algorithm, Algorithm Selection screen is displayed, as shown in the next figure.

LENOVO	Diagnostics	5 UEFI			Time	03:12 -	Version	04.08.0
		MO?	THERBOARD 1: M	IAIN_MOTHERBOARD				
			ALGORITHM	SELECTION				
	[X]	Select / De	eselect All Op	tions		]		
	[ X ] [ X ] [ X ] [ X ]	Chipset Tes PCI/PCIe Te RTC Test USB Test	t st					
			Confir	'm [C]				
Navigation	[Arrows]	Enter	[Space]				Но	me [Esc]
			Motherboard Alg	orithm Selection				

The system allows the user to access the motherboard diagnostics from the Home screen, Diagnostics, Motherboard.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.

LENOVO	Diagnostic	s UEFI		Т	ime 03:12	- Version	04.08.0
			MOTHERB	OARD			
			DIAGNOSTICS	EXECUTION			
	Final Result C MOTHERBOARD Start Chips PCI/P RTC T USB T Finis RESUL Elaps	ode: ed at: et Test: CIe Test: est: est: hed at: T CODE: ed Time: -		2018/12/11 03:12: PASSED PASSED Progress [07] Waiting 0000/00/00 00:00:1	34 00		
					Stop	Tests (Es	6C]
Nav igat	ion [Arrows]					На	ome [Esc]
			Motherboard Diagno	ostics Execution			

The Motherboard Diagnostics Execution screen provides information about the motherboard diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).

- Progress of the current test (current test's progress in percentage).
  - A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
    - Waiting, indicating the test is waiting to be run.
    - Progress (plus the test execution percentage), indicating the test is being run.
    - **PASSED**, indicating the algorithm has found no problems at device.
    - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
    - FAILED, indicating the algorithm has found one or more faults.
    - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### Mouse

List of tests that can be performed:

- Reset Test:
  - Description: "Reset Test" is a mouse test that resets the connection for both PS/2 and USB External type mouses.
  - Results: PASSED; FAILED; CANCELED; NOT APPLICABLE.
- Mouse Test:
  - Description: "Mouse Test" is a mouse test that checks the access and move detection to PS/2 type mouses.
     Results: PASSED; FAILED; CANCELED; NOT APPLICABLE.
- USB External Mouse Test:
  - Description: "USB External Mouse Test" is a mouse test that checks the access and move detection to USB type mouse.
     Results: PASSED; FAILED; CANCELED; NOT APPLICABLE.

After the selection of the desired mouse type, the test begins as the screen below:



The Mouse Diagnostics Execution screen provides information about the memory diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

After the test finishes, a confirmation screen pop up to check if the test worked fine. After the confirmation, a screen with one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  - PASSED, indicating the algorithm has found no problems at device.
    WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
  - FAILED, indicating the algorithm has found one or more faults.

- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

## **PCI Express**

After the user enters the PCI Express option, the application computes the number of algorithms that can be performed by the diagnostic. If the diagnostic has only one algorithm, it will be started, as shown in the next figure.

LENOVO	Diagnostics	UEFI			Time	03:12	- Versi	on 04.0	)8.0
			PCI EXI	PRESS					
			DIAGNOSTICS	EXECUTION					
	Final Result C PCI EXPRESS Starte Status Finisl RESULT Elapse	ode: ed at: 5 Test: ned at: CODE: ed Time:		2018/12/11 0 Progress [ 6 0000/00/00 0	03:12:57 50% 1 90:00:00				
						Stop	Tests I	[Esc]	
Nav igat i	ion [Arrows]							Home []	Esc.
		PCI	Express Diagn	ostics Execution					

The PCI Express Diagnostics Execution screen provides information about the PCI Express diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- · Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
  - A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
    - Waiting, indicating the test is waiting to be run.
    - Progress (plus the test execution percentage), indicating the test is being run.
    - PASSED, indicating the algorithm has found no problems at device.
    - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
    - FAILED, indicating the algorithm has found one or more faults.
    - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### RAID

The system allows the user to access the RAID diagnostics from the Home screen, Diagnostics, RAID.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, and all the tests are initially selected to be tested.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

LENOVO	Diagnostic	s UEFI			Time	16:01 -	• Version	04.08.0
			RAID 1	: RAID				
			ALGORITHM	SELECTION				
	[X]	Select / Dese	elect All Op	tions		]		
	[ X ] [ X ] [ X ]	Status test Slot test Link test	n toot					
	[ X ]	Huvanceu erru	n' test					
			Confir	m [C]				
Navigation	[Arrows]	Enter [S	Space]				Ex	it [Esc
			RAID Algoriti	hm Selection				

At least one test must be selected so that the application can run the diagnostic. After the user chooses which tests will be performed, the user can press Confirm by pressing the ENTER key. Consequently, the system will run the tests, as illustrated in the following figure.



LENOVO	Diagnostics UEFI		-	Time 16:01	– Version 04.08.0
		RA	[D		
		DIAGNOSTICS	EXECUTION		
F	inal Result Code:	U1H7RP617-PAF745			
R	AID				
	Started at: Status test Slot test: Link test: Advanced er Finished at RESULT CODE Elapsed Tim	: ror test: : : e: 00:00:00	2018/03/27 16:01: PASSED PASSED NOT APPLICABLE 2018/03/27 16:01: URD007000-NNSXQL	:48 :48 -	
				V	iew Log [V]
Navigatio	n [Arrows]				Home [Esc
		RAID Diagnost	tics Execution		

The RAID Diagnostics Execution screen provides information about the RAID diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  - Waiting, indicating the test is waiting to be run.
  - Progress (plus the test execution percentage), indicating the test is being run.
  - **PASSED**, indicating the algorithm has found no problems at device.
- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### Storage

The system allows the user to access the storage extended diagnostics from the Home screen, Diagnostics, Storage.

After the user enters the Storage option, the storage diagnostics type's menu will be displayed, as the following image.

LENOVO	Diagnostics	UEFI			Time	03:13	- Version	04.08.0
			STOR	AGE				
			DIAGNOST	ICS TYPE				
	[ X ] [ ]	Quick Extended						
			Confir	m [C]				
Navigation	[Arrows]	Enter	[Space]				Но	me [Esc]
			Storage Diag	nostics Type				

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it.

After the user enters the Confirm button, the application will display the number of storage devices available in the system. If there is more than one storage device installed, the menu Device Selection is displayed, as shown in the next figure.

LENOVO	Diagnostics	UEFI				Time O	3:13	- Version	04.08.0
				STORAGE					
			DEVIC	E SELECTIO	IN				
	[ X ]	CV3-8D128-L	ITE-ON IT	Corporatio	m		(i)		
			Con	nfirm [C]					
Navigation	[Arrows]	Enter	[Space]		Selected 1	(tem Info	[]]	Но	me [Esc]
Storage Device Selection									

This screen also allows seeing devices details. To access this feature, the user has to press the I key when the desired device is focused, leading to the exhibition of a popup with the device information, as shown in the subsequent figure.

LENOVO	Diagnostics UEFI		Time 03:13	- Version 04.08.0
		STORAGE		
		DEVICE SELECTION		
		STORAGE INFORMATION		
	Display Name: Manufacturer:	CV3-8D128-LITE-ON IT Corporation LITE-ON IT Corporation		
	Device Type: Size:	SSD 119 GB		
	0120.	117 00		
		Ok		
		Confirm [C]		
Navigation	[Arrows]	Enter [Space] Select	ed Item Info []]	Hone (Esc
		Storage Information Popup		

#### **Storage Quick Diagnostics**

The system allows the user to access the storage quick diagnostics from the Home screen, Diagnostics, Storage.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access the storage quick diagnostics, the user can use the UP/DOWN arrow key until "Quick" is focused and press SPACE key to select it.

In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, and all the tests are initially selected to be tested.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

LENOVO	Diagnostics	UEFI		Time	18:09	- Versio	n <b>04.08.0</b>
		STORAGE 1: ST500LM021-1	LKJ152-Seagate Techno	ology			
	[ X ] [ X ] [ X ] [ X ] [ X ] [ X ]	SMART Status Test SMART Short Self-Test Drive Self-Test Random Seek Test Funnel Seek Test Target Read Test			(i) (i) (i) (i) (i)		
		Confi	irm [C]				
Navigation	[Arrows]	Enter [Space]	Selected Ite	em Inf	`o []]	H	ome <u>(Esc</u> )
		Storage Quick A	Algorithm Selection				

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be tested, the user can use the Confirm button. It will start the diagnostic, as demonstrated in the next figure.



	LENOVO	Diagnostic	5 UEFI			Time	03:14 -	Version	04.08.0				
	STORAGE - QUICK												
				DIAGNOSTICS I	EXECUTION								
Final Result Code:													
STORAGE: CV3-8D128													
		Starto SMART SMART Targe SMART Finis RESUL	ed at: Status Test: Short Self-Tes t Read Test: Wearout Test: hed at: CODE: ed Time:	:t:	2018/12/11 Progress [ Waiting Waiting 0000/00/00	03:14:06 907 ] 00:00:00							
							Stop 1	lests (Es	c]				
	Navigation	n [Arrows]						Но	me [Esc]				
	Storage Quick Diagnostics Execution												

The Storage Quick Diagnostics Execution screen provides information about the storage diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  Waiting, indicating the test is waiting to be run.
  - **Progress** (plus the test execution percentage), indicating the test is being run.
  - **PASSED**, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

#### **Storage Extended Diagnostics**

The system allows the user to access the storage extended diagnostics from the Home screen, Diagnostics, Storage.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access the storage extended diagnostics, the user can use the UP/DOWN arrow key until "Extended" is focused and press SPACE key to select it.

In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show a list of tests, as illustrated in the next figure, and all the tests are initially selected to be tested.

The user can deselect a selected test by pressing the SPACE key when the test is highlighted. An empty space will appear between the brackets. To select a test again, the user can press the SPACE key again.

Initially, the "Select/Deselect All Options" is selected. If the user presses the SPACE or ENTER key on that option, then all test options will be deselected. If the user selects the "Select/Deselect All Options" again, all tests options will be selected again.

LEN0V0	Diagnostic	s UEFI		Time 14:19 - V	'ersion 04.08.(
		STORAGE 1: ST9500423	AS-Seagate Technolo	9y	
		ALGORITH	1 SELECTION		
	[X]	Select / Deselect All O	ptions		
	[ X ] [ X ]	Bad Block Test Linear Read Test		(I) (I)	
	101				
		Confi	irm [C]		
Navigatio	n [Arrows]	Enter [Space]	Selected It	em Info [1]	Home [Esc

#### Storage Extended Algorithm Selection

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be tested, the user can use the Confirm button. It will start the diagnostic, as demonstrated in the next figure.

LEN0V0	Diagnostics UEFI	Tim	e 14:19	- Version 04.08.0
		STORAGE - EXTENDED		
F	inal Result Code: TORAGE: ST9500423AS Started at: Bad Block Test: Linear Read Test: Finished at: RESULT CODE: Elapsed Time:	2019/01/11 14:20:44 Progress [0%] Waiting 0000/00/00 00:00:00		
			Stop	Tests [Esc]
Total esti	mated time: 00:00:03 of 1	1:00:00		
Navigatio	n [Arrows]			Home [Esc
	Stora	ge Extended Diagnostics Execution		

The Storage Extended Diagnostics Execution screen provides information about the storage diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

• Final Result Code (an encrypted code that informs which modules were tested).

- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
  - A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
    - Waiting, indicating the test is waiting to be run.
    - Progress (plus the test execution percentage), indicating the test is being run.
    - PASSED, indicating the algorithm has found no problems at device.
    - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
    - FAILED, indicating the algorithm has found one or more faults.
    - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

## Optical

The system allows the user to access the optical diagnostics from the Home screen, Diagnostics, Optical. After the user accesses the Optical option, the application displays the number of algorithms that can be performed. If the diagnostic has more than one algorithm, Algorithm Selection screen is displayed, as shown in the figure below.

LENOVO	Diagnostic	s UEFI			Time	18:45 -	Version	04.08.0
		OPT	ICAL 1: DVDRO	m daðdesh -	PLDS			
			ALGORITHM	SELECTION				
	[ X ]	Select / De	select All Op	tions				
	[ X ] [ X ] [ X ] [ X ] [ X ]	MOST Test Linear Seek Random Seek Funnel Seek Read And Co Write Test	Test Test mpare Test					
			Confin	'm [C]				
Navigation	[Arrows]	Enter	[Space]				Ex	it [Esc]
	LENOVO	LENOVO      Diagnostics        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ X ]      [ X ]        [ Navigation [Arrows]	LENOVO    Diagnostics UEFI      OPT      I    X I      Select / Dett    Image: Select / Dett      I    X I      Select / Dett    Image: Select / Dett      I    X I      I    X I      Image: Select / Dett    Image: Select / Dett      I    X I      Image: Select / Dett    Image: Select / Dett      Image: Select / Dett    Image: Select / Dett	Diagnostics UEFI      OPTICAL 1: DUDRO      ALGORITHM      I X I Select / Deselect All Op      [ X ] MOST Test    [ X ] Linear Seek Test      [ X ] Kandom Seek Test    [ X ] Random Seek Test      [ X ] Funnel Seek Test    [ X ] Read And Compare Test      [ X ] Write Test    [ X ] Write Test      [ Navigation [Arrows]    Enter [Space]	Diagnostics UEFI      OPTICAL 1: DUDROM DABDESH -      ALGORITHM SELECTION      I X I Select / Deselect All Options      I X I MOST Test      [ X ] MOST Test    [ X ] Linear Seek Test      [ X ] Kandom Seek Test    [ X ] Random Seek Test      [ X ] Funnel Seek Test    [ X ] Read And Compare Test      [ X ] Write Test    [ X ] Write Test	Time      OPTICAL 1: DUDROM DA8DESH - PLDS      ALGORITHM SELECTION      I X 1 Select / Deselect All Options      [ X 1 Select / Deselect All Options    [ X 1 MOST Test      [ X 1 MOST Test    [ X 1 MOST Test      [ X 1 MOST Test    [ X 1 Random Seek Test      [ X 1 Random Seek Test    [ X 1 Read And Compare Test      [ X 1 Write Test    [ X 1 Write Test      Confirm ICI      Navigation [Arrows]    Enter [Space]	Time 18:45 -      OPTICAL 1: DUDROM DA&DESH - PLDS      ALGORITHM SELECTION      I X 3 Select / Deselect All Options      [ X 3 MOST Test    [ X 1 MOST Test      [ X 1 MOST Test    [ X 1 Linear Seek Test      [ X 1 Random Seek Test    [ X 1 Random Seek Test      [ X 1 Read And Compare Test    [ X 1 Write Test      Confirm ICI      Navigation [Arrows]      Enter [Space]	LENOVO    Diagnostics UEFI    Time 18:45 - Version      OPTICAL 1: DVDROM DABDESH - PLDS      ALGORITHM SELECTION      I X I Select / Deselect All Options      [ X ] MOST Test    [ X ] MOST Test      [ X ] MOST Test    [ X ] Random Seek Test      [ X ] Funnel Seek Test    [ X ] Funnel Seek Test      [ X ] Read And Compare Test    [ X ] Write Test      V inte Test    Exemption      Confirm ICI

#### **Optical Algorithm Selection**

At least one test must be selected, so that the application can run the diagnostic. After the user chooses which tests must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the next figure.

LENOVO	Diagnostics	5 UEFI			Time	18:45	- Vers	ion 04.08.0		
			OPTICA	ìL						
F	Final Result C OPTICAL: DVDRO Starte MOST 1 Linear Randor Funne Read f Write Finisl RESUL1 Elapse	ode: M DA8DESH ed at: Test: Seek Test: A Seek Test: Seek Test: And Compare Te Test: And Compare Te Test: Med at: CODE: ed Time:	est:	2018/03/27 18:45 Progress [0%] Waiting Waiting Waiting Waiting Waiting 0000/00/00 00:00	:41					
						Stop	Tests	[Esc]		
Nav igat ic	on [Arrows]							Home [Esc]		
	Optical Device Diagnostics Execution									

The Optical Diagnostics Execution screen provides information about the optical diagnostics progress, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).

- Progress of the current test (current test's progress in percentage).
  - A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
    - Waiting, indicating the test is waiting to be run.
    - Progress (plus the test execution percentage), indicating the test is being run.
    - **PASSED**, indicating the algorithm has found no problems at device.
    - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
    - FAILED, indicating the algorithm has found one or more faults.
    - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

## Video Card

The video card diagnostic is not available to the end user, but it's possible to access it from ShellView version. The user has to type the command on ShellView and the diagnostic is started. S/he will have the diagnostics's result into a log generated by the application.

## Touch

The system allows the user to access the touch diagnostics from the Home screen, Diagnostics, Touch. After the user accesses the Touch option, the application displays the number of algorithms that can be performed. If the diagnostic has more than one algorithm, Algorithm Selection screen is displayed:

- Reset Test:
  - Description: "Reset Test" is a touch device test that resets the connection with touch device.
  - Results: PASSED; FAILED; CANCELED; NOT APPLICABLE.
- Grid Test:
  - Description: "Grid Test" is a touch device test that tracks all touch events on touch device.
  - Results: PASSED; FAILED; CANCELED; NOT APPLICABLE

On Grid test, a popup is show asking the user to touch the screen in all points to test if it is working correctly.

GRID TEST      Check whether the touch screen is working correctly. Please touch in all points of the screen. When finish, press either ESC or F3      Cancel [Esc]    Ok
Check whether the touch screen is working correctly. Please touch in all points of the screen. When finish, press either ESC or F3 Cancel [Esc] Ok
Cancel [Esc] Ok

Touch Grid Test start pop-up

After the test finishes, a confirmation screen pop up to check if the test worked fine.

After the confirmation, a screen with one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  PASSED, indicating the algorithm has found no problems at device.
  - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
  - FAILED, indicating the algorithm has found one or more faults.
  - CANCELED, indicating the algorithm has been canceled by user.
    - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

LENOVO	) Diagnost	tics UEFI			Time	14:52	- Version	04.08.0			
			TO	UCH							
			DIAGNOSTIC	S EXECUTION							
	Final Resul	t Code:	U1WNGFTGZ-XDFTD2								
	Touch Devic	е									
	Sta	arted at:		2018/05/12 14:	51:15						
	Res	set Test:		PASSED							
	Gra	id Test:		FAILED							
	Fii RES	nished at SULT CODE	:	2018/05/12 14: UTS003002-7N7	52:50 <mark>/25F</mark>						
						Vie	ew Log [V]				
Nav iga	tion [Arrows]						Ho	ome [Esc]			
	Touch Diagnostic Execution Result										

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

## **Run All**

The system allows the user to access the run all diagnostics from the Home screen, Diagnostics, Run All.

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. To access a diagnostics type, the user can use the UP/DOWN arrow key until the desired item is focused and press SPACE key to select it, as illustrated in the figure below.

LENOVO	Diagnostics	UEF I		TIME 11:00 - VERSION 04.08.0
			RUN	ALL
			DIAGNOST	ICS TYPE
Quick (Unattended) [Q] Quick [W]			Qu E× mo e. Th	ick: cludes extended tests of modules that take re than 10 minutes to complete each test. g. Extended tests of CPU, Memory and Storage. is test mode takes about 15 minutes to complete
			Fu In WA	Full: Includes all quick and extended tests of modules. WARNING: This test mode can take several hours
1.5	Full (Unattend Full [R		Un Te us	attended: st mode that excludes tests that need er interaction.
17			e.	g. Mouse, Keyboard, Touch, etc.
Navigatio	n [Arrows]	Enter	[Space]	Exit [Esc
			Run All Diag	nostics Type

Run All is an option that runs all the available diagnostics, such as Battery, CPU, Display, Fan, Memory, Motherboard, Optical, PCI-e, RAID and Storage. The choices the user have are: "Quick", "Extended" and "Restrict prior selection to unattended tests".

At least one diagnostic type must be selected so the application can run the diagnostic. After the user chooses which one must be performed, the user can use the Confirm button. Consequently, the system will run all tests, as illustrated in the figure below.

	LENOVO	Diagnostics UEFI		1	ime 11:15 - Version 04.08.0
	Diagnostic	Status	Progress	Summa	ary
	DISPLAY	NOT SELECTED	>	Finished at:	2019/03/19 11:08:26
	KEYBOARD	PASSED	100% >	RESULT CODE:	UNE0080000000-UU7X1M
	MOUSE	PASSED	100% >	MEMO	IRY
	OPTICAL	NOT FOUND	>		
	TOUCH	NOT FOUND	>	Started at:	2019/03/19 11:08:26
	BATTERY	NOT FOUND	>	Advanced Integrity Test:	PASSED
	CPU	FAILED	1007. >	Hadress lest: Bit High Tect:	DOGGED BUCCEN
	FAN	NOT FOUND	>	Bit Low Test:	PASSED
	MEMORY	IN PROGRESS	477. >	Walking Ones Right Test:	PASSED
	MOTHERBOAR	D PENDING	07 >	Walking Ones Left Test:	Progress [ 62% ]
	DCT FXDDFS		07. >	Modulo-20 Test:	Waiting
	DOLD		07. 7	Moving Inversions-8bit Test:	Waiting
	KHLU	NUL LUUN	2	Moving Inversions-32Dit lest: Random Pattern Test:	Walting Haiting
	STURHEL	PENDING	⊎7. >	Random Number Sequence Test:	Waiting
				Block Move Test:	Waiting
				Bit Fade Test (~180 min):	Waiting
	Total estima Passed: 02	ated time: 00:16:3 Failed: 01 Not H	3 <b>2 of 08:1</b> Found: 05	1:06 FIN XXX Canceled/Not Selected: 01	AL RESULT CODE XXXXXXX-XXXXX
ľ	lavigation [f	Arrows]			Stop Tests (Esc
			Ru	n All Diagnostics Execution	

The Run All Diagnostics Execution screen provides information about the diagnostics progress of all modules, as well as information about the results. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Table menu
- Total progress bar and diagnostic status counter area
- Summary Diagnostic Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The Diagnostic Table menu shows the overall execution status and progress of each module and the user can navigate among the diagnostics changing what is showed on the main section (Summary Diagnostic Information Section). The Diagnostic Table menu contains the following information which are updated dynamically through the execution:

- The module progress information is relative to all devices and tests of that module.
- The diagnostic general status, which can be one of the following:
  - **PENDING**, indicating the diagnostic is waiting to be run.
  - IN PROGRESS, indicating the diagnostic is being run.
  - PASSED, indicating all test algorithm of the diagnostic has found no problems for all its devices.
  - WARNING, when applicable, indicating the diagnostic has detected signs to the user be aware (for instance, of an imminent failure).

- **FAILED**, indicating the diagnostic has found one or more faults.
- CANCELED, indicating the diagnostic has been canceled by user.
- NOT APPLICABLE, indicating the diagnostic is not supported.
- NOT SELECTED, indicating the diagnostic was not selected for the current execution.
- NOT FOUND, indicating the diagnostic is not supported or is unavailable on the system.

The total progress bar and diagnostic status counter area, as the name describe, has the total progress overall diagnostics, the current and total estimated time for the execution and also have the counters for the following diagnostics status:

- Passed, counting how many diagnostics has PASSED status.
- Failed, counting how many diagnostics has FAILED status.
- Not Found, counting how many diagnostics are not supported or are unavailable on the system.
- Canceled/Not Selected, counting how many diagnostics were canceled or were not selected for the current execution.

The screen has one main section that provides information about the diagnostic, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize tests details after finishing the diagnostic execution. That section contains the following diagnostics information:

- Final Result Code (an encrypted code that informs which modules were tested).
- Date and time that diagnostic has started.
- Test (name of the test being currently run).
- Progress of the current test (current test's progress in percentage).
- A list with all the algorithms which compose device test and their respective status, whereas an algorithm can have seven status:
  - Waiting, indicating the test is waiting to be run.
  - Progress (plus the test execution percentage), indicating the test is being run.
  - PASSED, indicating the algorithm has found no problems at device.
  - WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
  - FAILED, indicating the algorithm has found one or more faults.
  - CANCELED, indicating the algorithm has been canceled by user.
  - NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the tests are finished (displayed after test is finished).
- Result Code for test.
- Elapsed time, that is a duration of test in hours, minutes and seconds (displayed after test is finished).

While the diagnostic is running, the user can stop it at any time by pressing the ESC key. If the user does that, the diagnostic is aborted and the status of the test that is being run is changed to CANCELED. After the diagnostic is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the test log (by pressing the V key).

### **Diagnostics Result Log**

After a test or a recover operation is finished, the user can see the Diagnostics Result Log screen by pressing the V key. That screen is shown in the following figure.

LENOVO	Diagnostics UE	FI		Time 03:26	- Version 04.08.0
		RUN	ALL		
		DIAGNOSTICS	RESULT LOG		
Serial nu	mber:	PFOFLMCH			
BIOS Vers	ion:	N1MET 10W	(0.10)		
Machine m	odel:	ThinkPad	X1 Carbon 5t	h	
Final Res	ult Code:	<b>U179SSP</b>	GN-8VEUE8		
CPU QUICK	DIAGNOSTIC   201	8/12/11 03:26:34			
Result co	de :	UCP13F00	)-UN7XQE		
UDI :		Intel (R)	Core(TM) i3-	7100U CPU @ 2.40GH	z - INTEL
Display N	ame:	Intel(R)	Core(TM) i3-	7100U CPU @ 2.40GH	z - INTEL
Model:		Intel(R)	Core(TM) i3-	7100U CPU @ 2.40GH	z
Vendor :		INTEL			
		Save Lo	og LF2J		
Navigation	n [Arrows]	Enter [Space]	Scrol	1 [Page Up/Down]	Home [Esc]
		Run All Diagno.	stics Result Log	Y	

The Diagnostics Result Log screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Diagnostic Log Section
- Save Log Button
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

Additionally, the screen has one main section that shows the diagnostic log, and a Save Log button that allows the user to store the log into an USB-Storage.

If the log content has many rows, user can scroll by pressing the Page Up and Page Down to move the displayed region up and down, respectively. The user can also go back to the Home screen by pressing the ESC key and save the log by pressing the F2 key.

## Log Saving

If the user chooses to save the log by pressing the Save Log button on the Diagnostics Result Log screen, the Log Saving screen is displayed, as shown in the figure below.

LEN	iovo	Diagnostic	s UEFI				Time	e 16:04	- V6	ersion	04.08.0
					LOG SI	AVING					
					USB-STORAGE	SELECTION					
		<b>F V 1</b>	KTNOOA								
			KINGS1								
		ĽJ	KINGSZ								
							1				
					Confir	'm [C]					
Nav	igation	[Arrows]	E	nter	[Space]					Ex	it [Esc
				L	og Saving USB-	Storage Select	ion				

The Log Saving screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- USB-Storage Selection List
- Confirm Button
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

In addition, user can choose a device from the USB-Storage Selection List to save the log in. After the user chooses a device, s/he can press Confirm. The application will attempt to save the log into the selected device.

If the saving operation is successful, a window will be displayed to inform the user that the operation was successful (as shown in the next figure). If the operation does not work, a window will be displayed to inform the user that the operation was not successful. In both cases, the user must press ENTER, and the Diagnostics Result Log screen will be displayed again.



# **System Information**

The System Information screen with the System tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI	[		Time 03:27 -	- Version O	4.08.0
		SYSTEM INFORMAT	TION			
CHOOSE A	MODULE :					
SYSTEM D	:0]	MACHINE INFORMATION				
CPU [1]						
DISPLAY	[2]	Machine manufacturer:	LENOVO			
VEUDOADD		Product name:	DX120NPI22			
KEYBUARD	131	Product version:	ThinkPad X1	Carbon 5th		
MEMORY [	[4]	Serial number:	PFOFLMCH			
MOTHERBO	IARD [5]	Eth Physical Address:	C8-5B-76-68-	A8-A8		
MOUSE [6	1					
PCI EXPR	ESS [7]	BIUS INFURMATIUN				
STORAGE	[8]	BIOS Version:	N1MET10W (0.	10)		
		BIOS release date:	09/12/2016			
		BIOS manufacturer:	LENOVO			
			Ехр	oort System I	nformation	[F2]
Navigation	n [Arrows]	Enter [Space]	Scroll [Page	e Up/Down]	Home	EESC.
	System Information's System Tab					

The System Information screen with the Battery tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI			Time 09:26 -	· Version	04.08.0
		SYSTEM INFORMA	ATION			
CHOOSE A	MODULE :					
SYSTEM [	0]	BATTERY INFORMATION				
BATTERY	[1]					
CPU [2]		UDI :	Sanyo			
DISPLAY	[3]	Display Name:	213-Sanyo			
MEMORY (	41	Primaru	¥FS			
	ADD [5]	Manufacturer:	SANYO			
		Serial number:	213			
PUL EXPR	ESS (6)	Bar code number:	P1SG563006M	I		
STORAGE	[7]	FRU number:	00HW022			
		Firmware level:	16			
		Manufacture date:	2015/06/03			
		First use date:	2000/12/31			
		Temmerature:	292.8 K			
			Ex	xport System I	nformatio	n [F2]
Navigation	n [Arrows]	Enter [Space]	Scroll [Pag	ge Up/Down]	Hor	ne [Esc]
System Information's Battery Tab						

The System Information screen with the CPU tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI		Time 03:27 - Version 04.08.0			
		SYSTEM INFORMAT	ION			
CHOOSE A	MODULE :					
SYSTEM [	:0]	CPU INFORMATION				
CPU [1]						
DISPLAY	[2]	UDI :	Intel(R) Core(TM) i3-7100U CPU @			
VEVBUQD	[3]		2.40GHz - INTEL			
		Display Name:	Intel(R) Core(TM) i3-7100U CPU @			
MEMORY [	4]		2.40GHz - INTEL			
MOTHERBO	IARD [5]					
MOUSE [6	5]	Model:	Intel(R) Core(TM) i3-7100U CPU @			
PCT EXPR	ESS [7]		2.406Hz			
		Vendor :	INTEL			
STORAGE	[8]	Number of cores:	2			
		Number of enabled cores:	2			
		Number of threads:	4			
		Simature:	806e9			
			Export System Information [F2]			
Navigatio	n [Arrows]	Enter [Space]	Scroll [Page Up/Down] Home [Esc			
	System Information's CPU Tab					

The System Information screen with the Display tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI		Time 03:27 - Version 04.08.0			
		SYSTEM INFORMAT	TION			
CHOOSE A	MODULE :					
SYSTEM D	0]	DISPLAY INFORMATION				
CPU [1]						
DISPLAY	[2]	UDI:	HV140FHM-N61 - BOE			
KEYBOARD	[3]	Display Name:	HV14UFHM-N61 - BUE			
MEMORY [	4]	Manufacturer ID:	BOE			
MOTHERBO	ARD [5]	Model Name:	HV140FHM-N61			
MOUSE [6]	1	EDID version:	1.4			
PCT FXPR	F99 [7]	Max resolution:	1920 x 1080 pixels			
		Max image size:	31 cm × 17 cm			
STORAGE	[8]	Input type:	Digital			
		Display type:	RGB 4:4:4			
			Export System Information [F2]			
Navigation	n [Arrows]	Enter [Space]	Scroll [Page Up/Down] Home [Esc.			
	System Information's Display Tab					

The System Information screen with the Fan tab selected is shown in the following figure.

LENOVO	Diagnostics UE	FI		Time 00:25	- Version	04.08.0
		SYSTEM IN	FORMATION			
CHOOSE A	MODULE :					
SYSTEM [	0]	FAN INFORMATION				
CPU [1]						
DISPLAY	[2]	UDI:	FAN_SYSTEM			
FAN [3]		Display Name:	FAN_SYSTEM			
MEMORY [	4]	CPU fan speed:	2680 RPM			
MOTHERBO	ARD [5]	CPU temperature:	30 C			
PCI EXPR	ESS [6]					
STORAGE	[7]					
			_			
			Ех	xport System 3	Informatio	m [F2]
Navigation	n [Arrows]	Enter [Space]	Scroll [Pa	ge Up/Down]	Но	me [Esc]
System Information's Fan Tab						

The System Information screen with the Memory tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI			Time 03:27	- Version (	94.08.0
		SYSTEM INFORMAT	ION			
CHOOSE A	MODULE :					
SYSTEM [	0]	MEMORY INFORMATION				
CPU [1]						
DISPLAY	[2]	UDI:	MEMORY_UDI			
KEYBOARD	[3]	Display Name:	MAIN_MEMURY	1		
MEMORY [	4]	Total physical memory:	4096 MB			
MOTHERBO	ARD [5]					
MOUSE [6	]	Origin: -	SMBIOS			
PCI EXPR	ESS [7]	Type:	LPDDR3			
OTODACE	roj	Manufacturer:	Micron			
STURHGE	[8]	Maximum Speed:	1867 MT/s			
		Current Speed:	1867 MT/s			
		Size:	2048 MB			
		Bank Locator:	RANK 0			
			Ex	kport System (	Informatior	[F2]
Navigation	n [Arrows]	Enter [Space]	Scroll [Pa	ge Up/Down]	Hom	e (Esc.
		System Information's M	emory Tab			

The System Information screen with the Motherboard tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI			Time 03:2	7 - Versio	n 04.	.08.0
		SYSTEM INFORMATI	(ON				
CHOOSE A	MODULE :						_
SYSTEM [	0]	MOTHERBOARD INFORMATION					
CPU [1]							
DISPLAY	[2]	UDI:	MOTHERB	DARD_UDI			
KEYBOARD	[3]	Display Name:	MATN_MO:	THERBUHRD			
MEMORY [	4]	No. USB Host Controllers:	1				
MOTHERBO	ARD [5]	Number of PCI:	17				
Mouse (6	1	RTC presence:	Yes				
PCI EXPR	ESS [7]	Resource :	PCI res	ource			
STORAGE	[8]	Index:	1				
		Slot:	0				
		Class name:	Bridge				
		Subclass name:	Host. hr	idae			_
				Export Syste	m Informati	ion [	F21
Navigation	n [Arrows]	Enter [Space]	Scroll	[Page Up/Down]	H	ome	[Esc]
	System Information's Motherboard Tab						

The System Information screen with the Optical tab selected is shown in the following figure.

LENOVO	Diagnostics l	JEFI	Time 00:25 - Version 04.08.0		
		SYSTEM INFO	DRMATION		
CHOOSE A	MODULE :				
SYSTEM [	0]	FAN INFORMATION			
CPU [1]					
DISPLAY	[2]	UDI:	FAN_SYSTEM		
FAN [3]		Display Name:	FAN_SYSTEM		
MEMORY [	4]	CPU fan speed:	2680 RPM		
MOTHERBO	ARD [5]	CPU temperature:	30 C		
PCI EXPR	ESS [6]				
STORAGE	[7]				
			Export System Information [F2]		
Navigation	n [Arrows]	Enter [Space]	Scroll [Page Up/Down] Home [Esc		
System Information's Optical Tab					

The System Information screen with the PCI Express tab selected is shown in the following figure.

LENOVO	Diagnostics UEF	[	Time 03:27 - Version 04.08.0			
SYSTEM INFORMATION						
CHOOSE A	MODULE :					
SYSTEM I	[0]	PCI EXPRESS INFORMATION				
CPU [1]						
DISPLAY	[2]	UDI:	PCI_EXPRESS_SYSTEM			
KEYBOARD		Display Name:	PCI_EXPRESS_SYSTEM			
		-				
MEMUKY I	[4]	Kesource:	PCI-Express resource			
MOTHERBO	IARD [5]	Bus:	0x0			
MOUSE [6	5]	Device:	0x2			
PCI EXPRESS [7]		Function:	0x0			
		Offboard Device:	No			
STORAGE	[8]	Vendor Id:	0x8086			
		Class:	Display controller			
		Subclass:	VGA compatible controller			
			Export System Information [F2]			
Navigatio	n [Arrows]	Enter [Space]	Scroll [Page Up/Down] Home [Esc			
System Information's PCI Express Tab						

The System Information screen with the RAID tab selected is shown in the following figure.

LENOVO Diagnostics	UEFI	Time 04:01 - 1	Version 04.08.0			
	SYSTEM INFO	RMATION				
CHOOSE A MODULE:						
SYSTEM [0]	RAID INFORMATION					
CPU [1]						
DISPLAY [2]	UDI:	RAID				
MEMORY [3]	Display Name:	RAID				
MOTHERBOARD [4]	Resource:	Raid Device				
PCI EXPRESS [5]	Bus:	0×17				
RAID [6]	Device:	0x0				
STORAGE [7]	Function:	0x0				
	Vendor Id:	0x1000				
		Export System In	formation [F2]			
Navigation [Arrows]	Enter [Space]	Scroll [Page Up/Down]	Home [Esc			
System Information's RAID Tab						

The System Information screen with the Storage tab selected is shown in the following figure.

LENOVO	Diagnostics UEFI	· · · · · · · · · · · · · · · · · · ·	Time 09:26 - Version 04.08.0				
	SYSTEM INFORMATION						
CHOOSE A	MODULE :						
SYSTEM D	0]	STORAGE INFORMATION					
BATTERY	[1]						
CPU [2]		UDI :	Samsung Electronics Co., Ltd., Memory				
να ταρτα	[3]		Division-SAMSUNG				
DIOLTUI			MZUKU512HAJH-000L1-S2CYNYAG600336				
MEMORY [	4]	Display Name:	SAMSUNG MZVKV512HAJH-000L1-Samsung				
MOTHERBO	ARD [5]		Electronics Co., Ltd., Memory Division				
PCI EXPR	ESS [6]						
STORAGE	[7]	nodel number:	2HU2ON@ USAKA2ISHHIH-0000F1				
		Manufacturer:	Samsung Electronics Co., Ltd., Memory				
			Division				
		Device Type:	NVMe				
		Serial number:	S2CYNYAG600336				
		Firmware revision:	31.00BXX7				
			Export System Information [F2]				
Navigation	n [Arrows]	Enter [Space]	Scroll [Page Up/Down] Home [Esc				
		System Information's S	Storage Tab				

The System Information screen is displayed after the user enters the option System Information on the Home screen. The System Information screen provides detailed information about the machine, the memory devices, and the storage devices. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Modules Tabs Bar;
- Content Tab;
- Export System Information Button;
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title Bar helps the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

Modules Tabs Bar contains the modules options to load information and displays the tab currently selected (the name of current tab has a red background to differentiate it from the other tabs), while the Content Tab is the region that exhibits information corresponding to the selected tab.

Export System Information Button can be accessed between the Content Tab and the Instruction Footer Bar, where it is possible to export all the modules' information at once to an USB-Storage device.

The user can change the current tab by using the up () and down () keys to navigate among the options and by pressing ENTER to access the option. The Content Tab region will display information about the device on the selected tab. The user can also scroll information content using the Page Up and Page Down keys if the number of content rows is greater than the number of rows on the screen.

For the *System tab*, the following information is displayed on the Content Tab:

Machine Manufacturer;

- Product Name;
- Product Version;
- Serial Number;
- BIOS Version;
- BIOS Release Date;
- BIOS Manufacturer;
- Processor Manufacturer;
- Processor Version.

For the *Battery tab*, the following information is displayed on the Content Tab:

- Primary;
- Manufacturer;
- Serial Number;
- Bar Code Number;
- FRU Number;
- Firmware Level;
- Manufacture Date;
- First Use Date;
- Temperature;
- Device Chemistry;
- Cycle Count;
- Charging Status;
- Remaining Charge;
- Capacity Mode;
- Full Charge Capacity;
- Remaining Capacity;
- Design Capacity;
- Current;
- Voltage;
- Design Voltage;
- Warranty Period;
- Warranty Cycles;
- OptionalMFGFunction2.

For the *CPU tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Model;
- Vendor;
- Number of Cores;
- Number of Enabled Cores;
- Number of Threads;
- Signature;
- Max Speed;
- Current Speed;
- Features;
- Cache L1;
- Cache L2;
- Cache L3.

For the *Display tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Manufacturer ID (a three-letter code identifying the manufacturer);
- Model Name;
- EDID Version;
- Max Resolution (in pixels);
- Max Image Size (in cm);
- Input Type (Analog or Digital);
- Display Type.

For the *Fan tab*, the following information is displayed in the Content Tab:

- UDI;
- Display Name;
- CPU Fan Speed;
- CPU Temperature.

For the *Keyboard tab*, the following information is displayed in the Content Tab:

- UDI;
- Display Name;

- Device Type;
- Serial Number (when applicable);
- Manufacturer (when applicable);
- Product Name (when applicable);

For the *Memory tab*, the following information is displayed on the Content Tab:

- UDI:
- Display Name;
- Total Physical Memory (total of physical memory of machine in MB) and, for each memory device installed on machine:
  - Origin (Identification of memory device);
  - Type (DDR2, DDR3, EEPROM and so on);
  - Manufacturer;
  - Maximum Speed (in MT/s);
  - Current Speed (in MT/s);
  - Size (in MB);
  - Part Number;
  - Serial Number.

For the *Motherboard tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- No. of USB Host Controllers;
- Number of PCI;
- RTC Presence;
- Resource;
- Index;
- Slot;
- Class Name;
- Subclass Name.

For the *Mouse tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Device Type;
- Resolution X;
- Resolution Y;
- Has Left Button;
- · Has Right Button;
- Serial Number (when applicable);
- Manufacturer (when applicable);
- Product Name (when applicable);

For the *Optical tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Model Number;
- Manufacturer;
- Serial Number;
- Firmware Revision;
- Size;
- Sector Size;
- Supported Features.

For the *PCI Express tab*, the following information is displayed on the Content Tab:

- UDI:
- Display Name;
- Resource;
- Bus (current item bus hexadecimal id);
- Device (current item device hexadecimal id);
- Function (current item function hexadecimal id);
- Offboard Device (in case it's an external PCI Express off board connected);
- Vendor ID (current item vendor hexadecimal id);
- Class (current item class name);
- Subclass (current item subclass name).

For the *RAID tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Resource;

- Bus (current item bus hexadecimal id);
- Device (current item device hexadecimal id);
- Function (current item function hexadecimal id);
- Vendor ID (current item vendor hexadecimal id).

For the *Storage tab*, the following information is displayed on the Content Tab:

- UDI:
- Display Name;
- Model Number;
- Manufacturer;
- Device Type;
- Serial Number;
- Firmware Revision;
- Size (in GB);
- Rotation Rate;
- Temperature (in Celsius);
- Physical Block Size (in bytes);
- Logical Block Size (in bytes);
- No. of Logical Blocks;
- Supported Standards;
  - ATA/ATAPI 4;
  - ATA/ATAPI 5;
  - ATA/ATAPI 6;
  - ATA/ATAPI 7;
- ATA8\_ACS;Standard Version;

For the *Touch tab*, the following information is displayed on the Content Tab:

- UDI;
- Display Name;
- Absolute Min X;
- Absolute Min Y;
- Absolute Min Z;
- Absolute Max X;
- Absolute Max Y;
- Absolute Max Z;
- Supports Alternative Button;
- Supports Pressure as Z;
- Serial Number;
- Manufacturer;
- · Product Name;

To exit the System Information screen and go back to the Home screen, the user must press the ESC key.

## Hardware Diagnostic Events (for ThinkStation)

Hardware Diagnostic Events are exhibited by accessing the Home screen, Tools, Diagnostic Event Log.

Nevertheless, this tool is currently limited to only ThinkStation products, specifically to P520C, P520, P720 and P920.

LENOVO	Diagnostics UEFI			Time	e 12:03	- Version	04.08.0
		HO	ME				
DIAGNOSTICS						TOOLS	
CPU [1]		DISPLAY [2]		S	YSTEM IN	FORMATION	[F1]
MEMORY [3]		MOTHERBOARD [4]	I	DI	AGNOSTIC	EVENT LOO	G [F2]
PCI EXPRESS [5]		RAID [6]					
		RUN ALL	[R]				
Navigatio	n lArrows] Ei	iter [Space]				Ex	it [Esc.
	Ноте						

When entering the tool, the events are loaded and displayed, as demonstrated in the next image.

LENOVO	Diagnost	ics UE	FI		Time 08:09	9 – Vers	ion O4	4.08.0
			HARDWARE DIAG	NOSTIC EVENTS				
For n	For more information about each event code, select "code lookup" on this web site: http://www.thinkworkstationsoftware.com							
Date	Time	Code		Descript:	ions			
2018/08/10	03:57:05	S008	5V standby bus – High	voltage error				
2018/08/10	03:57:05	N000	Power button pressed					
2018/08/09	09:16:56	N000	Power button pressed					
2018/08/09	09:13:02	S008	5V standby bus – High	voltage error				
2018/08/09	09:13:02	N000	Power button pressed					
2018/08/09	08:56:48	N000	Power button pressed					
2018/08/09	08:49:04	S040	Motherboard voltage re	egulation error				
2018/08/09	08:49:04	S014	Startup timing error					
2000/01/01	12:00:00	S008	5V standby bus – High	voltage error				
2000/01/01	12:00:00	N000	Power button pressed					
2018/08/06	14:08:04	S040	Motherboard voltage re	egulation error				
2018/08/06	14:08:04	S014	Startup timing error					
2018/08/06	14:08:03	N000	Power button pressed					
Serial Numbe	Serial Number: INVALID Clear Front Panel LED [Delete]						lete]	
Navigation	[Arrows]		Enter [Space]	Scroll	[Page Up/Down]		Home	[Esc

#### Hardware Diagnostic Events

The application may be unable to retrieve the requested information. When that occurs, users can use the "Clear Front Panel LED" button to be able again to retrieve hardware diagnostic events.

# **Bad Block Recovery**

The Bad Block Recovery is a tool that recovers bad blocks in a storage device.

The system allows the user to access that tool by accessing the Home screen, Tools, Bad Block Recovery.

LENOVO	Diagnostics UEFI		Time 03:28 - Version 04.08.0
		HOME	
	DIAGNO	ISTICS	TOOLS
CPU [1]		DISPLAY [2]	SYSTEM INFORMATION (F1)
KEYBOARD	) [3]	MEMORY [4]	BAD BLOCK RECOVERY [F3]
MOTHERBO	ARD [5]	Mouse [6]	
PCI EXPR	RESS [7]	STORAGE [8]	
		RUN ALL [R]	
Navigatio	n [Arrows] Er	iter [Space]	Exit [Esc
		Home	
		Ноте	

After the user enters the Bad Block Recovery option, the application will display the storage devices available in the system. The menu Device Selection is displayed, as shown in the next figure.


LENOVO	Diagnostic	s UEFI				Time	93:28	- Version	04.08.0
			BAD BLOCK	K RECOVER	RA				
			DEVICE S	BELECTION	I				
	[ X ]	Select / De	select All Op	ptions			]		
	נאז	CV3-8D128-L	ITE-ON IT Cor	rporation	1		(i)		
			Confi	rm [C]					
Navigation	n [Arrows]	Enter	[Space]		Selected	Item Info	) [I]	Но	ome [Esc]
		Ba	d Block Recove	ery Device	Selection				

This screen also allows seeing devices details. To access this feature, the user has to press the I key when the desired device is focused, leading to the exhibition of a popup with the device information, as shown in the subsequent figure.



LEN0V0	Diagnostics UE	FI		Time 06:16	- Version	04.08.0
		BAD BLOCK	RECOVERY			
		DEVICE SE	LECTION			
		STORAGE INF	FORMATION			
	Display Name	: ST2000LM007-1R8174-S	eagate Technology			
	Manufacturer Device Type:	: Seagate Technology SATA				
	\$ize:	1863 GB				
		01/				
		UK				
		Confirm	n [C]			
Navigation	[Arrows]	Enter [Space]	Selected Ite	m Info [1]	H	ome (Esc
		Bad Block Recovery	Device Information			

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show the Bad Block Recovery item, as illustrated in the next figure, where the item is selected to be executed.

LENOVO	Diagnostics	5 UEFI				Time O	3:29	- Versior	04.08.0
		STORAGE	1: CV3-8D128-L	ITE-ON	IT Corporat	ion			
			ALGORITHM	SELECTI	ON				
	[ X ]	Select / De	eselect All Opt	tions					
	[ X ]	Bad Block I	Recovery				(i)		
			Confir	m [C]					
Navigation	[Arrows]	Enter	[Space]		Selected It	em Info	[]]	Н	ome [Esc
			Storage Algori	ithm Sele	ection				
			2.0. 490						

That screen also allows seeing the algorithm details. To access this feature, the user has to press the I key when the Bad Block Recovery item is focused, leading to the exhibition of a popup with the algorithm information, as shown in the subsequent figure.



LEN	040	Diagnostic	s UEFI				Time 03:29	- Ver:	sion 04.08.0
			STORAGE	1: CV3-8D128	LITE-ON	IT Corporat	ion		
				ALGORITH	1 SELECT	ION			
			BA	AD BLOCK RECO	VERY IN	FORMATION			
		"Bad Bloc in the st may take perform a	ck Recovery" torage device a long time a complete ba	very" is a storage tool that checks for device and tries to fix them. The check time to complete. Before running it, y ete backup.				y	
					Ok				
				Conf	irm (C)				
Navi	igation	[Arrows]	Enter	[Space]		Selected It	em Info []]		Home (Esc.

### Bad Block Recovery Information Popup

#### Note

Once the Bad Block Recovery might perform write operations on a device, it may cause data loss. Consequently, the user must backup his or her data before running that operation.

In order to confirm the tool's execution, the user can use the Confirm button. Consequently, the system will run the tool, as illustrated in the figure below.

LENOVO	Diagnostics	5 UEFI				Tim	e 17:40	- Vers	sion (	94.08.0
			BAD B	LOCK RI	ECOVERY					
			<b>T</b> 00	l execi	JTION					
Fir	nal Result C	ode: U1	7EZP3K5-2QAD	33						
SIL	IKHGE: 21916	041285								
	Starte Bad B	ed at: lock Recou	loru ·		2018/06/04	17:40:25				
	Finis	ned at:	erg.		2018/06/04	17:40:41				
	RESULT	CODE:			UBK000000-	-rn7acg				
	Elapse	ed Time:	00:00:16							
							V:	iew Log	[V]	
Navigation	[Arrows]								Hom	e lEsci
			Bad Block Re	ecovery	Tool Execution	n				

The Bad Block Recovery Tool Execution screen provides information about the Bad Block Recovery tool progress, as well as its result when it has finished. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Tool Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the tool, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize the algorithm execution details after finishing the tool execution. That section contains the following information:

- Final Result Code (an encrypted code that informs the algorithm's execution).
- Date and time that the operation has started.
- Bad Block Recovery (name of the algorithm being currently run).
- Progress of operation (algorithm's progress in percentage).
- The tool's algorithm can have seven status:
  - Waiting, indicating the algorithm is waiting to be run.
  - Progress (plus the tool execution percentage), indicating the tool is being run.
  - PASSED, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- NOT APPLICABLE, indicating the algorithm is not supported by device.
- Date and time that the operation is finished (displayed after it is finished).
- Result Code for the tool's algorithm.
- Elapsed time, that is a duration of the tool's algorithm in hours, minutes and seconds (displayed after it is finished).

While the tool is running, the user can stop it at any time by pressing the ESC key. If the user does that, the operation is aborted and its status is changed to CANCELED. After the operation is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the tool log (by pressing the V key).

# **Storage Data Disposal**

Data Disposal Tool is a storage tool that erases all data from storage device.

This tool is currently available in HDD devices only

The data erasing process may take a long time to complete. Before running it, you should perform a complete backup as the data will not be restorable from the disk

The system allows the user to access this tool by accessing the Home screen, Tools, Storage Data Disposal

LENOVO	Diagnostics	5 UEFI			Time 22:5	1 - Version 04.08.0
			HO	ME		
		DIAGNO	ISTICS			TOOLS
CPU [1]			DISPLAY [2]		SYSTEM	INFORMATION [F1]
KEYBOARD	) [3]		MEMORY [4]		BAD BLO	ICK RECOVERY (F3)
MOTHERBO	JARD [5]		Mouse [6]		STORAGE 1	DATA DISPOSAL [F4]
OPTICAL	[7]		PCI EXPRESS [8]			
STORAGE	[9]					
			RUN ALL	[R]		
Navigatio	n [Arrows]	Er	ter [Space]			Exit [Esc]
			Storage Data	Disposal Tool		

After the user enters the Storage Data Disposal option, the application will display the storage devices available in the system. The menu Device Selection is displayed, as shown in the next figure.



LENOVO	Diagnostics	UEFI				Time 2	2:51	- Version	04.08.0
			STORAGE DAT	(A DISPO	JSAL				
			DEVICE S	ELECTIO	N				
	[ X ]	Select / De	select All Op	tions					
	[ X ]	ST9160412AS	-Seagate Tech	no logy			(i)		
			Confir	rm [C]					
Navigation	[Arrows]	Enter	[Space]		Selected Ite	m Info	[]]	Ho	ome [Esc]
		Stor	rage Data Dispo	sal Dovir	se Selection				
		5101	age Data Dispo.						

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show the Storage Data Disposal item, as illustrated in the next figure, where the item is selected to be executed.

STORAGE 1. STORGALIAS Security Testing Laws	
STUKHEL 1: STSTED412HS-Seagate Technology	
ALGORITHM SELECTION	
[ X ] Select / Deselect All Options	
[ X ] Storage Data Disposal (i)	
Confirm [C]	
Navigation [Arrows] Enter [Space] Selected Item Info []]	ome [Esc]
Storage Data Disposal Algorithm Selection	

That screen also allows seeing the algorithm details. To access this feature, the user has to press the I key when the Storage Data Disposal item is focused, leading to the exhibition of a popup with the algorithm information, as shown in the subsequent figure.



LENOVO	Diagnostic	sUEFI			Time	15:46	- Version	04.08.0	
		STORAGE	1: ST9500423	AS-Seagate Teo	thno logy				
			ALGORITHM	SELECTION					
		STO	NRAGE DATA DISI	Posal informat	TON				
	"Data Disposal Tool" is a storage tool that erases all data from HDD device. The data erasing process may take a long time to complete. Before running it, you should perform a complete backup as the data will not be restorable from the disk.								
			C	k					
			Confi	rm [C]					
Navigation	[Arrows]	Enter	[Space]	Select	ed Item In	fo [1]	Ho	me (Esc	

Storage Data Disposal Information

In order to confirm the tool's execution, the user can use the Confirm button. Consequently, the system will display a warning message about the data disposal process, as illustrated in the figure below.

LENOVO	Diagnostic	s UEFI				Time 22	:51	- Ver	sion Q	4.08.0
		:	STORAGE DA	TA DISPOS	AL.					
			TOOL E	ECUTION						
F	inal Result C	ode:								
S	TOR	:	storage da	TA DISPOSA	ìL					
	WARNING: please pe process m	All disk data u erform a complet ay take a long No [Esc]	will be era te backup l time to co	ased and w before usi omplete, d	uill mot 1 mg this <sup>-</sup> lo you wis Ye	be restora tool. The sh to cont	able tinu	, e?		
						S	Stop	Tests	Esc)	
									_	
Navigatio	n [Arrows]								Hone	(Esc.
		Storage	e Data Dispo	sal Warning	Message					

After reading the warning message, the user can confirm the tool's execution. Consequently, the system will start the data disposal process, as displayed in the figure below.

LENOVO	Diagnostics	5 UEFI				Time	22:51	- Vers	ion 04	.08.0
			STORAGE	DATA D	ISPOSAL					
			TOOL	EXECUI	TION					
Fi	nal Result C	ode:								
ST	ORAGE: ST916	0412AS								
	Starto Storag Finisl <mark>RESUL</mark> I	ed at: je Data Dispo ned at: CODE:	sal:		2018/12/13 Progress [6 0000/00/00	22:51:50 )/] 00:00:00				
	Elapse	ed Time:								
				-			Q4 on	Teste	[Fee]	
							օւսի	Tests	LESCI	
Navigation	n [Arrows]								Home	[Esc]
		S	Storage Data	a Dispos	al Execution					

The Storage Data Disposal Tool Execution screen provides information about the data disposal progress, as well as its result when it has finished. This screen is composed of:

- Application Header Bar
- Screen Title Bar
- Screen Sub-title Bar
- Tool Information Section
- Instruction Footer Bar

The Application Header Bar contains the name of the application, system's time and application's current version; the Screen Title and Screen Sub-title Bars help the user to be attentive of where s/he is throughout the application; and the Instruction Footer Bar contains additional instructions for using the screen, as well as the Exit button.

The screen has one main section that provides information about the tool, as well as a progress bar and a View Log button, both placed at the bottom of the section, where the former indicates the global execution progress and the latter allows to visualize the algorithm execution details after finishing the tool execution. That section contains the following information:

- Final Result Code (an encrypted code that informs the algorithm's execution).
- Date and time that the operation has started.
- Storage Data Disposal (name of the algorithm being currently run).
- Progress of operation (algorithm's progress in percentage).
- The tool's algorithm can have seven status:
  - Waiting, indicating the algorithm is waiting to be run.
  - Progress (plus the tool execution percentage), indicating the tool is being run.
  - SUCCESS, indicating the algorithm has found no problems at device.

- WARNING, when applicable, indicating the algorithm has detected signs to the user be aware (for instance, of an imminent failure).
- FAILED, indicating the algorithm has found one or more faults.
- CANCELED, indicating the algorithm has been canceled by user.
- Date and time that the operation is finished (displayed after it is finished).
- Result Code for the tool's algorithm.
- Elapsed time, that is a duration of the tool's algorithm in hours, minutes and seconds (displayed after it is finished).

While the tool is running, the user can stop it at any time by pressing the ESC key. If the user does that, the operation is aborted and its status is changed to CANCELED. After the operation is finished or canceled, the user can go back to the Home screen (by pressing ESC again) or visualize the tool log (by pressing the V key).

## **SMART** Information

SMART Information is a tool used to obtain information related to the hardware condition, reported by the S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) monitoring system of HDDs and SSDs, in order to prevent imminent hardware failures.

The system allows the user to access this tool by accessing the Home screen, Tools, SMART Information Tool, as displayed in the figure below.



After the user enters the SMART Information option, the application will display the storage devices available in the system. The menu Device Selection is displayed, as shown in the next figure.

LENOVO	Diagnostic	s UEFI				Time 2	20:50	- Version	04.08.0
			SMART INFOR	MATION T	00L				
			DEVICE S	ELECTION	I				
	[ X ]	THNSFJ25660	SU-Toshiba				] (i)		
			Confir	m [C]					
Navigation	[Arrows]	Enter	[Space]	5	Selected 1	[tem Info	5 [I]	Но	me [Esc]
			SMART Informati	ion Select	t Device				

An item can be selected/deselected by pressing SPACE when it is highlighted. A desired item is selected when it shows "[X]" preceding it. In order to continue, the user has to press ENTER on the button Confirm. As a result, the system will show the SMART Information, as illustrated in the next figure.

LENO	JO Diagnostics	5 UEFI			T	'ime 20:50 - Version 04.08.0
SMART INFORMATION TOOL						
		Displays	SMART at	tributes and	its values	
TD	Name		Ualue	Threshold	Raw Ualue	Hex Raw
1	Read Error Rate		100	0	0	0
2	Throughput Performance		100	50	0	0
3	Spin-Up Time		100	50	0	0
5	Reallocated Sectors Count		100	50	0	0
7	Seek Error Rate		100	50	0	0
8	Seek Time Performance		100	50	0	0
9	Power-On Hours		100	0	5296	<b>14B</b> 0
10	Spin Retry Count		100	50	0	0
12	Power Cycle Count		100	0	1735	607
167	Unknown		100	0	0	0
168	Unknown		100	0	0	0
169	Unknown		100	10	100	64
170	170 Available Reserved Space		100	10	0	0
Refresh [R] Export SMART Information [F2]						
Nav ig	Navigation [Arrows] Enter		[Space]	S	croll [Page	Up/Down] Home [Esc.
SMART Information screen						

# **Exit Application**

To exit the application, the user must select the option "Exit" on the Home screen and press the ENTER key. Then, the interface will be closed and the machine will be reset.

# About

### Lenovo Diagnostics for UEFI

### 04.08.000

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