

Intel® Rapid Storage Technology (Intel® RST) 15.9.8.1050 Production Version Release

8 August 2019

DISCLAIMER: Information in this document is provided in connection with Intel products. No license, express or implied, by estoppels or otherwise, to any intellectual property rights is granted by this document. Except as provided in Intel's Terms and Conditions of Sale for such products, Intel assumes no liability whatsoever, and Intel disclaims any express or implied warranty relating to sale and/or use of Intel products, including liability or warranties relating to fitness for a particular purpose, merchantability or infringement of any patent, copyright or other intellectual property right. Intel products are not intended for use in medical, lifesaving, or life-sustaining applications.

Intel may make changes to specifications and product descriptions at any time, without notice.

Contact your local Intel sales office or your distributor to obtain the latest specifications before placing your product order.

* Other names and brands may be claimed as the property of others.
Copyright © Intel Corporation 2000-2019

Supported Operating Systems[#]

Microsoft Windows 7*^{1 2}

Microsoft Windows 7 x64 Edition*²

Microsoft Windows 8.1*^{1 2}

Microsoft Windows 8.1 x64 Edition*²

Microsoft Windows 10*¹

Microsoft Windows 10 x64*³

Microsoft Windows Server 2016 x64 Edition*

1 - These OS versions pass validation testing, but are not WHQL certified.

2 - These OS versions are supported only on SKL platform and not supported on any future platforms starting KBL.

3 - This is WHQL certified against latest Windows 10 OS.

- *The OS support list referred here is a high-level OS support list for this release. However support varies by platform. Please refer the platform POR for the respective platform OS support.*

Revision History

Date	Driver Revision	Build Number
8 August 2019	15.9.8.1050 PV Release	1050
13 March 2019	15.9.6.1044 PV Release	1044
19 October 2018	15.9.4.1041.1 PV Release	1041.1
25 April 2018	15.9.4.1041 PV Release	1041
28 March 2018	15.9.2.1040 PV Release	1040
24 Nov 2017	15.9.0.1015 PV Release	1015
23 Oct 2017	15.9.0.1015 PC Release	1015
30 Sept 2017	15.9.0.1013 Release	1013
15 Sept 2017	15.9.0.1011 Release	1011
25 August 2017	15.9.0.1007 Release	1007
18 August 2017	15.9.0.1002 Release	1002

Notes:

1. Known Issue is defined as a potential Intel® RST issue that has been replicated internally by the Intel® RST team but has not been root caused to be an Intel® RST defect.
2. The driver and user interface version is 15.9.8.1050 and RAID OROM & UEFI version for this release is 15.9.3.3408. For Intel® RST Premium features (e.g. RAID, Intel® Optane™ memory, CPU Attached Storage), it is recommended that both the Intel® RST pre-OS and Intel® RST OS driver components are updated. Please contact your CE for further details.
3. If RTD3 is enabled, Windows can turn off disk for very short time (e.g. 20ms). The minimum off time for some disks can be much longer (even 1s). If the disk is turned on too fast, it can hang in some undefined state. RTD3 should be disabled if the disk specification states longer minimum off time.
4. **Security update:** Intel® RST 15.9.8.1050 and later has been updated to include functional and security updates. Users should update to the latest Intel® RST version.
 - Configuration Impacted: Intel® Optane™ Memory volume – 32 GB and higher.

Supported Hardware

SKUs shown below with (A) symbol supports AHCI mode only

SKUs shown below with (O) symbol supports both AHCI and Optane™ modes only

Chipset Name	Platform	SKU details	
Intel® 200 Series Chipset Family	Coffee Lake (CFL-S) Desktop SKU KBP-H	<ul style="list-style-type: none"> · Z370 	
Intel® 8th Generation Core Processor Family Platform I/O SATA AHCI/RAID Controller	Kaby Lake-Refresh (KBL-R) SPT PCH-LP (Mobile-LP)	<ul style="list-style-type: none"> · Base-U (A) · Premium · Premium-Y 	
Intel® 200 Series Chipset Family	Kaby Lake S Desktop SKUs KPT-H	<ul style="list-style-type: none"> · Q250 (O) · B250 (O) · Z270 	<ul style="list-style-type: none"> · H270 · Q270 · C236** · X299 #
Intel® 7th Generation Core Processor Family Platform I/O SATA AHCI/RAID Controller	Kaby Lake SPT PCH-LP (Mobile-LP)	<ul style="list-style-type: none"> · Base-U (A) · Premium-U · Premium-Y 	
Intel® 100/C230 Series Chipset Family	Kaby Lake Halo SPT PCH-H (Mobile/Mobile WS)	<ul style="list-style-type: none"> · HM175 · QM175 · CM238 	
N – 1 (No Intel® Optane™ Memory Support)			
Intel® 100/C230 Series Chipset Family	Skylake SPT PCH-H (Desktop/WS)	<ul style="list-style-type: none"> · H110 (A) · Q150 (A) · B150 (A) · Z170 	<ul style="list-style-type: none"> · H170 · Q170 · C236
Intel® 100/C230 Series Chipset Family	Skylake Halo SPT-H (Mobile/Mobile WS)	<ul style="list-style-type: none"> · HM170/HM175 · QM170/QM175 · CM236/CM238 	
Intel® 6th Generation Core Processor Family Platform I/O SATA AHCI/RAID Controller	Skylake SPT PCH-LP (Mobile)	<ul style="list-style-type: none"> · Base-U (A) · Premium-U · Premium-Y 	

** Greenlow-R support

Supports SKL-X and KBL-X processors

Resolved Issues

Resolved Issues In 15.9.8.1050 Production Version Release

ID	Title	Operating System
N/A	Refer notes section for Security Update	N/A

Resolved Issues In 15.9.4.1041.1 Production Version Release

ID	Title	Operating System
PSIRT-TA-201810-009	Intel® RST Installer Advisory Doc ID 604541	N/A

Resolved Issues In 15.9.4.1041 Production Version Release

ID	Title	Operating System
1805544813	Upgrade without reboot and enter S4	windows.10_rs2.x64
1805547725	DPC_WATCHDOG_VIOLATION (133) in PortStateMachine::delay on resetbus	windows.10_rs2.x64
1805475274	0x9F_3_IMAGE_iaStorA.sys. Power Srb not completed due to Ahci Port reenumeration or channel setup failed.	windows.10_rs2.x64
2201992335	Stuck during boot while parsing the legacy version table of the preboot driver	windows.10_rs2.x64
1805901093	Bit Locker hardware encryption does not work	windows.10_rs2.x64
1805109997	ATTO Disk Benchmark freezes on 3xHDD RAID5 with Write back cache	windows.10_rs2.x64
1805868136	HDD Abnormal Power off with Optane When entry DS3/non-hybrid S3	windows.10_rs3.x64
1805837451	BSOD after optane separation: SYSTEM_THREAD_EXCEPTION_NOT_HANDLED (7e)	windows.10_rs3.x64
1804279130	30-second timeout , AtaDevice::startIo() will cause BSOD 0x133	windows.8_1.x64
1805745314	Data corruption after manually initiated bugcheck when page file is moved to different volume than BOOT VOLUME	windows.10_rs2.x64
1806014406	Installation on windows7 fail with driver name change	windows.7.x64

Resolved Issues In 15.9.2.1040 Production Version Release

ID	Title	Operating System
1805109997	ATTO Disk Benchmark froze on 3xHDD RAID5 configuration with write back cache on	windows.10_rs2.x64
1805749866	Intel® RST RAID5 issue when volume is created using one of the ports from SATA port 0-5 and SATA ports 6,7	windows.10_rs3.x64
1805880640	Enable Intel® Optane™ Memory in OS and system BSOD occurs after first time reboot. (0x7B)	windows.10_rs3.x64
1805836528	Waking up from S3/S4/S5 is resulting in Bug Check 1A) with 2x NVMe SSD(2TB) as DATA drives (Intel® RST Controlled)	windows.10_rs3.x64
1805739643	Incorrect verbiage in Readme File of Intel® RST installer	All OS
1805760255	iaStorAfs Service (Intel® Optane™ Memory service) is not running automatically with Optane enabled using Intel® Optane™ UI	windows.10_rs3.x64
1805841055	BSOD 0x154 when perform s4 stress with HDD	windows.10_rs3.x64
1805747309	NvmePassthrough VendorSpecific commands are blocked by driver	windows.10_rs3.x64
1805545189	Size of the drive is different in UI and in disk manager after enabling Intel® Optane™ Memory.	
1805625510	System encounters "C1" BSOD when running certain tools	windows.7.x64
1805751867	Low performance on CFL platform after running storage stress test	windows.10_rs2.x64
1805490090	" Intel® Optane™ Memory " tab is seen in Intel® RST UI even when Intel® Optane™ device is not connected to the system	windows.10_rs2.x64
1804926443	System hangs when run S4 stress test with pwrtest.exe	windows.10_rs1.x64
1805544813	BSOD 0xA0 [HIBERSTACK_INIT_FAILED] happens when driver is upgraded without reboot and enter S4	

1805490063	Intel® Optane™ Memory PCMV HDD cycles test score is low around 50K in cache full (~100%) condition	
------------	--	--

Resolved Issues In 15.9.0.1051 Production Version Release

ID	Title	Operating System
1805544813	BSOD with Bugcheck 0xA0 (HIBERSTACK_INIT_FAILED) when driver is upgraded without reboot and enters S4.	
1805739643	Incorrect verbiage in Intel® RST installer in Readme File Information window	
1805565098	Bugcheck PAGE_FAULT_IN_NONPAGED_AREA (50) on disabling SATA AHCI Controller in AHCI mode	
1504378391	ODD lost after installing Intel® RST driver	
1805531738	BSOD 0xD1 (DRIVER_IRQL_NOT_LESS_OR_EQUAL) during S4 stress testing	windows.10_rs2.x64
1805531747	BSOD 0x154 UNEXPECTED_STORE_EXCEPTION during S4 stress testing	windows.10_rs2.x64
1805436606	When IRRT volume is created, it is shown as RAID 1 volume instead of Intel Recovery Volume.	windows.10_rs2.x64
1805524181	Bugcheckpoints to Intel® RST driver when VTIO support is enabled in Bios	

Resolved Issues In 15.9.0.1013 Production Version Release

ID	Title	Operating System
1805161214	Unable to enable Intel® Optane™ Memory when 2 or more RAID data volumes exist on the system	windows.10_rs2.x64
1805499844	Intel® Optane™ Memory application ran into a problem after closing tray icon notification	windows.10_rs2.x64
1805494907	System will BSOD after finishing Win10 RS3 OS installation on NVMe drive.	windows.10_rs2.x64
1805480543	BSOD "0xD1" occurred when system resumes from S3	windows.10_rs2.x64
1805463515	Asserts/bugcheck on disabling Intel® Chipset SATA/PCIe RST Premium Controller	windows.10_rs2.x64

1805474013	Inaccessible boot device BSOD after creating Raid5 volume and going through Safe Mode	windows.10_rs3.x64
1805476772	Shrinking OEM partition does not work when some gpt attributes are set.	
1805490634	[RAID0 NVMe] Low scores when PCMarkVantage is run	windows.10_rs1.x64
1805478480	Service is disabled after creating NGS in WinPE using slow drive without partitions	

Resolved Issues In 15.9.0.1011 Beta Release

ID	Title	Operating System
1804732076	BSOD 0xD1 during S4 exit	windows.10_rs1.x64
1504547298	Connected Standby BSOD - Drive compatibility issue with Intel® RST 15.7	windows.10_rs2.x64
1805111358	RAID0 NVMe Seq read Q32T1 bandwidth is lower than single drive	windows.10_rs1.x64
1804342366	OS does not run smoothly for about one minute after resume from S3.	windows.10_th.x64
1805303808	BSOD during S3/S4 cycling with a bug check 0xEF (CRITICAL_PROCESS_DIED)	windows.10_rs2.x64
1805289807	S3 long run will show Black screen (BSOD_0xD1_DRIVER_IRQL_NOT_LESS_OR_EQUAL)	windows.10_rs2.x64
1804926545	OS freezes in IOmeter with MSI-X MessageNumberLimit = 1	windows.10_rs1.x64
1805284752	Black screen appears without backlight when run S4 and dump bugcheck 'D1' points to iaStorA.sys	windows.10_rs2.x64
1805297251	SLP-S0 residency is <90% when RTD3 support is disabled and Intel® Optane™ volume is enabled	windows.10_rs2.x64
1804734666	SATA device lost after loading Intel® RST f6 driver from SATA ODD during win7/win10 installation, its causes OS install to fail.	windows.10_rs1.x64
1804669082	ODD missing after offline ejection during manufacturing process	windows.10_rs1.x64

1805178399	BSOD occurred when running System - Sleep and PNP (disable and enable) with IO using Realtek Cartier ac 2x2 card.	windows.7.x64
1805171623	Incomplete NVMe SSD brand name in device manager	
1805246045	Error 0xA007000B during enabling and disabling Intel® Optane™ Memory	windows.10_x64
1805168878	F6 driver issue (ports 6,7) using RST 15.7.1.1015	windows.10_rs2.x64
1805118237	In the system report, the type of Intel® Optane™ Memory Volume is displayed as "Unknown".	windows.10_rs2.x64
1805109668	SATA DevSLP sometimes does not assert or takes too long to assert blocking SLP_S0#	windows.10_rs2.x64

Known Issues

Known Issues In 15.9.6.1044 Production Version Release

ID	Title	Operating System
1604306111	Unexpected_Kernel_Mode_Trap BSOD is observed during Shrink of Disk Partition (C:) drive after enable Intel® Optane™ Memory before Restart the SUT	windows.10_rs1.x64
1805815700	Sporadically restart option not showing, After enabling/disabling Intel® Optane™ Memory with one click	windows.10_rs3.x64
1807075852	L10N Chinese Traditional OS Intel® Rapid Storage driver not translate into target language	windows.10_rs5.x64
1805667095	Cannot open Intel® RST UI sporadically when certain HDD's are plugged into the system	windows.10_rs2.x64
1805625734	Bug check D1 observed during S3 cycling	windows.10_rs3.x64
1805529543	Very Sporadic "IAStorUI Stopped working" error message appears when Intel® RST UI kept Open while performing manual S3 cycles	windows.10_rs3.x64
1805522991	ADK Shutdown Duration score can't meet spec	windows.10_rs2.x64
1805501315	Cannot install Win10 rs2 on NVMe SSD in Intel® RST mode	windows.10_rs2.x64

1805491379	SUT is not Booting to OS when Password is enabled on Primary HDD with SB2 as Secondary NVME.	windows.10_rs3.x64
1805490090	" Intel® Optane™ Memory " tab is seen in Intel® RST UI even when Intel® Optane™ device is not connected to the system	windows.10_rs2.x64
1805490063	Intel® Optane™ Memory PCMV HDD cycles test score is low around 50K in cache full (~100%) condition	windows.10_rs2.x64
1805490049	Intel® RST UI crashes after system wakes from HybridS3 or Deep S4 or Hibernate, only if Intel® RST UI application was open earlier.	windows.10_rs3.x64
1805482707	SUT is not booting to OS after enabling Hyper-V option.	windows.10_rs3.x64
1805480515	Windows is not detecting Intel® Optane™ drive after disruptive power off during disabling process	windows.10_rs2.x64
1805475125	Legacy Intel® RST OROM does not load on CFL platform, when enabling CSM and "Use legacy OROM" option in SATA configuration	windows.10_rs2.x64
1805473462	After installing Intel® RST driver using Setup.exe -notray -s method system tray icon cannot be turned on using IRST UI.	windows.10_rs2.x64
1805464013	Error event log ID7000/ID7009 (iaStorAfsService) show up after PBR reset/refresh.	windows.10_rs2.x64
1805161226	HDD/SSD password and Volume status.	windows.10_rs1.x64
1805116821	Unexpected page shows up and it would not be go back to previous page when press "ESC".	windows.10_rs2.x64

Terminology

Common Terms and Acronyms	Definition
AEN	Asynchronous Event Notification
AHCI	Advanced Host Controller Interface
ATA	Advanced Technology Attachment
ATAPI	Advanced Technology Attachment Packet Interface

BIOS	Basic Input / Output System						
BUS PROTOCOL GROUP	<p>A bus protocol group represents a set of bus protocols with similar performance characteristics. Bus Protocol Groups are listed here in descending order of speed:</p> <p>1- PCIe* 2- SATA</p>						
Chipset	A term used to define a collection of The PNHCI components required to make a PC function.						
CSMI	OEM Common Storage Management Interface for reporting RAID configurations and SMP, SSP, STP pass through.						
DEVSLP	Serial ATA Device Sleep						
DMA	Direct Memory Access						
DOS	Disk Operating System						
DIPM	Device Initiated Power Management						
Disk's Write Cache	A memory device within a hard drive, which is allocated for the temporary storage of data before that data is copied to its permanent storage location.						
GB	Giga-byte = 1024^3 bytes						
HDD	Hard Disk Drive						
HIPM	Host Initiated Power Management						
Hot Plug	A term used to describe the removal or insertion of a SATA disk while the system is powered on.						
ICH	Input / Output Controller Hub						
InstantGo*	Microsoft Windows* 8.1 connected standby low-power state that features extremely low power consumption while maintaining Internet connectivity.						
KB	Kilo-byte = 1024bytes						
LPM	Link Power Management						
M.2	Specification for internally mounted computer expansion cards and associated connectors. It replaces the mSATA standard. Formerly known as the Next Generation Form Factor (NGFF)						
MB	Mega-bytes = 1024^2 bytes						
MEMORY GROUP	<p>A memory group represents a set of backend storage media types with similar performance characteristics. Memory Groups are listed here in ascending order of speed:</p> <table border="0"> <tr> <td>1- SpindleDevice(HDD)</td> <td>4- PCIe* NAND Device (SSD)</td> </tr> <tr> <td>2- NAND Spindle Hybrid Device</td> <td>5- PCIe* NAND Device (SXP)</td> </tr> <tr> <td>3- PCH SATA NAND Device (SSD)</td> <td></td> </tr> </table>	1- SpindleDevice(HDD)	4- PCIe* NAND Device (SSD)	2- NAND Spindle Hybrid Device	5- PCIe* NAND Device (SXP)	3- PCH SATA NAND Device (SSD)	
1- SpindleDevice(HDD)	4- PCIe* NAND Device (SSD)						
2- NAND Spindle Hybrid Device	5- PCIe* NAND Device (SXP)						
3- PCH SATA NAND Device (SSD)							
mSATA	Computer bus interface that connects host bus adapters to mass storage devices such as hard disk drives and optical drives. Uses PCI Express Mini Card-like connector that is electrically SATA.						
NAI	Notification Area Icon						
NTFS	NT File System						
NVC	Non-Volatile Cache						
NVMe*	Non-Volatile Memory Express: Non-Volatile Memory Host Controller Interface Specification (NVMHCI), is a specification for accessing solid-state drives (SSDs) attached through the PCI Express (PCIe*) bus						

OEM	Original Equipment Manufacturer
ODD	Optical Disk Drive
OROM	Option ROM
OS	Operating System
PCH	Platform Controller Hub
PCIe*	PCI Express (Peripheral Component Interconnect Express): is a high-speed serial computer expansion bus standard
Port	The point at which a SATA drive physically connects to the SATA controller.
PRD	Product Requirements Document
PUIS	Power Up In Standby - Drive feature that allows a spindle device to be powered up in standby mode without spinning the disk up.
RAID	Redundant Array of Independent Disks Matrix RAID: A configuration supporting two RAID levels by having two volumes in a single RAID array that use Intel® RST
RTD3	Runtime D3
RS2	Redstone2
SATA	Serial ATA
SIPM	Software Initiated Power Management
S.M.A.R.T.	Self-Monitoring, Analysis and Reporting Technology: an open standard for developing hard drives and software systems that automatically monitors a hard drive's health and reports potential problems.
SED	Self-Encrypting Drive
SRT (EOL)	Intel® Smart Response Technology. Intel® RST's premium feature to use caching technology that enables caching of a device or volume using a faster device. Note: This feature has EOL'd and is no longer supported beginning with the Intel(R) RST 16.0 product line
SSD	Solid State Drive – non volatile memory used as storage media
SSHD	Solid-State Hybrid Drive
TB	Tera-byte = 1024 ⁴ bytes
UEFI	UEFI pre-OS driver
UI	User Interface
VC	Validation Candidate
ZPODD	Zero Power Optical Disk Drive