



Intel® Rapid Storage Technology (Intel® RST) 21.0.0.1033.2 Release

25 November 2025

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Revision History

Date	Driver Revision	Build Number
11 Mar 2025	21.0.0.1013.0 Release	1013
9 Apr 2025	21.0.0.1015.3 Release	1015
15 May 2025	21.0.0.1017.0 Release	1017
25 Jun 2025	21.0.0.1020.0 Release	1020
8 Jul 2025	21.0.0.1024.0 Release	1024
7 Aug 2025	21.0.0.1027.0 Release	1027
26 Aug 2025	21.0.0.1029.2 Release	1029
7 Oct 2025	21.0.0.1030.2 Release	1030
25 Nov 2025	21.0.0.1033.2 Release	1033

1 Release Kit Summary

Intel® RST Components

The Intel® Rapid Storage Technology Suite contains these core components:

- Intel® Rapid Storage Technology BIOS components (Intel® RST Pre-OS Driver)
 - Intel® RST Windows* OS runtime software package (Intel® RST OS Driver)
 - Intel® RST Graphical User Interface
 - Intel® RST OEM/ODM-Only Manufacturing support tools
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Release Kit Details

Kit Release	RST_PV_21.0.0.1033.2
Target Platform	PTL-H12Xe/H484/H404
Contents	• RAID OROM & UEFI version 21.0.0.5883 • Driver and user interface version are 21.0.0.1033.2 • Intel® Rapid Storage Technology Management (HSA) driver version 21.0.1018

2 General Information

2.1 Important Notes

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.

The RAID OROM & UEFI version for this release is 21.0.0.5883, the driver and user interface version are 21.0.0.1033.2 and Intel® Optane™ Memory and Storage Management (HSA) driver version 21.0.1018 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.

2.2 Intended Audience

This document is targeted for the following audience under proper Intel NDA guidelines and thus can be shared amongst the following provided they have proper NDA in place (for example, an OEM can share with an ODM that has Intel NDA in place):

- OEMs (Original Equipment Manufacturers)
- ODMs (Original Design Manufacturers)
- IHVs (Independent Hardware Vendors)
- ISVs (Independent Software Vendors)
- IBVs (Independent BIOS Vendors)
- SIs (System Integrators)

2.3 Supported OS

OS Version	OS POR Platforms
Microsoft Windows 11 x64* 24H2	PTL-H12Xe/H484/H404
Microsoft Windows 11 x64* 25H2	PTL-H12Xe/H484/H404

3 Features Added



Implemented Features in 21.0.0.1024

ID	Title	Operating System	Component
18042659214	[TSE] DUMP_INFO_V1 support	Windows*11	Driver
18042631558	[TSE][HLK] Set alignment mask back to `FILE_LONG_ALIGNMENT`	Windows*11	Driver
18042501578	[DLRM] DlrM State does not change when working in best performance power plan	Windows*11	Driver

Implemented Features in 21.0.0.1020

ID	Title	Operating System	Component
13012671906	[RCR][ARL]Add option to check DLRM status with CLI	Windows*11	Driver
18042003824	[HSA][Cli][TSE] disk with TSE encrypted partition can be marked as spare	Windows*11	Driver
18042182892	[PTL] Encryption is not finishing on data drive	Windows*11	Driver
18041588458	RST UEFI driver should display warning at RAID volume creation process.		PreOS
18042180849	Create new utest architecture to avoid problems with build system errors.		PreOS
18042059515	[PTL] RST UEFI to set INTMS register for NVMe device.		PreOS
18042095370	[PTL] EFI_BLOCK_IO_CRYPTO_PROTOCOL ReadExtended and WriteExtended return EFI_UNSUPPORTED when incorrect crypto iv input is provided		PreOS

Implemented Features in 21.0.0.1017

ID	Title	Operating System	Component
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18041760324	[PERF][DLRM][PTL-H] Difference between DLRM "ON" and "OFF" state on RAID1 volume [DD] in AC power mode and Balanced power plan is higher than 7%	Windows*11	Driver
18041481922	RST DLRM improvement	Windows*11	Driver
13013038369	[RCR] STOR_FEATURE_DUMP_INFO feature implementation	Windows*11	Driver
18041472343	Implementation of "Increase Maximum Transfer Length to 2MB."	Windows*11	Driver
18037928728	[PreOS] Incorrect port numbering in RST HII menu.		PreOS

Implemented Feature in 21.0.0.1015

ID	Title	Operating System	Component
18041576686	[RCR] RST HSA/CLI tools shall block RAID creation when NVME drive has partition encrypted by Bitlocker using TSE	Windows*11	MW/HSA

Implemented Feature in 21.0.0.1013

ID	Title	Operating System	Component
13012671767	[DLRM] Dynamic Link Rate Management improvement	Windows*11	Driver
18041374364	[RCR] RST VMD OS driver shall support TSE for NVME passthrough drives		

4 Features Changed/Modified

Driver Features Changed/Modified in 21.0.0.1033.2 with 25H2 and 24H2 signed



ID	Title	Operating System	Component
18043546284	RSTCLI can still enable RAID from a TSE-encrypted SSD	Windows*11	Driver
18043591579	Fix intel copyright strings in Infs files.	Windows*11	Driver
18043535055	Update RST driver to EWDK 26100.6584	Windows*11	Driver
18043725422	Bugcheck D1 caused by memory violation.	Windows*11	Driver

Driver Features Changed/Modified in 21.0.0.1030.2 with 25H2, 24H2, and SV2 signed

ID	Title	Operating System	Component
18042849416	[21.0][PTL] Intel VMD controller not found under mapped devices		PreOS
18043267749	[RST][UEFI] Intel VMD Device Info UEFI variable is too large.		PreOS
18043107095	[20.2] [MTL-P] [NVMe] [BSOD] DPC_WATCHDOG_VIOLATION (133) [0x133_DPC_iaStorVD!unknown_function] during ModernStandby	Windows*11	Driver
18042910404	[Survivability IOCTL] Power state ioctl does not return proper state	Windows*11	Driver
18043332365	Update RST 21.0 to EWDK 26200.5074	Windows*11	Driver

Driver Features Changed/Modified in 21.0.0.1029

ID	Title	Operating System	Component
18043087822	[21.0][PTL-H][RAID1 OS][BSOD] DRIVER_POWER_STATE_FAILURE (9f) during S4	Windows*11	Driver

Driver Features Changed/Modified in 21.0.0.1027			
ID	Title	Operating System	Component
18042414648	EWDK 25H2 update for RST 21.0	Windows*11	Driver
18042824936	[TSE] Fix false-positive incorrect alignment assert	Windows*11	Driver
18041464365	[PERF][RSTvsMSFTI][PTL-H] RST results from CDM7 tool are worse than Msft results for more than 10% for RND 4KiB (Q32,T16) workloads	Windows*11	Driver
13013476380	[PTL][VMD][NCU][iVTU][IOC] Sporadic Lost MSI for VMD mapped device when VTd PI and Cluster1 C6 are enabled -> VMD arch bug -> RST WA	Windows*11	Driver
18023790387	[MTL-S] Change hardcoded value of bus number for Root Bus 1 to a value read from VMD register.		PreOS
18042633071	[PTL] Flush Blocks returns EFI_SUCCESS, when it should be: EFI_MEDIA_CHANGED		PreOS
18042462685	Incorrect IoAlign value reported by EFI_BLOCK_IO_PROTOCOL instance.		PreOS

Driver Features Changed/Modified in 21.0.0.1024			
ID	Title	Operating System	Component
18041900140	[MTL] BSOD 154 due to OS abnormal power transition	Windows*11	Driver
18042536492	RST UEFI driver should not check memory type assigned by BIOS at MEMBAR registers.		PreOS
18041483745	[L10n][HSA][Installer] Aggregated localization fixes		HSA/Installer

Driver Features Changed/Modified in 21.0.0.1020			
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ID	Title	Operating System	Component
18041725948	Set max NVMe Gen during transition from D3 to D0	Windows*11	Driver
18042272495	[HSA][Driver][MW][Installer]] Copyright notice change for OWR PreCheck - versionchk.md requirements changes	Windows*11	MW/Installer
18041402368	[PreOS] Driver cannot be loaded under UEFI shell.		PreOS
18042026335	PeimService.asm incorrect value		PreOS
18042026365	[RST WHQL] Failures during formatting and disappearing PT disk during DISKPART operations with Win11 SV2 (22631) and Win10 VB (19045) no reproduce on Win11 24H2 (26100)	Windows*11	Driver
18041900140	[MTL] BSOD 154 due to OS abnormal power transition	Windows*11	Driver

Driver Features Changed/Modified in 21.0.0.1017			
ID	Title	Operating System	Component
18040403457	ScsiUnitUsage shall be handled per volume not per unit	Windows*11	Driver
18041726069	[PTL] Bitlocker returned 2150694958 exit code during encryption	Windows*11	Driver
15017476641	Assign ISM thread affinity to non-zero P-cores only when CPU has 4 or more P-cores	Windows*11	Driver
18041235715	[AER_EVENTS][HSA] Smart events occurs only after MwService21 restart and unable to remove smart events from HSA	Windows*11	Driver
18041887826	[TSE] Driver reports incorrect alignment mask	Windows*11	Driver
18041478272	[PTL-H][A0][VMD][RST][BIOS] VMD devices are supporting and sending INTx during boot -> pre-os RST driver		PreOS

14023484738	[VMD] Incorrect Root Port configuration for MEMBAR2.		PreOS
18041835329	Observing delay on post code 10A7 while booting to BIOS.		PreOS
18041815151	[PTL] Reset block device fails		PreOS

Driver Features Changed/Modified in 21.0.0.1015

ID	Title	Operating System	Component
18041623131	[21.0] Impossible boot to WinPe with RST driver 21.0.0.1013 injected (DISM tool)	Windows*11	Driver
18041503380	After Enabling "Map RP BDF under VMD " for NVME, Reset From bios page is not working		PreOS
18041235715	[PTL][A0][CENTRAL][ES2][PCIE][VMD] FATAL\NONFATAL Error msg detected by RP when VMD enable & PCIe ASPM disable -> pre-os RST driver		PreOS
18041478272	[PTL-H][HSA][21.0] Can't open HSA UI when global mapping is disabled	Windows*11	HSA

Driver Features Changed/Modified in 21.0.0.1013

ID	Title	Operating System	Component
18040819555	[MW] RAID verification, inicialization, migration progress bar stops at 0%	Windows*11	MW
18041321608	[RST] Inf files update after introduction of new InfCompChk(OWR)	Windows*11	Driver
18040835119	[Win11][24H2][26100][CodeQL] 21.0 VMD driver project do not compile after solution name changing (necessary for CodeQL scans & reports)	Windows*11	Driver
18041502721	[21.0] Update RST 21 INFs with new HSA name in HSAComponent and HSAExtension	Windows*11	Driver



5 Features

Deprecated/Removed

Removed Feature in 21.0.0.1017			
ID	Title	Operating System	Component
18022034972	[21.0] [INF] Removal Intel RST VMD Managed Controller 09AB	Windows*11	HSA

Removed Feature in 21.0.0.1015			
ID	Title	Operating System	Component
18039537227	[CLI][OPTANE][NGSA] Remove Optane Support from CLI	Windows*11	Driver

Removed Feature in 21.0.0.1013			
ID	Title	Operating System	Component
13012671950	[21.0] Remove support for ADL & RPL & MTL& ARL system generations	Windows*11	Driver

6 Security Issues Fixed

21.0.0.1017 Security Issues Fixed

ID	Title	Operating System	Component
18041988998	[Security] Improve IOCTL to use private data buffer	Windows*11	Driver
18041704731	[PSIRT] Intel® Rapid Storage Technology Applications Privilege Escalation	Windows*11	HSA

7 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	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: 1- PCIe* 2- SATA
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



Common Terms and Acronyms	Definition
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.
HSA	Hardware Supported App
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	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: 1- Spindle Device (HDD) 2- NAND Spindle Hybrid Device 3- PCH SATA NAND Device (SSD) 4- PCIe* NAND Device (SSD) 5- PCIe* NAND Device (SXP)
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

Common Terms and Acronyms	Definition
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	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
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