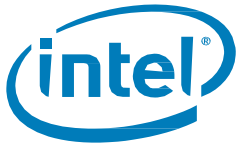


Intel® Solid State Drive Data Center Tool

Release Notes

August 2019

Software Version 3.0.20



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Tool Revision History

Revision	Date	Version	Description
034	August 2019	3.0.20	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <ul style="list-style-type: none"> Intel® SSD DC D3-P4326 Series products; latest firmware version 8DV10510 <p>This release includes the following feature changes:</p> <ul style="list-style-type: none"> Feature for saving telemetry binaries Updated support for Avago SAS 9400 and SAS 9440 <ul style="list-style-type: none"> NOTE: SUSE is currently a known limitation preventing usage of SAS cards on SUSE distros Fix missing '/' for config file path Default location of config file changed to 'etc/isdct/'
033	March 2019	3.0.19	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <ul style="list-style-type: none"> Intel® SSD DC S4510 Series M.2 products; latest firmware version XC311102 Intel® SSD DC S4510/S4610 Series products; latest firmware version XCV10110 Intel® Optane™ SSD P4800X/P4801X Series products; latest firmware version E2010435 Intel® SSD DC S4500/S4600 Series products; latest firmware version SCV10150
032	February 2019	3.0.18	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <ul style="list-style-type: none"> Intel® SSD DC P4510/P4610 Series products; latest firmware version VDV10152 Intel® SSD DC P4511 Series products; latest firmware version VDV10352 Intel® SSD DC D5-P4320 Series products; latest firmware version VDV10110 Intel® SSD DC P4101 Series products; latest firmware version HH006D



Revision	Date	Version	Description
031	December 2018	3.0.17	<p>This release includes the following feature changes:</p> <ul style="list-style-type: none"> • VSAN firmware update prompt added for ESXi version of tool. • Updated firmware upgrade mode for Intel® SSD DC S3710, S3610, and S3510 Series products. • Additional model strings for Intel® SSD DC P4510/P4610, S4510/S4610, and Optane™ SSD DC P4800X Series products added. • Installation is moved from “system” folder to “Program Files” • If 32-bit version is being installed over the 64-bit version or if the 64-bit version is being installed over the 32-bit version please uninstall the previous version of the tool. • Time out has been increased to accommodate larger capacity drives
030	October 2018	3.0.16	<p>This release includes the following feature changes:</p> <ul style="list-style-type: none"> • Updated firmware upgrade paths to FW E2010435 for Intel® Optane™ SSD DC P4800X Series products.
029	October 2018	3.0.15	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for: Intel® SSD DC S3110 Series products; latest firmware revision LHF002D.</p> <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none"> • This release added support for Intel® SSD DC P4101 Series. • New SKU support for Intel® Optane™ SSD DC P4800X Series products added. • Miscellaneous bug fixes.
028	August 2018	3.0.14	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <p>Intel® Optane™ SSD DC P4800X Series products; latest firmware revisions E2010435 (375GB & 750GB).</p> <p>Intel® SSD DC P4510/P4610/P4511 Series products; latest firmware revision VDV10131/VDV10140/VCV10301.</p> <p>Intel® SSD DC P4500/P4501 and P4600/P4601/P4608 Series products; latest firmware revision QDV101D1.</p> <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none"> • This release added support for Intel® SSD D5-P4320 & Intel® SSD D5-P4326 Series products. • This release added support for Intel® SSD D7-D4512 Series products. • Support for ESXi* 6.7 added. • Miscellaneous bug fixes.



Revision	Date	Version	Description
027	June 2018	3.0.13	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <p>Intel® SSD DC S4500/S4600 Series products; latest firmware revision SCV10142 (MR4).</p> <p>Intel® SSD DC D4502/D4600 Series products; latest firmware revision QDV10151.</p>
026	May 2018	3.0.12	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <p>Intel® Optane™ SSD DC P4800X Series products; latest firmware revisions E2010423.</p> <p>Intel® SSD DC P4510/P4610 Series products; latest firmware revision VDV10131.</p> <p>Intel® SSD DC P4500/P4501/D4502 and P4600/P4601/P4608/D4600 Series products; latest firmware revision QDV101B1.</p>
025	March 2018	3.0.11	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <p>Intel® SSD DC S4500/S4600 Series products; latest firmware revision SCV10121.</p> <p>Intel® SSD DC P3520 Series products; latest firmware revision MDV10290.</p> <p>Intel® SSD DC P4500/P4600 Series products; latest firmware revision QDV10190.</p>
024	February 2018	3.0.10	<p>Documentation correction.</p> <p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <p>Intel® SSD DC P4500/P4600 Series products; latest firmware revision QDV10170.</p>



Revision	Date	Version	Description
023	February 2018	3.0.10	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for:</p> <ul style="list-style-type: none">Intel® SSD DC S4500/S4600 Series products; latest firmware revision SCV10111.Intel® SSD DC P4500/P4600 Series products; latest firmware revision QDV10190.Intel® SSD DC P4510/P4610 Series products; latest firmware revision VDV10120.Intel® Optane™ SSD DC P4800X Series products; latest firmware revisions E2010324 (375GB) and E2010325 (750GB). <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none">• This release added support to Intel® SSD DC D4800X Series products• The dump event log command has no issues.• Miscellaneous bug fixes.
022	October 2017	3.0.9	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for the Intel® SSD DC P4500 Series and DC P4600 Series products. The latest firmware revision is QDV10150. The latest bootloader is QB1B0110.</p>
021	September 2017	3.0.7	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for the Intel® SSD DC S3520 Series products. The latest firmware revision is N2010121.</p> <p>This release of the Intel SSD Data Center Tool also includes enhancements to the syntax including new ability to select a drive based off of the physical drive path. All details have been documented in the User Guide</p> <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none">• Bug fixed which left off "Series" at the end of some SSD DC P4600.
020	July 2017	3.0.6	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for the Intel® SSD DC P4500/4600 Series products. The latest firmware revision is QDV10130. The latest bootloader is QB1B0100.</p>



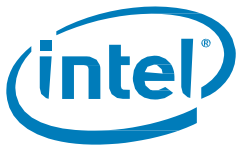
Revision	Date	Version	Description
019	June 2017	3.0.5	<p>This release of the Intel® SSD Data Center Tool includes a firmware update for the Intel® SSD DC P3100 Series products. The latest firmware revision is PSF119D. The latest bootloader is PSL038H1PB. This release of the tool also includes a firmware update for the Intel® SSD DC S3100 Series products. The latest firmware revision is LSF041D.</p> <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none"> • End of Life Notification enhanced for 15% spare left • Added support for the Intel® SSD DC P4500/P4600 drive – nvme log option • Added support for IOCTL NVMe* format command passthrough • Support for firmware update for Intel® SSD DC P3100 Series and DC S3100 Series • Updated Power Governor Mode parsing for Intel SSD DC P4500 and DC P4600 Series • Updated NVMe SMART Attribute F4/F5 reporting in Bytes written • Updated display of the firmwareupdateavailable property • NVME 1.2 Specification support for the Async Event Configuration get feature command • Updated support for Intel® Solid State Drive 600s, Pro 6000s, and E 6000 Series drives with Intel® RST driver
018	May 2017	3.0.4	<p>This release of the Intel SSD Data Center Tool includes product detection for the Intel SSD DC P4500 and P4600 Series products.</p>
017	April 2017	3.0.4	<p>This release of the Intel SSD Data Center Tool includes product detection for the Intel® SSD DC S3520, and Intel® Optane™ SSD DC P4800X Series products.</p> <p>This release of the tool also includes a firmware update for the Intel® SSD DC P3520 Series product. The latest firmware revision is MDV10271. The latest bootloader is MB1B0105.</p> <p>This release of the tool also includes the first firmware update for the Intel® SSD DC S3520 Series product. The firmware revision is N2010112.</p> <p>Added Windows 10 Inbox driver support</p> <p>Added fixes to some known compatibility issues with LSI* Mega RAID adapters</p>



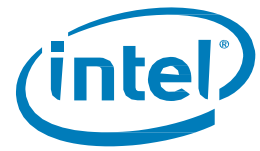
Revision	Date	Version	Description
016	February 2017	3.0.3	<p>This release of the Intel SSD Data Center Tool includes a firmware update for the Intel® SSD DC D3700, DC D3600, DC P3700, DC P3600, DC P3608, and DC P3500 Series products. The latest firmware revision is 8DV101H0. The latest bootloader revision is 8B1B0133.</p> <p>This release of the tool also includes a firmware update for the Intel® SSD DC S3710 and DC S3610 Series products. The latest firmware revision is G2010160.</p> <p>Additionally, this release also includes the following feature changes:</p> <ul style="list-style-type: none"> • Optimization to timeout during NVMe format feature • Fixes to delete feature – corrected SATA behavior not performing the delete and the NVMe behavior of not checking if drive has partitions. • Added compatibility with Linux Kernel 4.7 and on. • Various additional bug fixes
015	August 2016	3.0.2	<p>This release of the Intel SSD Data Center Tool includes enhancements to the log pages with additional support for NVMe IO queue metrics. All details have been documented in the User Guide.</p> <p>This release of the tool also includes a firmware and bootloader update for the Intel® SSD DC P3700, DC P3600, DC P3608, and DC P3500 Series products. The latest firmware revision is 8DV101F0. The latest bootloader revision is 8B1B0133</p> <p>There is a firmware update available for the Intel® SSD DC S3100 Series products. This release of the Intel® SSD Data Center Tool will detect if user's drive is eligible for the firmware update and directs them to use the Intel® SSD Firmware Update Tool.</p> <p>The latest firmware revision is 036D.</p>
014	April 2016	3.0.0	<p>Documentation Update only</p> <p>This release of the Intel SSD Data Center Tool includes support for the Intel® SSD DC S3100, DC P3320, DC D3700 and DC D3600 Series products.</p>
013	March 2016	3.0.0	<p>This release of the Intel SSD Data Center Tool includes support for ESXi 5.5 and 6.0 as well as enhancements to the syntax including new/modified Targets and Properties. All details have been documented in the User Guide.</p> <p>This release of the tool also includes a firmware update for the Intel® SSD DC S3700, DC S3500, DC S3710, DC S3610 and DC S3510 Series products.</p> <p>For the Intel SSD DC S3700 Series, the latest firmware revision is 5DV12270.</p> <p>For the Intel SSD DC S3500 M.2 and DC S3500 HD Series, the latest firmware revision is G2010150.</p> <p>For the Intel SSD DC S3500 Series, the latest firmware revision is D2012370.</p> <p>For the Intel SSD DC S3710, DC S3610 and DC S3510 Series, the latest firmware revision is G2010150.</p>



Revision	Date	Version	Description
012 011	December 2015	2.3.1	<p>The release of tool version 2.3.1 includes a firmware update for the Intel® SSD DC P3500 Series products. The latest firmware revision is 8DV10174. The latest bootloader revision is 8B1B0131 (no change). The tool also includes a firmware update for the Intel® SSD 750 Series products. The latest firmware revision is 8EV10174. The latest bootloader revision is 8B1B0131 (no change).</p> <p>Additionally this tool version includes the following feature changes:</p> <ul style="list-style-type: none"> • Power governor mode modified to update both drives in Intel® SSD DC P3608 Series products. • Enabled RSTe* 4.3 NVMe RAID support <p>Known compatibility issues with RAID volume configurations using RST version 13.2+.</p>
010	October 2015	2.3.0	<p>Update to documentation - The release of tool version 2.3.0 also includes a firmware and bootloader update for the Intel® SSD 750 Series products. The latest firmware revision is 8EV10171. The latest bootloader revision is 8B1B0131.</p> <p>Additionally this tool version fixes the following bug:</p> <ul style="list-style-type: none"> • MR4 Firmware requires NSID to be set to 0xFFFFFFFF when getting log page 0x2. DCT 2.3.0 properly sets the NSID.
009	September 2015	2.3.0	<p>The release of tool version 2.3.0 adds support for the Intel® Solid State Drive Data Center (Intel® SSD DC) P3608 Series. It also includes a firmware and bootloader update for the Intel® SSD DC P3700, P3600 and P3500 Series products. The latest firmware revision is 8DV10171. The latest bootloader revision is 8B1B0131.</p> <p>Additionally this tool version includes the following features for PCIe* and SATA devices:</p> <ul style="list-style-type: none"> • Added functionality to Enable/Disable Latency Tracking • Added functionality to Parse the read and write commands from Latency Tracking logs • Added functionality to read and/or modify the SM Bus Address for Intel® NVMe SSD Devices only • Updated Power Governor settings to add support for new Intel® SSD Product SKUs
008	August 2015	2.2.4	<p>This version adds a new firmware update for the Intel® SSD DC S3710, DC S3610, DC S3510, DC S3500 M.2 and DC S3500 HD Series. For all above listed products, the latest firmware revision is G2010140.</p>



Revision	Date	Version	Description
007	May 2015	2.2.3	<p>This version adds tool support for new PCIe and SATA products in the Intel® SSD Data Center Family, as well as a new firmware and bootloader update for the Intel® Solid State Drive DC P3700, P3600 and P3500 Series.</p> <p>For the Intel® SSD DC P3500 Series, the latest firmware revision is 8DV10135. The latest bootloader revision is 8B1B012E.</p> <p>For the Intel® SSD DC P3700 and P3600 Series, the latest firmware revision is 8DV10151. The latest bootloader revision is 8B1B012F.</p> <p>This tool version contains:</p> <ul style="list-style-type: none"> • For the Linux DCT executable, added capability of the library files being relocated and ran from a different directory • Added functionality to turn On/Off Tool debug log file (Option to specify a name for the log file) • Added functionality to turn On/Off the Tool from loading and using the LSI Adapter Library • Various bugs fixes
006	March 2015	2.2.1	<p>This version contains additional command support for both SATA and PCIe products, as well as a new firmware and bootloader update for the Intel® Solid State Drive DC P3700 and P3600 Series.</p> <p>The latest firmware revision is 8DV10131. The latest bootloader revision is 8B1B012E.</p> <p>This version contains:</p> <ul style="list-style-type: none"> • Fix to NativeMaxLBA calculation for NVMe drives • Modification to the Dump feature – command now enabled with default behavior to output to the screen with the option to output to a file (see the Intel® SSD Data Center Tool User Guide for syntax changes).
005	February 2015	2.2.0	<p>This version added support for the Intel® SSD DC P3500 Series as well as a firmware and bootloader update for the Intel® SSD DC P3700 and P3600 Series. The latest firmware revision is 8DV10130. The latest bootloader revision is 8B1B012D.</p>
004	December 2014	2.1.6	<p>This version provides firmware update capability for Intel® Solid State Drive Data Center Family of products (P3700 and P3600 Series). The latest firmware revision is 8DV10110.</p>
003	October 2014	2.1.4	<p>This version provides firmware update capability for Intel® SSD DC P3700 and P3600 Series. The latest firmware revision is 8DV10102.</p>
002	September 2014	2.1.3	<p>This version contains additional command support for both SATA and PCIe products, as well as a new firmware update for Intel® SSD DC P3700 and P3600 Series.</p> <p>For this version of the tool, to view the correct drive capacity after issuing a Maximum LBA setting, you must refresh the Disk Management Utility. For Linux OS, you must perform a full power-off shutdown.</p> <p>The Standby Immediate command will not work on a host/OS drive.</p>



Revision	Date	Version	Description
001	June 2014	2.1	<p>Initial Release</p> <p>ISSUE: When modifying a MaximumLBA setting on a drive with a partition, the tool will proceed with the operation which means that valid data is left in the SSD media.</p> <p>Workaround: Remove all partitions on the drive and run the NVMe* Format command before modifying the MaximumLBA setting.</p> <p>ISSUE: After completing a successful change of MaximumLBA, the new drive size does not appear.</p> <p>Workaround: After a successful change to MaximumLBA setting, complete a full power off shutdown, wait 5 seconds and restart. The correct drive size will now be reported.</p>



Product Firmware Revision History

Intel® Solid State Drive DC D3700 and D3600 Series Revision History

Date	Firmware Revision	Description
February 2017	8DV101H0 8B1B0133 8AP6Z511	<p>This version provides a firmware and bootloader update for the Intel® SSD DC D3700 and D3600 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none">• Multiple PCIe* Link Dynamic Equalization updates SQ Header Pointer Mismatch fix• Drive Drop issue under heavy IO testing• Drive unresponsive during concurrent IO and NVMe*-MI Basic Management Commands• XN022 Assert Fixes• Sequential read performance improvement at end of life from firmware 8DV101D0

Intel® Solid State Drive DC P3700, P3600 and P3500 Series Revision History

Date	Firmware Revision	Description
February 2017	8DV101H0 8B1B0133	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3700, P3600 and P3500 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none">• XN022 Assert Fixes• Sequential read performance improvement at end of life from firmware 8DV101F0• Misc. sightings closure and improvement on product health.
August 2016	8DV101F0 8B1B0133	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3700, P3600 and P3500 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none">• Added NVME* IO Queue Metrics log page support• Added Secure Erase Command Monitoring log page support• Updated Secure Erase Command User Data Erase option• Fix for drive entering disable logical mode after frequent, repeated O/S reboots• Prefetch activate/deactivate logic enhancement• Fix for sequential read performance decay• Fix for formatting 4k+DIF causing read errors when using Intel SPDK• Misc. sightings closure and improvement on product health.



Date	Firmware Revision	Description
December 2015	(P3500 only) 8DV10174 8B1B0131	<p>This tool version provides a firmware update for the Intel® SSD DC P3500 Series. No change to the bootloader.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • Fix for some use cases where user data may be inaccessible or at risk of loss (see Intel Advisory INTEL-SA-00047). • Misc. sightings closure and improvement on product health.
September 2015	8DV10171 8B1B0131	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3700, P3600 and P3500 Series.</p> <p>This firmware and bootloader version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • Vendor Unique Command to change SM BUS address on “NVMe* Basic Management Command” • Improved TRIM IOPS operation • In-field Drive Configuration Update capability • Windows* Driver update with bug fixes • Misc. sightings closure and improvement on product health
May 2015	8DV10135 8B1B012E 8DV10151 8B1B012F	<p>This version provides firmware update capabilities for Intel® SSD DC P3700, P3600 and P3500 Series.</p> <p>For the Intel® SSD DC P3500 Series, the latest firmware revision is 8DV10135. The latest bootloader revision is 8B1B012E. This is the production firmware/bootloader for the product.</p> <p>For the Intel® SSD DC P3700 and P3600 Series, the latest firmware revision is 8DV10151. The latest bootloader revision is 8B1B012F.</p> <p>This firmware/bootloader version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • Pin11 Activity signal and Activity LED blink frequency varies with workload • Data Units Read and Data Units Write attributes reset after high count • High correctable errors reported during link training with drive behind PCIe switch
March 2015	8DV10131 8B1B012E	<p>This version provides firmware update capabilities for Intel® SSD DC P3700 and P3600 Series.</p> <p>The following issues are fixed in this release:</p> <ul style="list-style-type: none"> • Activity LED/Pin11 functionality during idle not meeting specification • OS may fail to boot from Intel® SSD DC P3700/P3600 in some platforms



Date	Firmware Revision	Description
February 2015	8DV10130 8B1B012D	<p>This firmware and bootloader are the production release version. The following issues are fixed in this firmware and bootloader revision:</p> <ul style="list-style-type: none"> • Endurance Analyzer feature cannot persist wear out info during power cycle • Drive incorrectly counts unsafe power shutdown events on warm reboots and resets • During IO activity, firmware image download/activate commands may timeout • Drive reports higher than actual data units read and write • Drive sub-4KB sequential write performance may be below 1MB/sec • Drive may be showing high values of host read/write commands fresh out of the box • Drive may disappear during S3/S4 cycling • Drive may not enumerate after an in-field bootloader update • Drive may not enumerate and/or enter disable logical mode following a warm reset
November 2014	8DV10110	<p>This version provides firmware update capability for Intel® SSD DC P3700 and P3600 Series. The following issues are also fixed in this release:</p> <ul style="list-style-type: none"> • Drive reports incorrect number of error information log entries • Surprise hot removal during firmware upgrade may cause the drive to enter disable logical mode • Drive may not enumerate on cold boot if connected to PLX*8732 switch • Drive may enter disable logical mode (BAD_CTX_1052) during unplanned power loss if there are outstanding NAND erases in progress • Drive may enter disable logical mode during reset handling with unplanned power loss • Drive may incorrectly display serial number and model number in BIOS Boot Override menu
October 2014	8DV10102	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel® SSD. The following issue is also fixed in this release:</p> <p>Drive may enter disable logical mode after warm reboot when running IOs.</p>
September 2014	8DV10100	This firmware is the production release version



Intel® Solid State Drive DC P3608 Series Revision History

Date	Firmware Revision	Description
February 2017	8DV101H0 8B1B0133	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3608 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • XN022 Assert Fixes • Sequential read performance improvement at end of life from firmware 8DV101F0 • Misc. sightings closure and improvement on product health.
August 2016	8DV101F0 8B1B0133	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3608 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • Added NVME IO Queue Metrics log page support • Added Secure Erase Command Monitoring log page support • Updated Secure Erase Command User Data Erase option • Fix for drive entering disable logical mode after frequent, repeated O/S reboots • Prefetch activate/deactivate logic enhancement • Fix for sequential read performance decay • Fix for formatting 4k+DIF causing read errors when using Intel SPDK • Misc. sightings closure and improvement on product health.

Intel® Solid State Drive DC P3520 Series Revision History

Date	Firmware Revision	Description
March 2018	MDV10290 MB1B0105	<p>This firmware version contains:</p> <ul style="list-style-type: none"> • Misc. sightings closure and improvement on product health
April 2017	MDV10271 MB1B0105	<p>This version provides a firmware and bootloader update for the Intel® SSD DC P3520 Series.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none"> • Fixed a boot issue with drive on FW270, FW253 didn't have this issue. • Improvements on Functional Level Resets handling, PLI handling, LED activity & several others.



Intel® Solid State Drive DC S3710 and DC S3610 Series Revision History

Date	Firmware Revision	Description
February 2017	G2010160	This firmware version includes support for the ACS-3 command set.
March 2016	G2010150	The following changes are included in this firmware update: <ul style="list-style-type: none">• Fixed SATA CRC errors seen when running at 3Gbps• Corrected SMART 05h behavior• Fixed power consumption on Staggered Spin-up. This latest firmware also includes a fix for a specific use condition where in certain cases if the device receives a command that violates the SATA protocol specification, the drive may ASSERT or stop responding to host commands (See Intel Advisory INTEL-SA-00050).
August 2015	G2010140	This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel SSD. The following issues are also fixed in this release: <ul style="list-style-type: none">• Added support for SMART Attribute F3h• Modification to Secure Erase to include NAND Erase• Improvements to the Maximum Latency for all Sequential and Random Write workloads• Added a fourth PHY mode setting to accommodate long interconnects (> 8-inches)

Intel® Solid State Drive DC S3510 Series Revision History

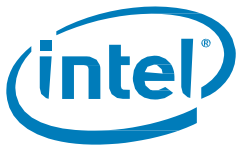
Date	Firmware Revision	Description
March 2016	G2010150	The following changes are included in this firmware update: <ul style="list-style-type: none">• Fixed SATA CRC errors seen when running at 3Gbps• Corrected SMART 05h behavior• Fixed power consumption on Staggered Spin-up. This latest firmware also includes a fix for a specific use condition where in certain cases if the device receives a command that violates the SATA protocol specification, the drive may ASSERT or stop responding to host commands (See Intel Advisory INTEL-SA-00050).



Date	Firmware Revision	Description
August 2015	G2010140	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel SSD.</p> <p>The following issues are also fixed in this release:</p> <ul style="list-style-type: none"> • Added support for SMART Attribute F3h • Modification to Secure Erase to include NAND Erase • Improvements to the Maximum Latency for all Sequential and Random Write workloads • Added a fourth PHY mode setting to accommodate long interconnects (> 8-inches)

Intel® Solid State Drive DC S3520 Series Revision History

Date	Firmware Revision	Description
September 2017	N2010121	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel SSD.</p> <p>The following changes are included in this firmware update:</p> <ul style="list-style-type: none"> • Drive may enter a disabled logical state or report SMART AFh failure if powered on after storage in certain conditions. • Drive may enter disabled logical state when executing SMART Extended self-test routine in captive mode. • Sanitize feature set cannot be re-enabled following an SSP disable and COMRESET • Misc. sightings closure and improvement on product health. • Subsequent firmware updates no longer require a power cycle of the system.
April 2017	N2010112	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel SSD.</p> <p>The following changes are included in this firmware update:</p> <ul style="list-style-type: none"> • Correction to SMART attribute BBh and F1h increment behavior • Fix to drive behavior when power loss occurs during Secure Erase • Fixed issue where SCT Extended Status Code, Action Code and Function Code were not being cleared on a COMRESET • Fix to address occasional Standby Immediate failure • Legacy ATA commands not relevant in ACS-3 no longer aborted • Correction to drive behavior when running SMART self-test using Smartctl* and ABORT command received



Intel® Solid State Drive DC S3700 Series Revision History

Date	Firmware Revision	Description
March 2016	5DV12270	This latest firmware include a fix for a specific use condition where in certain cases if the device receives a command that violates the SATA protocol specification, the drive may ASSERT or stop responding to host commands (See Intel Advisory INTEL-SA-00050).
June 2014	5DV10270	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel® SSD.</p> <p>The following issues are also fixed in this release:</p> <ul style="list-style-type: none">• In the unlikely event that a drive fails, the drive will now report the correct serial number and actual capacity. The error code is available in ID block word 140 and GPL address 0xDD• When a power-off is less than 500ms the drive will automatically reset and allow proper drive enumeration• Support for both 512B and 4KB physical sector size• As blocks are retired, the SMART E8h value will decrease linearly• After a power cycle, timed workload variables will resume from the last saved values and update after 60 minutes and every minute thereafter• SMART Attribute 05h now has a normalized value of 100• SMART Attribute C2h now reports the correct temperature



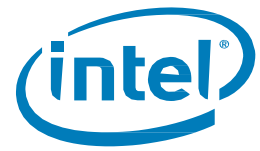
Intel® Solid State Drive DC S3500 Series Revision History

Date	Firmware Revision	Description
March 2016	(For DC S3500 M.2, DC S3500 HD only) G2010150 (For DC S3500 only) D2012370.	These latest firmware includes a fix for a specific use condition where in certain cases if the device receives a command that violates the SATA protocol specification, the drive may ASSERT or stop responding to host commands (See Intel Advisory INTEL-SA-00050).
August 2015	(For DC S3500 M.2, DC S3500 HD only) G2010140	<p>Only applicable for the Intel SSD DC S3500 M.2 and DC S3500 HD Series.</p> <p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel SSD. The following issues are also fixed in this release:</p> <ul style="list-style-type: none"> • Added support for SMART Attribute F3h • Modification to Secure Erase to include NAND Erase • Improvements to the Maximum Latency for all Sequential and Random Write workloads • Added a fourth PHY mode setting to accommodate long interconnects (> 8-inches)
June 2014	D2010370	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel® SSD. The following issues are also fixed in this release:</p> <ul style="list-style-type: none"> • In the unlikely event that a drive fails, the drive will now report the correct serial number and actual capacity. The error code is available in ID block word 140 and GPL address 0xDD • When a power-off is less than 500ms, the drive will automatically reset and allow proper drive enumeration • Support for both 512B and 4KB physical sector size • As blocks are retired, the SMART E8h value will decrease linearly • After a power cycle, timed workload variables will resume from the last saved values and update after 60 minutes and every minute thereafter • SMART Attribute 05h now has a normalized value of 100 • SMART Attribute C2h now reports the correct temperature



Intel® Solid State Drive DC S3100 Series Revision History

Date	Firmware Revision	Description
June 2017	041D	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel® SSD.</p> <p>The firmware version contains the following enhancements:</p> <ul style="list-style-type: none">• Optimized SATA signal integrity• Optimized behavior entering and resuming from low-power states <p>This firmware version contains the following fixes:</p> <ul style="list-style-type: none">• Intermittent errors when resuming from unsafe shutdown• Fixed issues around use in Connected Standby• Fixed intermittent boot error in Linux*• Mitigates a security vulnerability CVE-2017-5695
August 2016	036D	<p>This tool version provides detection of whether user's Intel® SSD DC S3100 Series is eligible for the firmware update and directs them to use the Intel® SSD Firmware Update Tool.</p> <p>The following changes are included in the firmware update:</p> <ul style="list-style-type: none">• Fixes issue that BSOD occurs during S3/S4 resume on systems supporting devsleep• Mitigates a security vulnerability which in some cases resulted in corruption of user's data (see Intel Advisory INTEL-SA-00055)• Corrected SMART AAh, E8h, ABh, and ACh behavior• Corrected DIPM enabled after COMRESET issue• Corrected errant FIS causing BSOD when Write Cache disabled• Corrected SATA NCQ Command Error log reporting issue• Mitigated a security vulnerability which in some cases resulted in corruption of user's data. (see Intel Advisory INTEL-SA-00053)



Intel® Solid State Drive DC P3100 Series Revision History

Date	Firmware Revision	Description
June 2017	119D	<p>This firmware revision has several continuous improvement optimizations intended to provide the best possible user experience with the Intel® SSD.</p> <p>This firmware version contains the following enhancements:</p> <ul style="list-style-type: none">• Improved link initializations <p>The following fixes are included in this firmware version:</p> <ul style="list-style-type: none">• Drive hangs intermittently after Format NVM command• Format NVM command occasionally failing with PCIe ASPM• Data miscompare caused by intermittent data corruption during heavy write workload with small file transfer size• Incorrect drive behavior for command with Forced Unite Access setting



Intel® Solid State Drive DC P4500 and P4600 Series Revision History

Date	Firmware Revision	Description
June 2018	QDV101D1 (MR5) QB1B0136	This firmware version contains: <ul style="list-style-type: none"> • SMART health log reporting fix • Thermal management power cycle issue fix • PerformanceRatingLogPage addition. • NAND & assert fixes. • Bootloader & FW update/downgrade counter fixes. • Miscellaneous LED behavior fixes.
May 2018	QDV101B1 QB1B0133	This firmware version contains: <ul style="list-style-type: none"> • SPI Storage area corruption fix • Management Interface Controller (MIC) hang issue fix • Performance inconsistency fix in certain workloads • Fix for system hang in a large cluster with SPDK • Improvements in Physical and Crypto Erase times • Other bug fixes and improvements to improve the overall quality of the firmware • Added capability to ResetCRC Error
March 2018	QDV10190 QB1B0122	This firmware version contains: <ul style="list-style-type: none"> • CRC reporting fix and clearing registers for existing CRCs • TRIM & 4K overlap fix • Same LBA collision fix for VMWare vSAN*. • Fix for MI returns drive not ready on temp read out • Fix for MIC gets stuck when 12V power supply is interrupted • Fix Abnormalities in reported NAND temperature - specifically stale temperature • Misc. sightings closure and improvement on product health
February 2018	QDV10170 QB1B0122	The following changes are included in this firmware update: <ul style="list-style-type: none"> • Fixed SATA CRC errors seen when running at 3Gbps • Corrected SMART 05h behavior • Fixed power consumption on Staggered Spin-up.
October 2017	QDV10150 QB1B0110	This version provides a firmware and bootloader update for the Intel® SSD DC P4500 and P4600 Series. This firmware and bootloader version contains fixes for the following issues: <ul style="list-style-type: none"> • Fixed issue where drive fails to boot as OS drive. • Fixed issue of bootloader download counter being incremented. • Includes mitigation to issue relating to Read ECC uncorrectable. • Corrections to when Critical Warning – RD bit is set. • Miscellaneous sightings closure and improvement on product health.



Intel® Solid State Drive 750 Series Revision History

Date	Firmware Revision	Description
December 2015	8EV10174 8B1B0131	<p>This tool version provides a firmware update for the Intel® SSD 750 Series. No change to the bootloader.</p> <p>This firmware version contains fixes for the following issues:</p> <ul style="list-style-type: none"> Fixed LED behavior to appear LED-On when drive active and LED-Off when drive idle. Fix for some use cases where user data may be inaccessible or at risk of loss. (see Intel Advisory INTEL-SA-00047) Misc. sightings closure and improvement on product health.
October 2015	8EV10171 8B1B0131	<p>This version provides a firmware and bootloader update for the Intel® SSD 750 Series.</p> <p>This firmware and bootloader version contains fixes for the following issues:</p> <ul style="list-style-type: none"> Vendor Unique Command to change SM BUS address on “NVMe Basic Management Command” Improved TRIM IOPS operation In-field Drive Configuration Update capability Windows* Driver update with bug fixes Misc. sightings closure and improvement on product health

Intel® Solid State Drive DC P4510 and P4610 and P4511 Series Revision History

Date	Firmware Revision	Description
February 2019	VDV10152 VDV10352	<p>The following changes are included in this MR5 firmware update:</p> <ul style="list-style-type: none"> Support for P4610: 1.6TB, 3.2TB, 6.4TB, 7.68TB SKUs Support for P4511: 1, 2TB SKUs
June 2018	VDV10131 VDV10140 VCV10301	<p>The following changes are included in this firmware update:</p> <ul style="list-style-type: none"> Support for P4610: 1.6TB, 3.2TB, 6.4TB, 7.68TB SKUs Support for P4511: 1, 2TB SKUs
April 2018	VDV10131	<p>The following changes are included in this firmware update:</p> <ul style="list-style-type: none"> General bug fixes. Drive/NAND stability improvements. Intel recommends customer to move MR3 firmware release to take advantage of latest NAND/drive optimizations.
February 2018	VDV10120 VB1B0053	<p>The following changes are included in this firmware update:</p> <ul style="list-style-type: none"> Support for higher capacity SKUs 4, 8TB. Unified binary for 1,2,4,8TB SKUs Other drive stability & functionality fixes.



Intel® Solid State Drive DC S4500 and S4600 Series Revision History

Date	Firmware Revision	Description
March 2019	SCV10150(MR5)	The following changes are included in this firmware update: <ul style="list-style-type: none">Miscellaneous bug fixes
June 2018	SCV10142 (MR4)	The following changes are included in this firmware update: <ul style="list-style-type: none">Added wildcard capability to matching SSD device strings.
March 2018	SCV10121 SBUB0020	The following changes are included in this firmware update: <ul style="list-style-type: none">BAD_CONTEXT_2020 issue fixBug fixes from previous firmware SCV10100 and SCV10111Misc. sightings closure and improvement on product health
February 2018	SCV10111 SBUB0018	The following changes are included in this firmware update: <ul style="list-style-type: none">Improved Random Read performanceFaster Secure Erase of the driveBug fixes from previous firmware SCV10100 Please see Intel SSD DC S4500 S4600 Series updated sightings report for all bug fixes in SCV10111

Intel® Solid State Drive DC S4510 and S4610 Series Revision History

Date	Firmware Revision	Description
March 2019	XC311102(MR1) XCV10110(MR1)	The following changes are included in this firmware update: <ul style="list-style-type: none">Resolved issue related to intermittent drive drop during initial boot.Resolved 1.92TB and 3.84TB SKUs may become unresponsive at 1700 hrs. of cumulative Idle Power On Hours.



Intel® Optane™ SSD DC P4800X Series Revision History

Date	Firmware Revision	Description
March 2019	E2010311 E2010435 E201043A	The following changes are included in this firmware update: <ul style="list-style-type: none"> • QAN 9871
July 2018	E2010435	The following changes are included in this firmware update: <ul style="list-style-type: none"> • Support NVMe-MI MCTP over SMBUS on the material that is factory shipped with firmware E2010435 Thermal throttling settings change. • Thermal throttling settings change on the material that is factory shipped with firmware E2010435. • Support P4800X 1.5TB capacity. • Multiple bug fixes.
April 2018	E2010423	The following changes are included in this firmware update: <ul style="list-style-type: none"> • Multiple bug fixes. • VSAN Certification Complete. • Added capability to ResetCRC Error.
February 2018	E2010324 (375GB) EB3B0306 E2010325 (750GB) EB3B0309	The following changes are included in this firmware update: <ul style="list-style-type: none"> • Bug fixes from previous firmware on 375GB (from FW: E2010320) • Note that 750GB was qualified on firmware E2010325. There is no maintenance release past that FW. Additionally, there is limited applicability of this firmware on qual samples. Please reach out to Intel representative if your 750GB samples are on earlier revision than FW E2010325.

Intel® Solid State Drive DC S3110 Series Revision History

Date	Firmware Revision	Description
October 2018	LHF002D	The following changes are included in this firmware update: <ul style="list-style-type: none"> • SMART Media wear out Indicator E9 implementation improved to accurately reflect SLC and TLC usage. • Improved FW policies for robust SSD recovery from unsafe shutdown scenarios. • Improved NAND background data refresh algorithms. • Updated NAND policies to prevent premature retirement of blocks. • Improved FW policies to handle page count changes during power state transitions. • Fixed corner case condition that triggered high E2E errors being reported in SMART.



Intel® Solid State Drive DC D5-P4320 Series Revision History

Date	Firmware Revision	Description
February 2019	3DV10110	The following changes are included in this firmware update: <ul style="list-style-type: none"><li data-bbox="743 436 1096 474">• Zeroed out SubNQN register
September 2018	3DV10100	PRQ release of product and firmware.



Intel® Solid State Drive DC P4101 Series Revision History

Date	Firmware Revision	Description
February 2019	006D	MR1 firmware Release
August 2018	005D	PRQ release of product and firmware.



Intel® Solid State Drive DC D5-P4326 Series Revision History

Date	Firmware Revision	Description
February 2019	8DV10400	PRQ Release
September 2018	8DV10510	MR2 Release (Production FW) Contains Hot Plug Fix