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SM2246EN Flash F/W & ISP Release Information – R0822A

Introduction
This purpose of this document is to provide release information on the SM2246EN F/W and ISP release information

Fix Coverage
■   stands for the **"new fix"** or **"new support"** in the category
□ stands for the **"no-update"** in the category

■ **Tester FW**	■ **Controller ISP**
□ **Yield Issue**	■ **Yield Issue**
■ **Flash Issue**	■ **Flash Issue**
□ SLC Flash	□ SLC Flash
□ Samsung Flash	□ Samsung Flash
□ Toshiba/Sandisk Flash	□ Toshiba/Sandisk Flash
□ Intel/Micron Flash	□ Intel/Micron Flash
□ Hynix Flash	□ Hynix Flash
□ Others	□ Others
■ MLC Flash	■ MLC Flash
■ Samsung Flash	■ Samsung Flash
■ Toshiba/Sandisk Flash	■ Toshiba/Sandisk Flash
■ Intel/Micron Flash	■ Intel/Micron Flash
■ Hynix Flash	■ Hynix Flash
□ **Compatibility issue**	□ **Compatibility issue**
□ **Tester Bug Fix**	■ **ISP Bug Fix**
■ **AP Bug Fix & New Function**	□ **Feature Enhance**
■ **Feature Enhance**	

ISP Revision History

Version	MP Tool version	ISP version	Note
R0822A	**R0823A**	**R0822A**	**This FW supports both 2D/3D MLC NAND (does not feature SLC caching)** **1. Update Security FW to version R0814A.** **2. Pass uLink 6.0 protocol tests.** **3. Apply a workaround for host issue: Data triggering is interrupted by host power mode command.** **(default off in previous version)** **4. Issue Fix: HDMA FIFOs may run out.** **5. Issue Fix: WL may not be applied due to continuous GC operation.** **6. Issue Fix: FW may hang during SATA error handle.** **7. Issue Fix: Dram reset may be invalid during BVA reset.** **8. Issue Fix: As SPOR occurs during closing a GC destination block, FW should return this process ASAP. (Flush dram as SPOR is enabled)**
R0411D	R0508A	R0411D	This FW supports both 2D/3D MLC NAND (does not feature SLC caching) 1. Update Security FW 2. Support Hynix 14nm MLC 3.3V devices. 3. Add extended CID for quick SATA settings. 4. Add check sum feature for download micro code. (optional) 5. Record read count for RTBB. 6. Issue Fix: mode 7 of download micro code. 7. Issue Fix: thermal throttle should not be applied as temperature < 0 degree. 8. Issue Fix: a corner case FW may lose the index info.
Q1112A	Q1124A	Q1112A	This FW supports both 2D/3D MLC NAND (does not feature SLC caching) 1. Update Security FW. 2. Issue fix for RDT hour setting. 3. Update BootISP. 4. Issue Fix: Before power on build link flow, system block may be seen as error block.
Q0810B	Q0824A	Q0810B	This FW supports both 2D/3D MLC NAND (does not feature SLC caching)

			9. Update Security Fw to version Q0727A.
			10. Update Boot ISP to version Q0609A.
			11. Support Hynix 3DV2 MLC 1CE multi-die devices.
			12. Support Samsung 14nm D-die 792 page devices.
			13. Support Samsung 1GB dram.
			14. Modify clear buffer flag algorithm in SATA error handle flow.
			15. Add pretest error code 0x2A: C_Pret_TotalFBlockOver8K and 0x2B: C_Pret_CapacityNotSupport.
			16. Set Vfr of VDT27 to 2.8V for L06B 3.3V devices.
			17. Issue Fix: FW should retrieve retry table after resuming form DEVSLP.
			18. Issue Fix: Modify the calculation for disk size reported to host. (Take TCG reserved sector count/shift count into consideration for both ISP and RDT FW)
			19. Issue Fix: Rest data in HW front-end buffer may cause the BVA halt from releasing SATA engine.
			20. Issue Fix: Sanitize frozen status should lock sanitize feature commands only.
			21. Issue Fix: HDMA count may overflow during closing part read FIFOs.
			22. Issue Fix: Apply DEVSLP after Slumber ACK Immediately would cause drive hang on DIPM Flow.
			23. Issue Fix: An error NCQ (double tag or out of range LBa … etc) came during standby mode, FW should not return D2H in ISR.
			24. Issue Fix: For read retry sequence of Toshiba 24nm/32nm SLC NANDs, 26h command should be removed.
Q0512A	Q0508A	Q0512A	This FW supports both 2D/3D MLC NAND (does not feature SLC caching) 1. Update security FW to version SMI_SEC_SATA_Q0330A. 2. Update RDT FW to version: Q0512A, featuring read retry sequence for error bit count over TH. 3. Improved early move algorithm to pass read disturb test: Butterfly Seeking. 4. Add an workaround method for a host issue. Data triggering is interrupted by host power mode command. 5. Issue fix: Incorrect dram cache size for Hynix 3DV2 from version P1225C.

Q0303B	Q0321B	Q0303B	This FW supports both 2D/3D MLC NAND (does not feature SLC caching) 25. Update security FW to version SMI_SEC_SATA_Q0116A. 26. Update BootISP to version: Q0303A. 27. Support Samsung 14nm MLC "K9GDGD8U0B". 28. Apply read scrub to all NANDs to prevent read disturbance. 29. Issue Fix: For Micron L06B 2TB drive, FW reports "too much bad" without default capacity setting during pretest flow. 30. Issue Fix: As program fail handle is disabled, minimum size of cache buffer(for host data) should be 3.5*size of super page, to prevent dram buffer flag issue. 31. Issue Fix: FW may refer to bit 0 of status register to check cache status. 32. Issue Fix: During sata error handle sequence, HW BVA reset may stop HDMA data transfer. 33. Issue Fix: Check HW command queue done before applying set feature sequence to NAND flash.
P1225C	Q0113B	P1225C	This FW supports both 2D/3D MLC NAND (does not feature SLC caching) 34. Support Micron L06B 2TB capacity. 35. Reduce command latency as GC is under operation. 36. Add one check spare seed mode to detect any plane "ALL FFh" pattern output. (in check EOB of Tail block or build F2H Map for unfull block) 37. Avoid specific L06B Train ADJ Fail in MP Flow. (Bit flip of parity of spare data) 38. Add vendor unique command for VPX to perform external destroy. 39. Add customized erase unit function for VPX. 40. Add MP option, if RDT Fail, keep ALL block program state, Don't Erase. (UFD Sorting) 41. Issue fix: As program fail handle is disabled, minimum size of cache buffer(for host data) should be 3*size of super page, to prevent dram buffer flag issue. 42. Issue Fix: Modify the cases that FW would clear following commands as LSCS occurs. 43. Issue Fix: As enable/disable write cache is set by SCT command, the feature can not be changed by set feature command. Device should not return error as

			well.
			44. Issue Fix: Initialize Link Table Info entirely in Erase Unit, in case that misplaced Link Table Info might be saved afterward.
			45. Issue Fix: Save security info prior to Prepare Fast Boot procedure before entering DEVSLP to keep fast boot ID for Link Block.
			46. Issue Fix: Variable overload leads to FW return wrong status.
P1111A	P1125A	P1111A	This FW supports both 2D/3D MLC NAND (no SLC caching) 1. Update SecurityFW to version: SMI_SEC_SATA_P1027A. 2. Update RDT to version P1027RDT: Modify that FW would output all FFh pattern in MP "Self Test Result" list for L06B 512GB and 1TB capacity. 3. Support 65h command to switch internal die for some specific NANDs. 4. For different type of SanDisk 1znm NAND, corresponding retry table is supported. 5. Improve cache program performance. 6. During power on flow, make spare blocks with minimum P/E count being used first. 7. Check spare seed for WPRO and Link block to prevent the case: all FFh pattern output by any plane. 8. Add pretest error code 0x28: CannotFindSysBlk to indicate number of bad block in each slot. 9. Issue fix: As SM2246EN force write cache is enabled, FW should not return error status as host apply disable write cache.
P1003B	P1018B	P1003B	This FW supports both 2D/3D MLC NAND (no SLC caching) 47. Update Security API 48. Reduce time consumption on dram access in update/check map functions. 49. Return COMRESET status in ISR if COMRESET occurs in Trim. 50. Return previous one SAMRT data as latest WPRO page is UECC. 51. Add pretest error code: 0x29 to sort power-on one pass L06B. 52. Add max/min Temp. in SMART ID: 0xC2(optional setting in MP tool). 53. Add flush dram as SPOR feature for 3.3V devices. 54. Fix the issue that FW may not enable HW interrupt if

			power drops(VDT40 and VDT27) and recover then.
			55. Fix the issue that writing same data is seen as UNC during ATA command: SMART EXECUTE OFFLINE IMMEDIATE(0xD4).
P0614D	P0628B	P0614D	This FW supports both 2D/3D MLC NAND (no SLC caching)
			1. Update Security FW to SMI_SEC_SATA_P0701A.
			2. Update RDT FW version to P0614RDT.
			3. Update Boot ISP version to P0801A: For Intel L06B single plane read may cause ECC fail under a specific condition.
			4. Add NAND sorting for SM3259.
			5. Add Lower Page Protection (LPP) for I/M L06B 3.3V devices.
			6. Pass WHCK-EHDD TPerReset test case on Windows 10.
			7. Pass WHCK-EHDD RangeCrossing test case on Windows 10.
			8. Abort FW Update operation, if the Security Settings don't remain the same.
			9. Fix issue: CRYPTO SCRAMBLE EXT command can't be successfully implemented when only AES is enabled.
P0614B	P0624A	P0614B	1. This FW supports both 2D/3D MLC NAND
			2. Enable "ODT by controller" for IM L06B 1TB drive.
			3. Modify strong/weak page table #04.
			4. Improve sequential read performance for 4-plane 16K-page devices.
			5. Support new form factor: CFast.
			6. Fix the issue of NCQ soft reset, where host could not send out FIS H2D.
			7. Fix the issue: During map saving, the last saved tail block should be empty block as its valid page count is 0.
			8. Fix the issue: During getting page pointer of data block, command queue may hang under corner case as program fail handle is disabled.
			9. Fix the issue: After moving WPRO block, meta data of plane 1 may be incorrect.
			10. Add the mechanism that block 0 is included in check system block flow during pretest flow.
			11. Fix the issue: Dummy pages of EOB may be filled with wrong serial.
O1225L	P0526A	O1225L	1. Support Mira dram (256MB/512MB)
			2. Modify save map policy: limit partial save map time consumption
			3. Modify issue of SSD cannot boot to Win8.1 when SATA Gen2 is forced
			4. Add new pretest error code 0x26: Run time/RDT too much bad

			5. Add backup page for erase unit info in WPRO block
			6. Improve sequential read performance for 4-plane 16K-page flash (including Toshiba/SanDisk 15nm).
			7. Modify strong/weak page table.
			8. Fix NCQ soft reset issue, where host could not send out FIS H2D.
			9. Fix issue of during the process of saving map, last saved tail block should be empty block as its valid page count is 0.
			10. Fix issue of during the process of getting page ID of data block, command queue may hang under corner case as program fail handling is disabled.
			11. Fix issue of after moving WPRO block, meta data of plane 1 may be incorrect.
O1225J	P0412B	O1225J	1. MP tool P0412B cannot swap ISP without being with ISP O1225J. Please don't use other version of ISP to be with MP tool P0412B to swap ISP.
			2. 3D MLC is not supported by this FW
			3. Modify features of thermal throttling.
			4. Modify partial cleaning mechanism to avoid large time-consuming on loading EOB
			5. Add an extra read method to handle NCQ read commands.
P0115G	P0223B	P0115G	1. Support Hynix 3D V2 MLC (SSD 128/256GB)
			2. Support Micron L06B (SSD 128/256GB)
			3. Support new seed table (1024 sets)
			4. Extend table corresponding to physical page (strong page/weak page) to 2KB
			5. Modify RDT for Micron L06B
			6. Fix the issue of loading code when the SSD is recovered from DEVSLP
O1225G	P0219B	O1225G	1. Modify that if "erase operation" was interrupted in the last power-on, return status to host and open HDRS interrupt before continuing doing erase operation.
			2. Record LUN number in RDT test fail information and show in MP tool self test result.
			3. Add an option, TotalFailCntTH, for the number of RDT Fail Threshold
			4. Abort R/W commands when the address which would be accessed beyond the range can be supported by drive (case of over flow is detected)
			5. Ram test flow is modified for higher coverage
			6. Use "compared seed" to detect all 0xFF read data during read retry sequence
			7. Modify read log extend command "Log address 04h-Device Statistics", in which Logical Sectors Written/ Number of Write Commands/ Logical Sectors Read/ Number of Read Commands should be recorded in 48 bits

			8. Modify the key management that each range has different key in the first place
			9. Modify Program Fail Read Back Algorithm
			10. Restore divided crystal frequency in shutdown process of DEVSLP function
O1225E	P0114A	O1225E	1. Doesn't support AES/security related function.
			2. Modify that if "erase operation" was interrupted in the last power-on, return status to host and open HDRS interrupt before continuing doing erase operation.
			3. Record LUN number in RDT test fail information and show in MP tool self test result.
			4. Add an option, TotalFailCntTH, for the number of RDT Fail Threshold
			5. Abort R/W commands when the address which would be accessed beyond the range can be supported by drive (case of over flow is detected)
			6. Ram test flow is modified for higher coverage
			7. Use "compared seed" to detect all 0xFF read data during read retry sequence
			8. Modify read log extend command "Log address 04h-Device Statistics", in which Logical Sectors Written/ Number of Write Commands/ Logical Sectors Read/ Number of Read Commands should be recorded in 48 bits
			9. Modify the key management that each range has different key in the first place
			10. Modify Program Fail Read Back Algorithm
O1026A	O1027A	O1026A	1. Modify crystal frequency in order to avoid it's too low to latch signals from SATA interface during the resume process.
			2. Modify system PLL in case that the controller will encounter power-loss which is caused by sudden high peak frequency.
			3. Modify the flow of SMART and security if UGSD occurs when doing "erase operation"
			4. Add read back mechanism to check the authentication of program fail in RDT for SanDisk 1znm.
			5. Add one mechanism to save event log
O0918B	O0910A	O0918B	1. Modify read retry sequence for Hynix 16nm B-Die
			2. Add bitmap scrub operations for SanDisk 1znm
			3. Support single 1GB DRAM (Vendor:Micron)
			4. Fix the issue for power cycling during erase map info block
O0821D	O0819A	O0821D	1. Support SID Authority Disable Proposal – Microsoft

			2. Support Mandatory GUDID Proposal - Microsoft
			3. Support Geometry Reporting Feature – Alignment
			4. For Hynix 20nm B die flash, fix the bug of flash ID changing after issuing "set feature".
			5. Fix ATA security bug when AES is disabled
			6. Fix the issue of internal interleave
O0724B	O0722C	O0724B	1. Support Toshiba 24nm SLC 2. Support SanDisk 24nm MLC 3. Support SanDisk A19 (1Y) MLC 4. Modify program fail handling procedure 5. Support Toshiba 15nm SLC mode (A2 command) 6. Change Tper authentication to "Anybody authority" 7. Support IEEE 1667 CONFIGURE SILOS command
O0617A	O0618A	O0617A	1. This FW can support security and non-security FW that are corresponding to SM2246EN_AB and SM2246EN_AA. 2. MP will detect the controller automatically. If the controller is SM2246AA, MP will block security related functions. If the controller is SM2246AB, MP will show the options of security related functions. 3. Fix the issue related to read command access interface of TCG. 4. Make sure that the related hardware settings constrained to change AES keys are fully performed. 5. Fix the bug that when issuing. SMART_EXECUTE_OFFLINE_IMMEDIATE command which may cause the FW not be able to enter low-power mode. 6. Make sure that partial / slumber mode can be low-power. 7. Capacity of SSD would not be influenced when supporting TCG function.

N1126K	O0522A	N1126K	1. Modified SMART attribute reset: ID 0xA4~0xA7, 0xAF, 0xC7 and 0xF5
			2. Returned status would include
			    ● Pure spare count if the threshold is not exceeded
			    ● Erase count if the threshold is exceeded
			3. Fixed trim bug: when LBA of trim command is higher than total LBA, this command should be returned
			4. Turn LED off when trim command is processed

			5. Solved device sleep DRAM backup issue: flash retry FIFO should not be overlapped by DRAM data 6. Solved spare block run out issue: successive Map block can be used
N1126F	O0327A	N1126F	1. Fix overflow issue of read – retry table that Hynix NAND flash use. 2. Fix U-link NCQ-03 script issue 3. Support Sandisk 1znm flash. 4. Support Hynix 16nm F-die flash. 5. Add CID options for enabling DRAM SRT feature.
N1114H	N1114A	N1114H	1. Fix DEVSLP issue 2. Fix time-out issue of downloading microcode.
N1114B	N1114A	N1114B	1. Support 4Die/1CE Flash 2. Support new VU command for Serial Number change 3. Support disk self-destroy function (erase all disk data via GPIO) 4. Extend # of bad block combination to 2048 to improve 1TB initialization 5. Modify Pretest Bad Block Threshold as configurable from 0 to 255 6. Bug fix of Trim command and potential command timeout/abort. 7. Support Samsung K9QDGD8U5M
N1007C	N0918A	N1007C	1. Support TSB 15nm MLC. 2. Support of Sanitize (erase all block feature). 3. Improve command response time with background map rebuild. 4. Improve Macbook installation compatibility. 5. Improve Pretest flow in the cases of reference original and runtime bad. 6. Enhance error/event log structure and content. 7. Enable CDI interrupt iff DEVSLP had been configured and enabled by CID and host. 8. Resolve bugs/issues of NCQ read flow, Flash setting at DEVSLP resume, Trim command handling, program fail handling in swapping active block.
N0815B	N0815A	N0815B	1. Fix of program fail handling on pure SLC Flash. 2. Improvement to resolve read disturbance on Hynix 16nm MLC Flash. 3. Improvement to speed up boot time by storing WPRO page index information.

			4. Bug fix of program fail.
			5. Fix of SPOR timeout issue on 512GB/1TB disk.
			6. Bug fix of LTS and RDT.
			7. Bug fix of pretest failure on Samsung 21nm Flash.
			8. Improvement of random read performance in internal interleave mode.
			9. Support of full disk SLC mode on Micron Flash.
N0711A	N0704B	N0711A	1. Fix cache program bug since N0704A.
			2. Fix program fail handle bug for internal interleave mode since N0704A
			3. Fix an IPM issue since FW N0516D which automatically change Partial to Slumber in HIPM if DIPM was enabled.
			4. Extend bad block combination number from 512 to 1024.
			5. Decide Hynix read-retry count by using OPT command instead of predefine value from MP package.
			6. Support Internal Interleave.
			7. Support program fail handling
			8. Modify trim flow for the performance with Marvell RAID chip
			9. Support Hynix 16nm 64Gb MLC: H27QCG8T2E5R, H27QEG8VEE5R
			10. Support Hynix 16nm 128Gb MLC: H27QEG8UDB8R, H27QFG8VEB8R-BCF, H27Q1T8YEB9R (CS sample and after)
N0530C	N0529A	N0530C	1. ISP Bug fix: Erase count miss-match after doing security erase
			2. Pretest Bug fix: Load L85A reclaim flash original bad bug found in N0530A
			3. Fix an IPM issue since FWN0516D, which cannot enter IPM mode normally.
N0530A	N0529A	N0530A	1. Support auto partial to slumber in HIPM
			2. Fill up the active block's valid pages word line when receiving Standby Immediately and swapping active block after power on

			3. Save SMART attribute every 20 minutes
			4. Save SMART info when receiving Standby Immediately
			5. Fine tune a read cache judgment
N0402C	N0415A	N0402C	1. Support 4CH8WAY interleave for 512page/block flash (L85A/L95B)
			2. Support 1TB capacity
			3. Fix DEVSLP bugs
			4. Support the entrance of device sleep without slumber mode first. (CID 0x4D.bit7)
			5. Fix the bug of occasional ISP hangs-up if power off while security erase
			6. Fix the bug of building the wrong mapping table after resuming from device sleep
			7. RDT update: Show the wrong fail message at MP result window
			8. Update L95B ECC to 60b in database
N0307A	N0307A	N0307A	1. Speed up boot up time by saving spare bitmap table, and shortening mapping table reset time.
			2. Re-issue flash multi-plane ALE after disabling read-retry.
			3. Issue one plane ALE instead of multi-plane in read-retry.
			4. Extend the ALE, CLE and write pulse width when setting read-retry sequence in EDO mode.
			5. Enable hardware write protect.(GPIO p1.bit1)
			6. Enable quick erase.(GPIO P1.bit5)
			7. Fix the SMART value (attribute ID 0x05) miss-match issue
			8. Fix a markbad bug. (N0227A issue from VCT)
			9. Fix SMART info miss match issue.
			10. Fix read and write log DMA extend command bug.
			11. Fix RDT firmware cannot recognize MP vendor command issue.
			12. Support 16k 4plane flash.
N0103B	N0114A	N0103B	1. Fix the bug of issuing Samsung 19nm read try command by EDO mode

			2. Support DMA read log extend and DMA write log extend.
			3. Support DMA read buffer and DMA write buffer.
			4. Mark bad block by single block instead of super block and use rest good block to re-combine super block.
			5. Support DMA download microcode
			6. Add full dram size test in pretest
M1213C	M1226A	M1213C	1. Support Micron/Intel L85A, L84C,
			2. Support Micron/Intel L95B
			3. Support Samsung 19nm MLC
			4. Fix seek & read verify sector command bug
			5. Support PIO Multiple mode to 2
			6. Fix SCT write same bug
			7. Enhance SPOR protection
			8. Write performance enhancement
			9. Fix a FW bug of WHCK Trim test
			10. Reduce DEVSLP power consumption
			11. Fix a read try bug for Micron/Intel NAND
			12. Support Download Micro Code
M1024C	M1024A	M1024C	1. Fix ATACT seek & read verify sector command bug.
			2. Fix the error of scaling down the number of interleave
			3. Add QC tool functions
M1011A	M1009B	M1011A	1. Enhance ATA command support for Ulink test
			2. Disable all flash CE if channel is idle.
			3. Fix a power-cycling bug
			4. Fix SN number issue when KeepSN is not 20 byte length.
M1003B	M1003A	M1003B	1. Fix IM20nm read retry bug and add more options for read retry. Issue flash reset command before retry sequence.
			2. Fix build-link bug in 4ch8way
			3. Fix SPOR function bugs
			4. Disable dram compensation
			5. Lower schmitt trigger windows)

			6. Fix seek, read verify sector, and RW multiple command bug
			7. Fix a wear leveling bug
			8. Support Few Samsung & Hynix dram.
			9. Support LTS and fix bugs of RDT function. Add the loop option in RDT
			10. Add Micron20nm SLC read-retry table.
			11. Add Dram 380Mhz option.
			12. Enable write cache as a default.
			13. Modify dram VDT from 1.4 to 1.3v.
M0808A	M0808B	M0808A	1. Fix Toshiba & Sandisk flash read-retry error.
			2. Enhance SATA error handling
			3. Switch to dummy write if the number of spare block decreases to zero, and do not mark bad block
			4. Modify SMART command for WAF
			5. Extend the number of write log page to 32
			6. Fix strong page size bug on M0719
			7. Fix pretest bug for manual toggle flash.
			8. Add RDT function.
			9. Don't reset DRAM when resume
M0719A	M0716B	M0719A	1. Support Samsung 21nm K9GCG MLC
			2. Support Toshiba 19nm 16KB 2Plane MLC
			3. Support Hynix H27QCGDT2BLR, H27QEGDVEBLR
			4. Support Micron L84A Onfi MLC
			5. Support Micron L85A Onfi MLC

Note:

1. F/W and ISP update is recommended.
2. History # is denoted by "Version-Date" .

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