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# FlashCORE Boost Software Update

## Application Brief / Best Practices

FlashCORE Boost software update — Data I/O's latest extension of the FlashCORE II architecture — greatly improves the throughput rate for NAND devices by significantly reducing programming and verifying times, thus reducing production costs and time to market.

### ***FlashCORE Boost Extends FlashCORE II Architecture***

Data I/O's FlashCORE Boost release further extends the capabilities of FlashCORE II by speeding up programming and verifying times for NAND devices.

With FlashCORE Boost, NAND program and verify speeds are increased by as much as 300-400%.

### ***What Is FlashCORE Boost?***

FlashCORE Boost is a programmer software update that significantly improves the throughput rate for NAND devices. This software combines an algorithm update with programmer engine design specifically tailored to NAND flash memories.

FlashCORE Boost software applies to FlashCORE II programmers only.

### ***NAND Programming Requirements***

NAND flash memory devices consist of thousands of blocks; each block consists of many pages; and each page consists of 512 to 4096 bytes.

In order to program these bytes with user data, the device has to receive the appropriate command and page address, followed by each data byte for every location in the page.

Since NAND devices and images are so large, any delay in loading each successive byte into the page during programming can quickly add up to create long program and verify times.

Long program and verify times lead to slower manufacturing throughput, higher production costs, and lower revenues. FlashCORE Boost technology addresses these issues.

### ***How FlashCORE Boost Works***

FlashCORE II programmers use a powerful engine to produce waveforms supplied to devices. When a NAND device is selected, the programmer dynamically loads the FlashCORE Boost into the engine.

With FlashCORE Boost, the engine is optimized to provide the most efficient and fastest waveform possible for NAND devices, thus allowing the programmer to feed the data to the NAND device as quickly as the device will accept it. This optimized engine reduces programming times dramatically.

The programmer engine is field upgradeable. No hardware change is required if a FlashCORE II programmer is already used. Through a simple software download, customers achieve faster speeds.

## Benefits of FlashCORE Boost

BENEFIT	FINANCIAL VALUE
NAND programming and verifying speeds are increased 300% to 400%.	Cuts down total production costs in some cases as much as 3 to 4 times, reducing labor expense by tens of thousands of dollars.
Significant gains in system throughput. Running FlashCORE Boost on each programming site (up to 4 sites on the PS288; up to 12 sites on the PS588), provides the equivalent of a second machine in the original footprint.	Several hundred thousand dollars in capital equipment savings.
Unlike other systems, FlashCORE I is field upgradeable to FlashCORE II. This significantly minimizes production downtime for machine changeover.	Large positive return on investment and very short payback period.

## NAND Device Programming Times, With and Without FlashCORE Boost

Device Name	With FlashCORE Boost		Without FlashCORE Boost		% Change
	Program	Verify	Program	Verify	
Samsung, K9F5608R0D-J, FBGA-63	15.4	4.3	38	33.5	363%
Toshiba, TY80009000CMGF, FBGA-149	27.52	9.61	60.11	77.97	372%
STMicro, NAND99R3M0A-ZBA-E, TFBGA-149	35.15	8.86	69.07	72.15	321%
Hynix, HYG0SEG0MF1-P, FBGA-149	27.25	8.6	56.83	67.37	346%
STMicro, NAND01GW3M2B, TFBGA-137	60	18.6	128	148	351%

Data I/O tests have established typical programming and verifying times using FlashCORE Boost technology. Shown above are the results for five NAND devices. These improvements in program and verify times are typical for NAND devices.

Data I/O supports more than 400 NAND devices. To search for devices, go to <http://www.dataio.com/device/>.

To learn if the device you are using—or plan to use—supports FlashCORE Boost technology, call or e-mail [support@dataio.com](mailto:support@dataio.com).

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