



## **WHITE PAPER**

### **Designing with Latest Generation Flash Memories Programming Made Easier with High-Speed Programmers from Data I/O® and Multiple Word Program from STMicroelectronics**

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#### **Introduction – Increased request for enhanced Flash memory performances**

Today's unstable Electronic Market is pushing more and more the End Equipment manufacturers to request more performing and optimized Flash devices.

The features more commonly requested today are high speed, high density and reliability, together with a huge flexibility in order to make them as versatile as possible.

Technology has always been a critical issue and the Semi-conductor manufacturers have continuously increased densities and features, while reducing the package size.

On the programming side, many solution providers, from conventional universal device programming manufacturers to suppliers of boundary-scan tools, have offered a variety of excellent ways for Flash memory users to program their devices.

In order to respond to this request for flexibility, STMicroelectronics have recently developed a new product family, specifically dedicated to Digital Consumer and Peripherals: the LightFlash™ Family

This dynamic group of products is optimised for basic code storage, when fast in-system programming and erasing operations are required and in-field partial code reprogramming is not mandatory. For such applications chip program and chip erase time are key targets, which are achieved through a new embedded Multiple Word Program (MWP) algorithm and a dedicated 12V power supply voltage for program/erase operations.

#### **High-speed programming that keeps up with the new LightFlashä devices.**

Data I/O introduced in 1999 its high speed programming solution FlashCORE as part of their revolutionary In-Line Programming Solution, ProLINE RoadRunner. The programmer is optimised to program very high-density Flash devices almost at theoretical time minimum.

Today, Data I/O offers the FlashCORE programming architecture in all of their solutions: in the Desktop Programmer FlashPAK, in the Off-Line Programming System PS 300 FC and in the In-Line Programmer ProLINE RoadRunner.

The current benchmark of a programming time under 0.3 seconds per Megabit demonstrates the programmer's performance.

The FlashCORE was designed to program even faster, so as Flash memories become bigger and faster, the FlashCORE will become faster as well.

With the Multiple Word Program algorithm used in the LightFlash devices, customers benefit from an ultra-fast programming on different programming solutions tailored to their individual needs.

All three programming solutions are embedded in Data I/O's Connected Programming Strategy. The Connected Programming Strategy creates a unified programming solution and enables customers to connect design to production, business processes to business systems, and the programming supply chain to its users. Customers can make code changes in design and incorporate them into the production line seamlessly and nearly instantaneously, regardless where design and production is located, being in-house or out-sourced to an EMS company. Data I/O's vision is lean manufacturing based on just-in-time programming, minimised inventory and flexible manufacturing.

### **What is Multiple Word Program?**

Multiple Word Program (**MWP**) is a new feature introduced by ST in the LightFlash™ family aimed at reducing the device program time.

The Multiple Word program command is based on a Fast Program Algorithm (FPA) and can be used to program large streams of data. It reduces the programming time by programming words at consecutive addresses, which are automatically incremented, thus reducing the number of write cycles required.

In Single Supply Flash memories, the high voltages necessary to perform a Program or Erase operation are generated internally starting from the external voltage supply: this is done for each location to be programmed. The LightFlash™ family uses a separate external high voltage supply  $V_{PP}$  12V for all program and erase operations, to further reduce Program and Erase time.

The MWP command allows a 16Megabit device to be programmed in less than 2 seconds, compared with 9 seconds using the standard Word Program command, which gives a time reduction of 80%!