

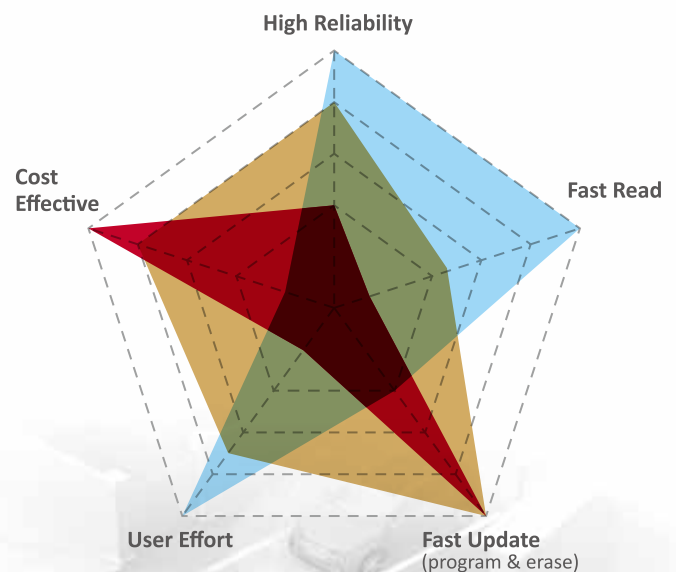
MACRONIX

LybraFlash™

The Optimum Solution for Gigabit Flash Memory

Today's applications continue to quickly evolve to support growing demands from the markets they serve. This demand is lengthening feature lists and driving the growth of non-volatile memory (NVM) capacities, previously 32-64MB, jumping to 128MB and above. These trends are also compelling the adoption of NAND Flash over NOR Flash for the cost advantage, when the density range of NOR can be matched by NAND. However, it can be an initial undertaking to work with NAND if the system designer lacks experience in doing so or if the application doesn't support it.

With that challenge in mind, Macronix has developed LybraFlash™ as an ideal choice for most automotive systems. LybraFlash™ delivers a user experience comparable to NOR flash, with no need to change the system's hardware design and only small modifications to system software to achieve this.



LybraFlash™ Gen 1 - The Optimum Solution

■ NOR (octaflash) ■ LybraFlash ■ SLC NAND

Note : The largest area of the radar chart is the best.



Gigabit density,
SPI interface



With particular features
for NOR-like application



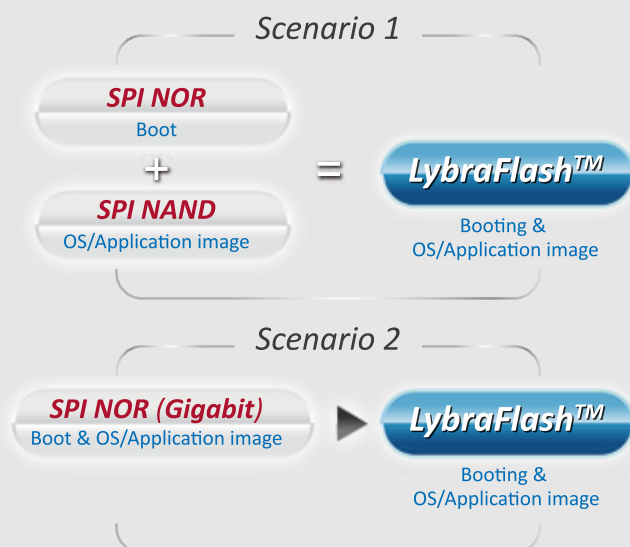
Optimum solution
between cost effective (@Gb),
performance and reliability



Challenges in adopting SPI NAND overcome with LybraFlash™

Features have been added so that it is possible to support a bootstrap process like SPI NOR which is unlike normal SPI NAND. Normal SPI NAND's read operation is much different from SPI NOR. Thus, this could cause a problem with normal SPI NAND booting unless the SoC ROM code is modified. This initial boot code is normally stored in ROM in the SoC and so any changes would require an expensive mask change. However, with LybraFlash™, it is more probable that no hardware changes will be necessary.

Some systems require a SPI NAND device but still need to adopt a SPI NOR for booting. LybraFlash™ could now offer a more efficient design, allowing the designer the cost benefit of gigabit flash capacity of LybraFlash™ and also allowing booting without having to add an additional SPI NOR.



Program and erase performance dramatically greater than SPI NOR

In addition to being able to emulate the boot sequence of SPI NOR Flash, LybraFlash™ delivers a significant performance boost compared to normal SPI NAND (see figure below). If a system does not require fast random read operations and focuses instead on a continuous read operation, LybraFlash™'s continuous read operation at 104Mhz I/O is close that of the most popular Quad SPI NOR at 133MHz, and is much faster than normal SPI NAND*. Program performance of LybraFlash™ can be 4 times that of SPI NOR, and its erase performance is almost 450 times faster than SPI NOR.

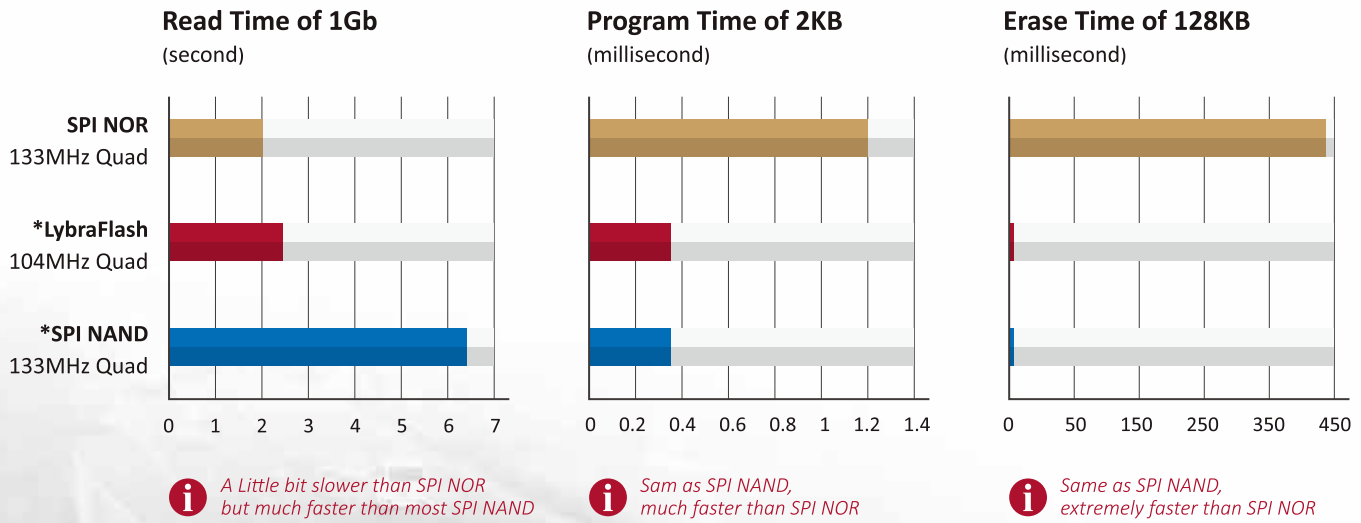
* Currently most SPI NAND devices cannot support continuous reads across blocks

Enhanced features for better reliability

Considering the industrial and automotive applications that demand data integrity and longer product lifetimes, LybraFlash™ provides enhanced reliability features. Please contact Macronix for detailed information.



Performance Comparison



*Note: current most SPI NAND cannot support continuous read cross over block but LybraFlash supports

LybraFlash™ Packages

	1Gb	2Gb
○ Available ● Developing		
3V Serial	MX31LF1GE4BC	MX31LF2GE4BC
8-WSON (8x6)	●	●
16-SOP	●	●
24-FBGA (6x8mm, 5x5 ball array)	●	●
1.8V Serial	MX31UF1GE4BC	MX31UF2GE4BC
8-WSON (8x6)	●	●
16-SOP	●	●
24-FBGA (6x8mm, 5x5 ball array)	●	●

- Some options with Vcc, package, and temperature grade options are not currently offered as a default, though showed in this roadmap material.
- Need to trigger derivative project for delta qual & part name release.
- Please contact Macronix Sales representatives for derivative project availability & lead time.

