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Computerworld, Lucas Mearian, February 14, 2013

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X-Bit Labs, Anton Shilov, February 14, 2013

Original URL: http://www.theregister.co.uk/2013/02/18/micron_tlc_facebook/

Hard Man of Facebook: We might just eat those cheap TLC flash chips Micron's teensy 3-bit NAND chips could feed FB data centre beast

By **Chris Mellor**

Posted in [Cloud](#), 18th February 2013 18:04 GMT

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Micron has built the world's smallest 3-bits per cell NAND chip, targeting USB stick memory and the like, while Facebook's open source hardware guru has indicated such chips could be used in its cloud's data centres providing ultra-cheap flash storage.

TLC (Triple-Level Cell) NAND Technology has 3 bits per cell, one more than in standard MLC (Multi-Level Cell) flash and it provides cheaper flash storage for a given capacity level - although access speed is slower than MLC and its working life in terms of write cycles is much lower. MLC flash built using a 20-something nanometre process size could have 3,000 raw write erase cycles whereas equivalent process TLC flash could have less than a third of that.

Even with over-provisioning to extend its endurance, TLC flash has not found favour in data centre use cases. Instead it has been used for USB memory sticks and camera flash cards - in a SanDisk focus for example, where its write life is not so important but its cost is.

Micron has just built a 128Gbit TLC chip using a 20nm process which is just 146mm² in area. That's 12.083mm a side, slightly bigger than a small fingernail. It means TLC flash applications can cram more capacity in the same physical size as before.

Micron thinks some 35 per cent of shipped NAND gigabytes this year will be used by removable flash storage products like camera cards and USB sticks. It's a big market for small chips.

At the same time Facebook's Open Compute Project prophet, Frank Frankovsky (right), has come down from the server, networking and storage mountain with another OCP commandment akin to his "Thou shalt not commit gratuitous differentiation" pronouncement. This time it's: "Thou shalt use TLC flash for cold data" - so to speak, of course. If he's right then TLC flash demand could become much higher.

There's a recognition that TLC flash is cheap as chips and much faster to access than disk or even, wash your mouth out, tape. Frankovsky, speaking to [Ars Technica](#) [1], said you could devise a controller algorithm that tracked cell status and maintained, in effect, a bad cell list like a disk drive's bad block list. Dead TLC flash cells would just be ignored. By knowing which cells were good and which were bad you could build a cold storage flash resource that would be cheaper than disk, he reckons, because you wouldn't need techies swarming all over the data centre replacing broken disk drives from the tens of thousands that would be needed.



FEBRUARY 17TH, 2013 by Josh Linden

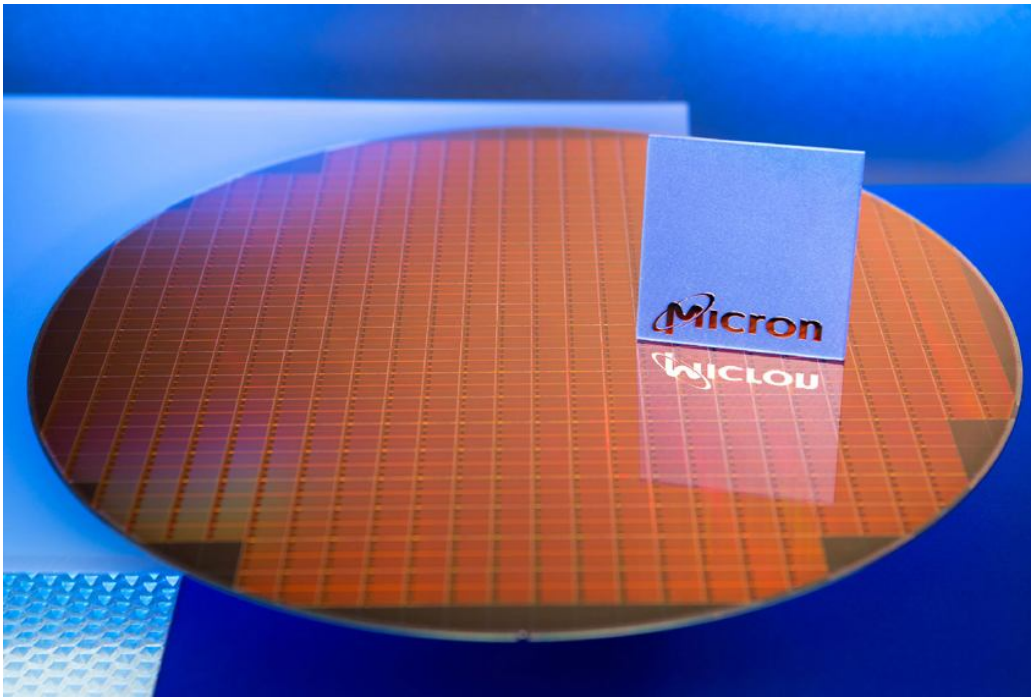
Micron Announces 20nm 128Gb TLC NAND Flash Device

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Micron has begun sampling a new TLC NAND device with select customers, in expectation of full production in the second quarter of 2013. The new 128gb device uses Microns 20nm process, resulting in a total size of just 146 square millimeters, more than 25% smaller than a similar-capacity Micron MLC NAND device.



Triple-level-cell (TLC) flash stores three bits per cell, compared to two bits for MLC and one for SLC flash. TCL's higher storage density comes at the cost of reduced endurance and performance, which is why most existing TLC devices are intended for removable storage applications such as flash cards and USB drives. New advances in TLC NAND architecture have demonstrated the potential for TLC to continue to grow its share of the flash storage market however, with Samsung already offering the [TLC-based SSD 840](#) and [TLC NAND SSD solutions expected from the OCZ Everest Platform](#) in the near future.

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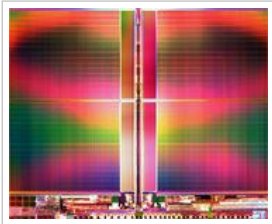
Micron Intros the World's Smallest 128Gb NAND Flash Device - Print

<http://www.tomshardware.com/news/micron-128gb-nand-flash-device,21134.html>

4:00 PM - February 17, 2013 by Tarun Iyer

Source: [TechPowerUp](#)

At the International Solid-State Circuits Conference taking place on February 19th, Micron is expected to present a paper on its new 128 Gb (gigabit) flash memory device which measures just 146 mm² and is currently the smallest of its kind. The device utilizes the company's 20 nanometer processing technology and a triple-level-cell (TLC) that stores 3 bits of data per cell and is more than 25 per cent smaller than the company's current multi-level-cell (MLC) devices.



Glen Hawk, Vice-President of Micron's NAND Solutions Group has stated that the device would be "empowering a new class of consumer storage applications" and is primarily aimed at the removable storage market (specifically memory cards and USB flash drives) which is expected to constitute 35 percent of the NAND market in 2013.

Micron is currently sampling the 128 Gb TLC device with "select partners" and should be available for purchase by Q2 2013 at a yet to be determined price.

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Tom's Hardware - <http://www.tomshardware.com>

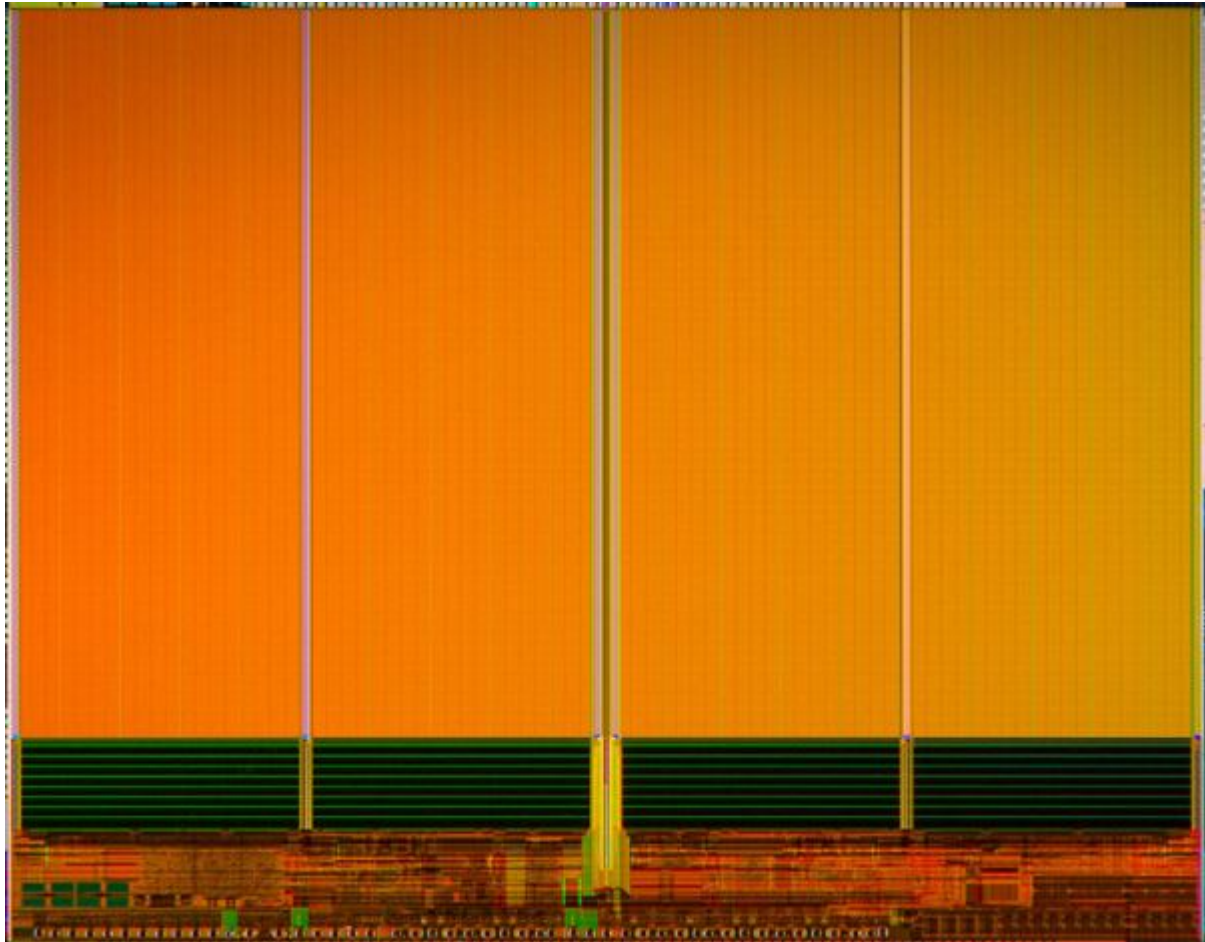
Micron creates 20 nm TLC memory chip with 128 gigabit capacity

By Marc Mouthaan, Sunday February 17, 2013 06:36 AM, source: [X-bit labs](#)

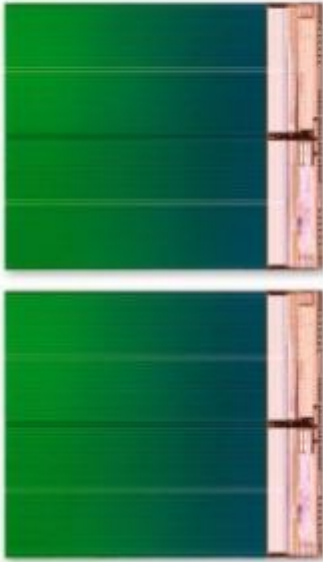
Micron has been able to create Triple Level Cell (TLC) chips with a capacity of 128 gigabit. The chips are manufactured using a 20 nm production process and, as the name suggests, are capable of storing three bits per memory cell. This combination allows for the same storage capacities to be created using just two-thirds of the chip surface. One of the downsides of the technology is that the writing speeds are rather disappointing and memory cells can be written 'only' 750x. Through over-provisioning and wear-leveling algorithms, the durability of the chips should last over a longer period of time as well, though.

Samsung uses TLC flash memory in its regular 840-series of SSDs. We've already mentioned before that if you intend to use your PC intensively and your SSD becomes rather full, we wouldn't recommend this type of memory chips.

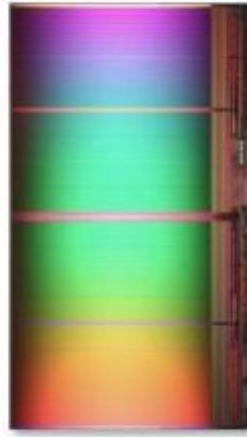
The above suggests that Micron's 128 gigabit TLC chips will predominantly be used in memory cards and USB flashdrives. Micron claims that its 20nm TLC chip has the greatest data density in the world. With a 146 mm² surface, the chip is roughly 25% smaller than a 128 gigabit MLC chip. Micron has yet to reveal any information regarding the first products featuring the technology.



34nm



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Posted February 15, 2013 by Scot Strong in [News](#)

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Micron Introduces Smallest 128-GB NAND Flash Device — 20nm With TLC Density

Micron Technology has announced the introduction of the industry's smallest 128GB NAND flash memory device. This new NAND flash module utilizes Micron's award-winning 20nm architecture with triple-level cells (TLC), which are able to store three bits of information per cell. This creates a highly compact storage solution, targeted at cost-competitive removable storage applications such as flash cards and USB drives.

Measuring a mere 146 square millimeters, this new 128GB device is more than 25% smaller than Micron's own multi-level cell (MLC) NAND modules also utilizing 20nm architecture. Flash cards and USB drives are anticipated to represent 35% of total NAND gigabytes sold in calendar 2013. Larger capacity USB drives in their same current form factor appear to be very close on the horizon!



According to Glen Hawk, vice president of Micron's NAND Solutions Group, "This is the industry's smallest, highest capacity NAND flash memory device — empowering a new class of consumer storage applications. Every day we learn of new and innovative use cases for flash storage, underpinning the excitement and opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base."

Micron is now sampling the 128GB TLC NAND device with select partners, and it should be in production in the second quarter of 2012. Micron's press release can be viewed in its entirety [here](#).

Micron 128Gb TLC NAND Flash Chip Measuring 146mm²

This is a Press Release edited by StorageNewsletter.com on Fri, February 15th, 2013

25% smaller than same capacity MLC device, using 20nm process

[Micron Technology, Inc.](#) introduced the industry's smallest 128Gb NAND flash memory device utilizing its 20nm process technology.

The new 128Gb device stores **three bits of information per cell**, called triple-level-cell (TLC), creating a compact storage solution.

Measuring 146mm², the new 128Gb TLC device is more than 25% smaller than the same capacity of Micron's 20nm MLC NAND device.

It is targeted at the cost-competitive removable storage market (flash cards and USB drives), which is projected to consume 35% of total NAND gigabytes in calendar 2013.¹

Micron is now sampling the 128Gb TLC NAND device with select customers; it will be **in production in calendar Q2**.

"This is the industry's smallest, highest-capacity NAND flash memory device empowering a new class of consumer storage applications," said Glen Hawk, VP of Micron's NAND solutions group. *"Every day we learn of new and innovative use cases for flash storage, underpinning the excitement and opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base."*

Micron is presenting a paper on the 128Gb TLC NAND device at the upcoming International Solid-State Circuits Conference (ISSCC) on Feb. 19, in San Francisco, CA.

Micron launches dense 128-Gbit NAND flash

Peter Clarke

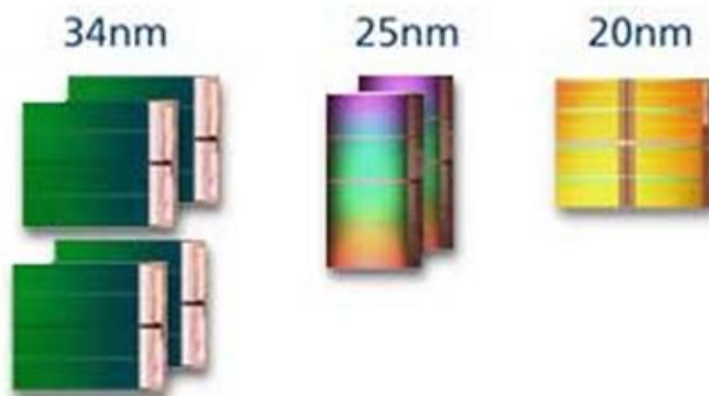
2/15/2013 6:06 AM EST

LONDON – Micron Technology Inc. (Boise, Idaho) has launched a triple-level cell (TLC) 128-Gbit NAND flash memory in a 20-nm manufacturing process technology that it claims is the world's densest memory.

At 146 square millimeters the memory die is more than 25 percent smaller than the company's same-capacity MLC NAND memory and it is intended for use in removable storage, including flash memory cards and USB drives. On the assumption of reasonable process yield a small die area results in more memories per wafer, lower costs for the manufacturer and lower prices for the buyer.

Micron expects removable storage to consume 35 percent of NAND memory in 2013. The 128-Gbit NAND is sampling with selected customers and will be in volume production in the second quarter of 2013, Micron said.

No details of the read or write performance, or the cycling endurance of the memory were provided by Micron in a press release but a paper is due to be presented on the 128-Gbit TLC NAND device at the upcoming International Solid-State Circuits Conference (ISSCC) on Feb. 19 at 3:15pm, in San Francisco, California.



16-Gbytes of storage required four die at 34-nm and two die at 25-nm. Micron claims an area saving of 25 percent at 20-nm over the previous generation.

February 15th, 2013, 09:34 GMT · By [Sebastian Pop](#)

Micron Reveals 128 Gb NAND Flash Memory Chip



When making a solid state storage drive, the maximum capacity ultimately depends on the individual capabilities of each flash chip, which is why Micron is going to cause a stir, however unnoticed by consumers at large.

Being one of the greatest innovators in terms of flash memory (as well as [DDR3 RAM](#), but that has no bearing this once), Micron often releases special products and reveals new milestones.

 ENLARGE

The latest product to be introduced via a press release qualifies as both: a NAND Flash memory devices with a capacity of 128 Gigabits.

Based on the 20nm manufacturing process technology, it stores three bits of information per cell, hence its TLC name (triple-level-cell).

It also measures 146 square millimeters, which makes it 25% smaller than Micron's 20 nm multi-level-cell (MLC) NAND device of similar capacity.

It is for this reason that the new chip is expected to become a force to be reckoned with on the markets of flash card, flash drives, etc.

"This is the industry's smallest, highest-capacity NAND flash memory device—empowering a new class of consumer storage applications," said Glen Hawk, vice president of Micron's NAND Solutions Group.

"Every day we learn of new and innovative use cases for flash storage, underpinning the excitement and opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base."

Oddly enough, Micron doesn't specifically mention solid state drives in its press release, despite the new device opening doors for 1 TB and 2 TB versions.

At any rate, sample shipments will only start in the second quarter of the year, which means that commercial devices will have to wait until Q3, most probably.

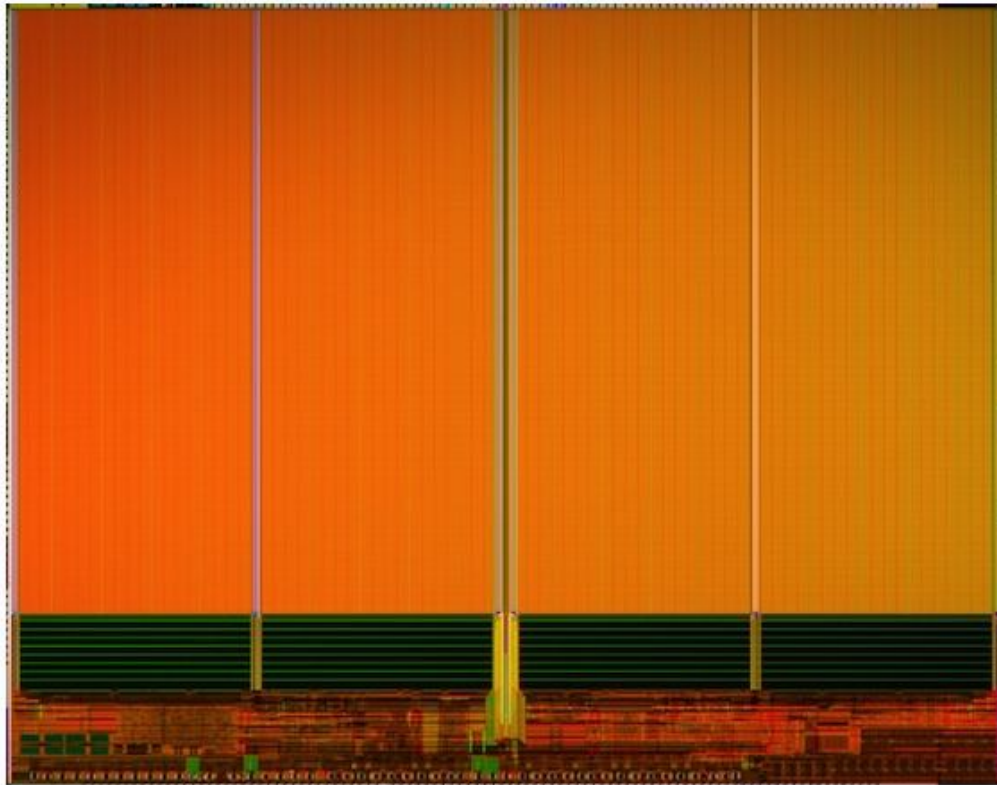
A paper on the 128Gb TLC NAND device will be presented at the next International Solid-State Circuits Conference (ISSCC) on Feb. 19, in San Francisco, California.

Micron Develops The Smallest 128-Gb NAND Flash Chip

Peeyush Gupta Feb 15th, 2013 0 Comments

Chip manufacturer Micron has developed a new NAND chip that is supposed to be the world's smallest 128-Gb [flash memory](#). The chip uses 20-nanometer process technology and its die area is just 146 mm square.

The chip is based on triple-level-cell (TLC) flash technology. It stores three bits per cell instead of two, that also makes it the densest 128-Gb chip. The chip is more than 25 percent smaller than the current multi-level-cell (MLC) based chips. But this high density will also result in lower write speed and reduced endurance. According to Glen Hawk, vice president at Micron NAND solution group this is industry's smallest, highest capacity NAND flash memory [device](#), empowering a new class of consumer storage application.



Micron is not planning to use this chip in SSDs, instead this new chip is targeted at cost competitive removable storage market. So, this chip will be used in memory cards and USB thumb drives.



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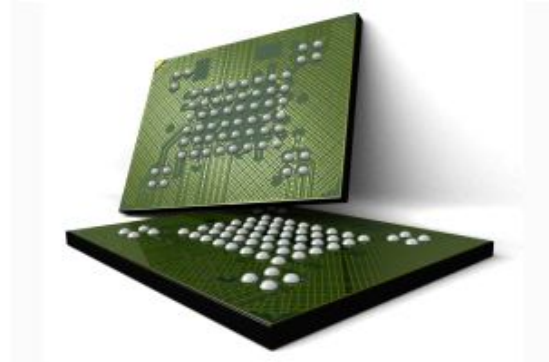
15 February 2013

NAND flash device is 'industry's smallest'

The industry's smallest 128Gb nand flash memory device has been touted by Micron Technology.

The triple level cell module, which measures just 146mm², is said to be 25% smaller than the same capacity of Micron's 20nm multi level cell nand device.

Utilising the company's 20nm process technology, it is targeted at the removable storage market, such as flash cards and usb drives.



"This is the industry's smallest, highest capacity nand flash memory device - empowering a new class of consumer storage applications," said Glen Hawk, vice president of Micron's nand solutions group.

Micron is now sampling the 128Gb device with select customers. Mass production is scheduled for Q2 this year.

Author

[Laura Hopperton](#)

Micron shrinks NAND with three bits per cell

Richard Wilson

Friday 15 February 2013 09:28

Micron Technology has introduced its smallest 128Gbit NAND flash memory fabbed on a 20nm process.

The memory device uses a triple-level-cell (TLC) design which stores three bits of information per cell.

This means the device is more than 25% smaller than the same capacity of Micron's 20nm multi-level-cell (MLC) NAND device.

Sampling

Micron is sampling the 128Gb TLC NAND device and it will be in production in Q2.

"This is the industry's smallest, highest-capacity NAND flash memory device," said Glen Hawk, vice president of Micron's NAND Solutions Group.

Micron is presenting a paper on the 128Gbit TLC NAND device at the upcoming International Solid-State Circuits Conference (ISSCC) on Feb. 19.

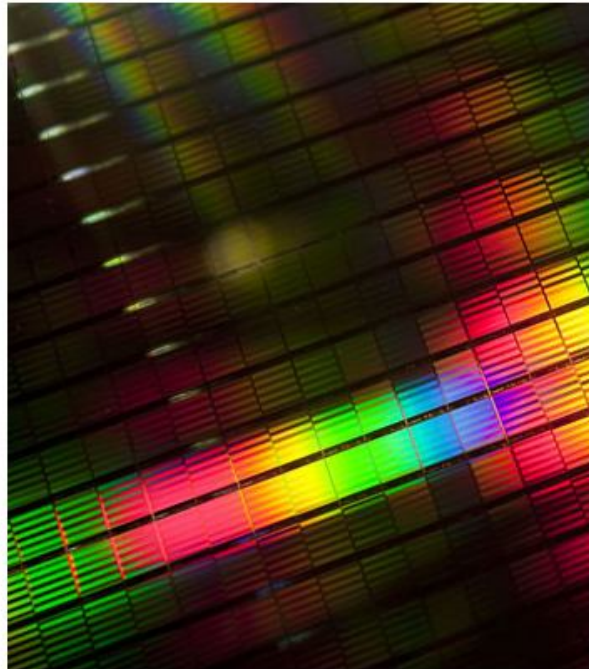
Micron touts industry's smallest 128Gb NAND flash chip

By Jose Vilches
On February 15, 2013, 9:50 AM

Micron Technology has announced what it claims is the industry's densest 128Gbit NAND flash memory device. With die area of only 146 square millimeters, the chip is made using a 20nm fabrication process and is based on triple-level-cell flash technology.

According to Micron, the new chip measures 12mm x 12mm and is roughly 25% smaller than a similar capacity 20nm multi-level-cell NAND device.

Triple-level-cell (TLC) flash technology is similar to single-level-cell (SLC) and multi-level-cell (MLC). All three consist of similar transistors, the difference is that they store a different amount of bits per cell. SLC only stores one, whereas MLC stores two and TLC stores three. Adding more bits per cell leads to higher storage density but it also reduces endurance while increasing program, erase and read latencies. In other words this is why pricier SLC NAND is mostly limited to business applications while MLC and TLC flash chips are found on consumer products.



Micron isn't targeting their TLC NAND at SSDs but rather at the cost-competitive removable storage market (flash cards and USB drives), which is projected to consume 35% of total NAND gigabytes in calendar 2013.

But TLC flash chips are indeed making their way into SSDs and will be an important factor in bringing prices further down. Last year, Samsung introduced the first commercially available TLC NAND based SSD in the form of the [Samsung 840](#) (a cheaper version of the [Pro variant we reviewed](#)). Even with the performance implications of TLC, many reviewers have found Samsung's 840 SSD to be faster than previous generation MLC based alternatives while offering similar or higher endurance as well. That's encouraging for the technology but also speaks about Samsung's skill when comes to designing a controller, firmware, and NAND chips themselves.



Product

Micron introduces industry's smallest 128GB NAND Flash

Micron Technology has introduced the industry's smallest 128-gigabit (Gb) NAND flash memory device utilizing its 28-nanometer (nm) process technology.

The new 128Gb device stores three bits of information per cell, called triple-level-cell (TLC), creating a highly compact storage solution.

Measuring 146mm², the new 128Gb TLC device is more than 25% smaller than the same capacity of Micron's 20nm multi-level-cell (MLC) NAND device. The 128Gb TLC device is targeted at the cost-competitive removable storage market (flash cards and USB drives), which is projected to consume 35% of total NAND gigabytes in calendar 2013. Micron is now sampling the 128Gb TLC NAND device with select customers; it will be in production in calendar Q2.

"This is the industry's smallest, highest-capacity NAND flash memory device—empowering a new class of consumer storage applications," said Glen Hawk, vice president of Micron's NAND Solutions Group. "Every day we learn of new and innovative use cases for flash storage, underpinning the excitement an opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base."

Micron touts smallest 128-Gb NAND chip

by [Cyril Kowaliski](#) — 6:00 AM on February 15, 2013

And the march toward ever-higher flash memory densities goes on. This time, it's Micron breaking a new record. The firm [has introduced](#) what it claims to be the industry's smallest 128-Gb NAND flash memory chip yet, with die area of only 146 mm².

The chip is fabbed using Micron's 20-nm process, and it's based on triple-level-cell (TLC) flash technology. According to Micron, the chip is "more than 25 percent smaller" than a similar 128-Gb offering built using multi-level-cell (MLC) tech on the same process.



For the uninitiated, TLC flash stores three bits per cell instead of two, but that higher density comes at a cost: lower write speeds and reduced endurance compared. You might have read about TLC before in [Geoff's review](#) of Samsung's 840 Series solid-state drives, which use this technology.

Now, Micron's new 128-Gb chip may not show up inside any SSDs. Micron says the chip is "targeted at the cost-competitive removable storage market"—in other words, SD cards and USB thumb drives. In those devices, the shortcomings of TLC memory may be less of a hindrance, and the higher density could help increase capacity per dollar. Bigger, cheaper thumb drives definitely sound good to me.

Micron is already sampling the 128-Gb chip with "select customers," and production is on track for next quarter.

Micron releases smallest 128Gbit flash chip

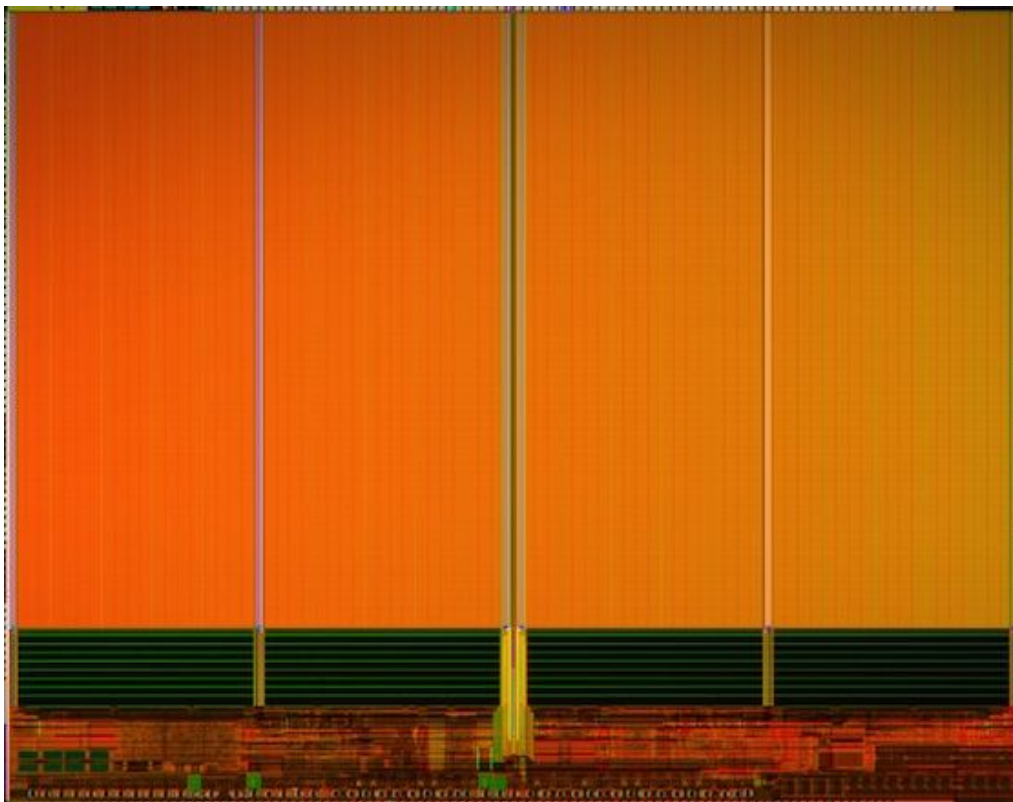
Triple-level cell NAND chip 25% smaller than previous NAND chip

Lucas Mearian

February 14, 2013 ([Computerworld](#))

Micron Technology [today introduced](#) the industry's densest 128Gbit NAND flash memory device utilizing its 20-nanometer (nm) process technology and packing three bits of data per cell into the chip.

Three-bit flash technology is referred to as triple-level-cell (TLC), a highly compact storage medium compared with far more common, two-bit, multi-level cell (MLC) NAND flash. The most expensive, highest performance and longest lasting NAND flash is single-level cell (SLC) flash.



A 20nm NAND flash die.



Micron's new chip measures 12mm x 12mm, and it is more than 25% smaller than the same capacity of Micron's 20nm multi-level-cell (MLC) NAND device. The 128Gb TLC device is targeted at the low-cost removable storage market (flash cards and USB drives), which is projected to consume 35% of total NAND gigabytes in calendar 2013, according to research firms.

Micron is now sampling the 128Gb TLC NAND device with select customers; it will be in production in second quarter of calendar 2013.

"This is the industry's smallest, highest-capacity NAND flash memory device, empowering a new class of consumer storage applications," said Glen Hawk, vice president of Micron's NAND Solutions Group.

Micron is presenting a paper on the 128Gbit TLC NAND device at the upcoming International Solid-State Circuits Conference (ISSCC) on Feb. 19 in San Francisco.

[Lucas Mearian](#) covers storage, disaster recovery and business continuity, financial services infrastructure and health care IT for Computerworld. Follow Lucas on Twitter at

 [@lucasmearian](#) or subscribe to [Lucas's RSS feed](#) . His e-mail address is lmearian@computerworld.com.

See [more by Lucas Mearian on Computerworld.com](#).



Legit News

Micron Introduces Industry's Smallest 128-Gigabit NAND Flash Device

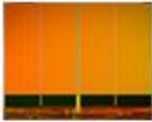
Micron Technology today introduced the industry's smallest 128-gigabit (Gb) NAND flash memory device utilizing its award-winning 20-nanometer (nm) process technology. The new 128Gb device stores three bits of information per cell, called triple-level-cell (TLC), creating a highly compact storage solution. Measuring 146mm², the new 128Gb TLC device is more than 25 percent smaller than the same capacity of Micron's 20nm multi-level-cell (MLC) NAND device. The 128Gb TLC device is targeted at the cost-competitive removable storage market (flash cards and USB drives), which is projected to consume 35 percent of total NAND gigabytes in calendar 2013.¹ Micron is now sampling the 128Gb TLC NAND device with select customers; it will be in production in calendar Q2.



"This is the industry's smallest, highest-capacity NAND flash memory device—empowering a new class of consumer storage applications," said Glen Hawk, vice president of Micron's NAND Solutions Group. "Every day we learn of new and innovative use cases for flash storage, underpinning the excitement and opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base."



News



Micron Debuts Industry's Smallest 128Gb NAND Flash Chip.

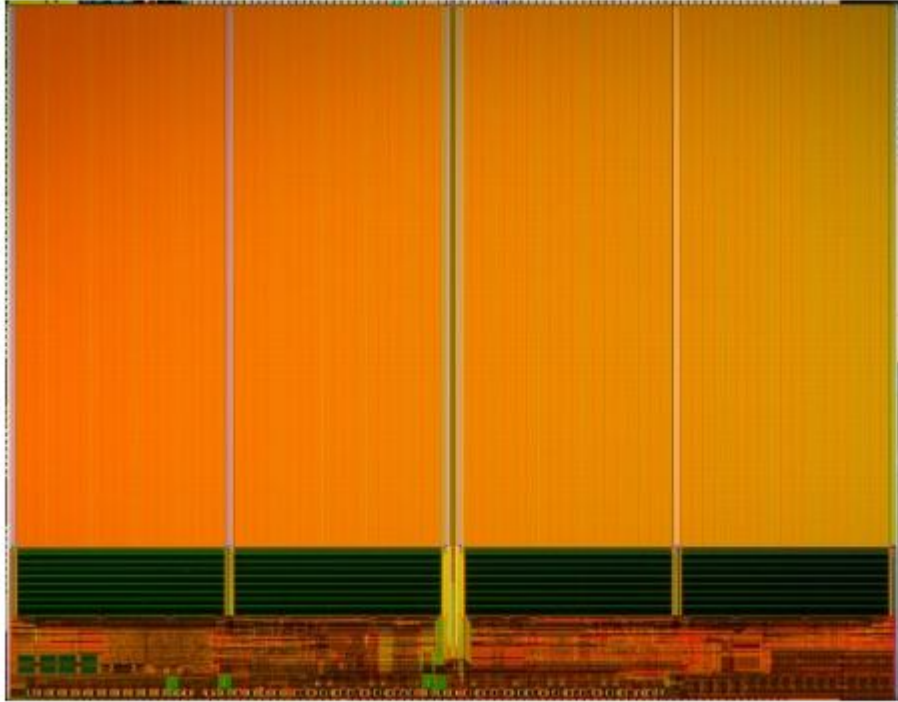
Micron Introduces 128Gb TLC NAND Flash Chip

[02/14/2013 02:40 PM]
by [Anton Shilov](#)

Micron Technology on Thursday introduced the industry's smallest 128Gb NAND flash memory device made using 20nm process technology. The new 128Gb device stores three bits of information per cell (3bpc or triple level cell [TLC]), which makes it smaller and more cost-efficient.



Measuring 146mm^2 , the new 128Gb TLC device is more than 25% smaller than the same capacity of Micron's 20nm multi-level-cell (MLC) NAND device. The 128Gb TLC device is targeted at the cost-competitive removable storage market (flash cards and USB drives), which is projected to consume 35% of total NAND gigabytes in calendar 2013.¹ Micron is now sampling the 128Gb TLC NAND device with select customers; it will be in production in calendar Q2.



"This is the industry's smallest, highest-capacity NAND flash memory device – empowering a new class of consumer storage applications. Every day we learn of new and innovative use cases for flash storage, underpinning the excitement and opportunity for Micron. We are committed to enriching our portfolio of leading Flash storage solutions that serve our broad customer base," said Glen Hawk, vice president of Micron's NAND solutions group.

