

ASX RELEASE

3 October 2019

## 4DS PROGRESSING TO IMEC'S MEGABIT MEMORY PLATFORM

- **Completed analysis of the fourth iteration of 300mm wafers (being the 46 wafers in “Lot 4”)**
- **Results affirmed, and further enhanced, 4DS’ understanding of the process conditions required to reproduce its memory on state-of-the-art production equipment with the characteristics required for stand-alone Storage Class Memory**
- **Based on the results of Lot 4, the Company and imec have agreed to integrate 4DS’s memory with imec’s megabit platform – a significant milestone as 4DS moves towards its goal of demonstrating a 1 megabit memory chip**
- **Planning with respect to the integration has commenced, with work to be undertaken in Q4 of 2019**

4DS Memory Limited (ASX:4DS) (**4DS** or the **Company**) refers to its ASX announcement dated 20 June 2019, and is pleased to provide this update on the status of the development of its memory technology.

During August and September 2019, the Company received and analysed the two sets of twenty-three 300mm wafers (46 in total) in Lot 4. This analysis, and the accumulated knowledge from prior Lots, has:

- further enhanced the Company’s understanding of the process conditions required to produce 4DS’ memory on imec’s state-of-the-art production equipment, being the same equipment as used by high volume/high density manufacturers of memory;
- affirmed the impact of changes in process conditions on cell structure and desired memory characteristics for stand-alone Storage Class Memory<sup>1</sup>, with meaningful improvements having been achieved with each subsequent Lot of 300mm wafers; and
- provided further evidence of the repeatability of the process for producing 4DS’ memory on state-of-the-art production equipment

Following the analysis of the results of Lot 4, 4DS and imec have agreed to advance to the next development stage, being the integration of 4DS’ memory technology with imec’s megabit platform. This platform is a proven CMOS megabit test vehicle fabricated on 300mm wafers on which the 4DS memory cells can be placed and function. It will enable 4DS to demonstrate the true potential of its Interface Switching ReRAM technology for Storage Class Memory. The integration will be undertaken in back-end-of-line (BEOL) processes, which is the latter stage of the chip manufacturing process.

4DS and imec have commenced planning for the initial phase of the integration of 4DS’ memory with imec’s megabit platform. The Company will produce its initial lot of 300mm wafers during Q4 of 2019. The integration includes continuous monitoring and analysis of speed, endurance, retention and yield (in that order of importance).

The integration will extend into calendar year 2020, beyond the existing term of the collaboration agreement between 4DS and imec (31 December 2019).

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<sup>1</sup> Notably speed, endurance and retention. See <http://www.4dsmemory.com/technology/reram> for the Company’s objectives and priorities with respect to the characteristics required for Storage Class Memory.

4DS is currently in discussions with imec regarding the terms of an extension to the collaboration agreement between the parties, and the Company expects to finalise and agree the terms of the extension in the coming weeks.

Megabit memories are the minimum size needed to collect the statistically significant and meaningful data on endurance, speed, data retention and yield that are essential for high-volume memory makers to make informed decisions.

Chief Executive Officer and Managing Director, Dr Guido Arnout, commented “Having fabricated and tested around one hundred 300mm wafers, over 4 iterations, we believe we know how to repeatedly produce our memory on state-of-the-art production equipment. We are excited to be progressing to imec’s megabit platform and look forward to ultimately producing a megabit memory chip”.

Chairman, Mr Jim Dorrian commented “The joint decision with imec to now integrate our technology with imec’s megabit platform represents a significant step forward, and is a credit to the hard work and dedication of Guido and his technical team. We are delighted with the continued support we receive from imec, as well as from our joint development partner, Western Digital.”

- ENDS -

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#### About 4DS

4DS Memory Limited (ASX: 4DS), with facilities located in Silicon Valley, is a semiconductor development company of non-volatile memory technology, pioneering Interface Switching ReRAM for next generation gigabyte storage in mobile and cloud. Established in 2007, 4DS owns a patented IP portfolio, comprising 22 USA patents granted and 11 patent applications pending and or filed, which has been developed in-house to create high-density Storage Class Memory. 4DS has a joint development agreement with Western Digital subsidiary HGST, a global storage leader, which accelerates the evolution of 4DS’ technology. 4DS also collaborates with imec, a world-leading research and innovation hub in nanoelectronics and digital technologies. The combination of imec’s widely acclaimed leadership in microchip technology and profound software and information and communication technology expertise makes them unique.

For more information, please visit [www.4dsmemory.com](http://www.4dsmemory.com).

#### About imec

imec is the world-leading research and innovation hub in nanoelectronics and digital technologies. The combination of our widely acclaimed leadership in microchip technology and profound software and ICT expertise is what makes us unique. By leveraging our world-class infrastructure and local and global ecosystem of partners across a multitude of industries, we create ground breaking innovation in application domains such as healthcare, smart cities and mobility, logistics and manufacturing, energy and education.

As a trusted partner for companies, start-ups and universities we bring together close to 3,500 brilliant minds from over 75 nationalities. Imec is headquartered in Leuven, Belgium and also has distributed R&D groups at a number of Flemish universities, in the Netherlands, Taiwan, USA, China, and offices in India and Japan. In 2016, imec’s revenue (P&L) totalled 496 million euro. Further information on imec can be found at [www.imec-int.com](http://www.imec-int.com).

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For more information, please visit [www.imec.be](http://www.imec.be).

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