

Mac Equity Partners

Equity Capital Markets

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4DS Memory Ltd | Research Report Update

ALL FOUR BOXES TICKED... BRING ON THE CHIP!

4DS Memory ("4DS") has entered into a collaboration with Belgium based imec to develop a production-compatible process for 4DS' Interface Switching ReRAM memory technology.

The collaboration comes after 4DS reached a significant and world first milestone, having successfully configured its Interface Switching ReRAM technology to achieve read speeds comparable to DRAM, without the need for speed crippling error correction.

Under the agreement, 4DS and imec will develop a production-compatible process for the 4DS IS-ReRAM technology so as to facilitate future transfer of the 4DS technology to larger scale production facilities.

We see this collaboration as a strong validation of the unique nature of the 4DS technology.

To follow up our previous research note, Mac Equity now provides our commentary on this milestone collaboration and also outlines where we see future value in the increasingly exciting 4DS story.

INVESTMENT HIGHLIGHTS

Significant Validation and De-risking of Technology

- Imec's involvement in manufacturing the 4DS chip has underpinned our belief that the fourth milestone being data retention has been sufficiently demonstrated for use in Storage Class Memory applications, such that the Company can now progress immediately to a megabit chip.

State-of-the-art Development and Production Tools

- 4DS now have the ability to quickly leverage imec's process facilities for 300mm wafers commonly used by mass producers of memory.

Fast Track to Scalability

- Scaling to Mb (and future Gb) memory platforms is likely to ensure a speedy pathway to future commercial and technical milestones for 4DS.

Take Over Target Reiterated

- 4DS is now well positioned within the global semi-conductor memory storage industry, with many memory storage players keeping a watching brief on 4DS and its technology development. Of particular note is 4DS' Joint Development Agreement with Western Digital, a US based semi conductor behemoth capped at US\$27 billion.

Recent Oversubscribed Placement

- We note that in the recent oversubscribed share placement, Mr Jim Dorrian, the Chairman of 4DS, subscribed for A\$250,000 worth of shares, subject to shareholder approval. This provides us with additional confidence that 4DS is uniquely placed to achieve commercial and technical outcomes towards the delivery of a Storage Class Memory solution.

GICS Sector	Semiconductors & Semiconductor Equipment
Share Price	\$0.055
30 Day VWAP	\$0.049
Shares on Issue	942.4m
Market Cap Undiluted	~\$51.8m
Cash	~\$5.0m
52 Week High/Low (\$)	0.068/0.018



MANAGEMENT

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Dr Guido Arnout	CEO + MD
David McAuliffe	Executive Director
Howard Digby	Non - Exec Director

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PROVING NEXT GENERATION STORAGE MEMORY THROUGH REAL WORLD MANUFACTURE

Imec Collaboration - Fast Track to Commercialisation

Imec is recognised as the world's #1 semiconductor development institute with a track record in the transfer of semiconductor systems for ultimate commercialisation. It collaborates with the majority of the world's leading semiconductor companies and some universities and Silicon Valley start-ups which establishes imec as a globally recognised expert in the full spectrum of memory storage classes.

Importantly, imec owns and operates the same semiconductor manufacturing equipment used in high volume high density production by semiconductor manufacturers. The obvious advantage for 4DS is that the ultimate commercialisation of the technology through to high volume high density mass production can be expedited with minimal alterations to imec's manufacturing facilities.

The aim of the collaboration is to integrate Interface Switching ReRAM memory cells with technology manufacturing processes already used in mass production memory fabrication plants. This will provide future users, licensees or acquirers of 4DS' technology with the ability to leverage their existing well established memory platform as a foundation for integrating 4DS' technology at low cost and with minimal disruption to their existing manufacturing processes.

The Last Milestone - Data Retention

As previously noted in our research and the Company's regular ASX announcements, 4DS was developing their technology through the achievement of four critical milestones, being scalability, endurance, access speed and data retention. Given the collaboration agreement with imec and the extensive due diligence that would have taken place, we have concluded that the data retention results to date have given imec confidence to progress with a collaboration and we consider that last milestone all but complete. This was reinforced by 4DS' presentation lodged with ASX on 24 November 2017.

Where to from here?

Using state-of-the-art equipment, 4DS and imec will manufacture a Mb-sized Interface Switching ReRAM chip, and conduct testing similar to that conducted by 4DS engineers to prove it has a Mb chip with a fully functioning memory suitable for Storage Class Memory, universally considered "the holy grail" of memory by the semiconductor industry. The data generated from real world testing will then be collated and used not only to prove the advantages of the technology at Mb scale (and in the future Gb scale), but also to provide potential technology licensees or acquirers of 4DS, with the data required to make informed investment decisions.

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