ASX RELEASE

19 July 2016

INVESTOR UPDATE

4DS Memory Limited (ASX: 4DS) (4DS) has released an updated presentation to coincide with investor marketing commencing in Australia today.

In addition, a corporate video can be viewed at www.4dsmemory.com/company/corporate-video.

ENDS

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About 4DS

4DS Memory Limited (ASX: 4DS), with research and development facilities located in Silicon Valley, is a developer of non-volatile memory technology, pioneering non-filamentary ReRAM for next generation storage in mobile and cloud. Established in 2007, 4DS owns a patented IP portfolio developed in-house to create high density gigabyte storage. 4DS has a joint development agreement with HGST, a global storage leader. For more information, please visit www.4dsmemory.com.

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Addressing the massive storage demands of tomorrow

July 2016
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4DS Memory

**We are** a Silicon Valley memory technology developer listed on the ASX

**We own** 16 patents with over US$10m invested in development so far

**We make** non-filamentary ReRAM for next generation gigabyte (GB) silicon storage

**We enable** higher-density memory to operate cooler, faster and longer

**We have** a strategic partnership with Western Digital subsidiary HGST, a global storage leader
Board and management team
Global expertise founding and building high-tech companies

Jim Dorrian
Chairman

Served as CEO and
director of several
Silicon Valley
companies. M&A and
IPO experience gained
through founding and
managing successful
technology exits as a
partner at Crosspoint
Venture Partners, a
venture capital firm for
early stage companies.

Dr. Guido Arnout
CEO &
Managing Director

Specific expertise with
over 30 years in
commercialising
electronics technology
from concept to product
including Power-Escape,
CoWare, CrossCheck
Technology and Silvar-
Lisco.

Howard Digby
Non-Executive
Director

Former senior roles at
IBM, Adobe, Gartner and
the Economist Group.
Director of Estrella
Resources (ASX:ESR).

David McAuliffe
Non-Executive
Director

Experienced company
director. Involved in
numerous capital
raisings and in-licensing
of technologies and
founder of several
companies in Australia,
France and the UK,
many of which are now
publicly listed.

Michael Van Buskirk
Chief Engineering
Officer

Executive roles with a
number of leading
memory companies in
Silicon Valley including
Adesto Technologies
Corporation, Innovative
Silicon Inc and Spanion
Inc.

Melanie Buffier
Corporate Strategy
& Investor Relations

Investor relations,
communications and
financial reporting
experience gained at
some of Australia’s
leading public
companies including
Scentre Group,
Westfield Retail Trust,
Mirvac Group and
Westfield Group.

For personal use only
Capital structure

ASX Code
4DS

Market capitalisation (fully diluted)\(^1\)
$18.3 million

Ordinary shares on issue\(^2\)
659.2 million

Performance shares\(^3\)
67.6 million

Unlisted options\(^4\)
106.2 million

Top 20 Shareholders
50.4%

Cash (at 31 March 2016)
$1.8 million

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1. At 18 July 2016 and including 67.6 million performance shares and 106.2 million unlisted options.
2. Including 113.4 million escrowed shares on issue.
3. Escrowed with expiry 31/12/18.
4. Including 66.5 million escrowed unlisted options.
90% of the data in the world today was created in the last two years
Endless demand

Every 24 hours...

1 million video hours are uploaded

250 billion emails are sent

700 million tweets are posted

1.3 billion photos are uploaded
Silicon storage facts

Apple is the **biggest buyer of Flash** in the world

Microsoft **trialed an underwater data centre** for 90 days to test its cooling benefits

Data centre space will grow to almost **200 million square metres** in 2018

**Amazon Web Services** adds more server capacity **in a day** than Amazon.com had a decade ago

Consumers spend over **US$2 trillion** on content, devices and services every year

Household digital content is forecast to grow by **150%** in the next 5 years

The world is home to **7.2 billion** mobile devices which are multiplying **five times** faster than we are
Flash, hard drives & solid state storage

- Flash dominates the US$40 billion non volatile memory market
- Used in billions of smartphones, tablets and laptops
- More recently used in solid state drives (SSDs) in data centres

- Hard disk drives (HDDs) are a data storage device used for storing and retrieving digital information in the cloud
- HDDs have great retention and recovery, but:
  - Power hungry
  - Heat producing
  - Inferior latency

- Data centres and cloud players are moving to the use of SSDs / silicon storage at exponential rates
- Flash has been able to scale to meet industry’s increasing storage needs – now it is starting to reach its limits
Growing demand for non volatile memory
Flash cannot scale forever

- It’s time for a memory innovation for GB silicon storage
- What is ReRAM?
  - resistive random access memory
  - non volatile: retains data when power is switched off
  - changes in material resistance works as the storage mechanism
- Scalability and low currents are essential for GB silicon storage
The solution: 4DS ReRAM

Why is 4DS ReRAM the solution?

- Operates without filaments
  - allows the switching current to scale in line with cell size
- Scales well to smaller geometries
  - well suited for GB storage required for mobile and cloud

The benefits of 4DS ReRAM

- Higher density / scalability
- Lower power consumption
- Greater endurance and reliability
- Faster access speed and performance

With higher density memory that runs cooler, faster, longer, 4DS is well positioned to target the fast growing multi-billion-dollar NVM market.
How 4DS fits into the GB silicon storage supply chain

4DS memory technology

- Mobile device makers
- Memory chip makers
- Silicon storage makers

Mobile products

Data centres

Cloud access

Consumer
Joint development agreement with HGST

- HGST is a subsidiary of Western Digital Corporation, the leader in digital storage
- Strategic player in emerging high growth technologies
- Commenced in 2014 and renewed for the 2\textsuperscript{nd} time in July 2016
- Goal is to optimise 4DS memory technology for the mobile and cloud GB storage market
- Collaboration provides access to HGST’s expertise
- Accelerates the evolution of 4DS’ non-filamentary ReRAM
- Cost effective way to demonstrate commercial viability of 4DS’ unique ReRAM technology
- Only known non-filamentary ReRAM technology with a JDA partner
Every time changes are made to the cell architecture, cell size, materials composition, material thickness or the fabrication process, 4DS has to re-confirm that the changes have the desired effects.
# Development timeline

<table>
<thead>
<tr>
<th>Today</th>
<th>Next 3 months</th>
<th>Ongoing</th>
<th>2017 goals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Produced 50nm cells, in line with 3D Flash production geometries</td>
<td>Endurance testing</td>
<td>Continue fabrication refinements</td>
<td>Demonstrate viability of 4DS ReRAM for GB silicon storage</td>
</tr>
<tr>
<td>Demonstrated scalability, consistency and behavior with high yield</td>
<td>Meet endurance performance milestone</td>
<td>Optimise endurance, access speed and retention</td>
<td>Additional patents granted</td>
</tr>
<tr>
<td>Renewed JDA with HGST</td>
<td>Demonstrate viable scalability below 50nm</td>
<td></td>
<td>Potential IP licensing</td>
</tr>
</tbody>
</table>
Our strategy

• Deliver higher density memory that operates with lower power consumption, increased reliability and improved performance
• Develop and own all IP
• Leverage strategic partnership with HGST
• Focus on GB silicon storage for mobile and cloud
• Demonstrate commercial viability and prove the value of our ReRAM solution
• Create significant shareholder value by continuing to achieve all critical technical milestones
ReRAM landscape

<table>
<thead>
<tr>
<th>Company</th>
<th>Exchange</th>
<th>Market Cap</th>
<th>Type</th>
<th>Target Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crossbar</td>
<td>Private</td>
<td>n/a¹</td>
<td>Filamentary ReRAM</td>
<td>Internet of Things, wearables, SSDs</td>
</tr>
<tr>
<td>Weebit Nano / Radar Iron</td>
<td>ASX</td>
<td>A$60 million²</td>
<td>Filamentary ReRAM</td>
<td>Internet of Things, wearables</td>
</tr>
<tr>
<td>Adesto Technologies</td>
<td>NASDAQ</td>
<td>US$57 million</td>
<td>Filamentary ReRAM</td>
<td>Internet of Things</td>
</tr>
<tr>
<td>Strategic Elements</td>
<td>ASX</td>
<td>A$33 million</td>
<td>Nano cube ReRAM</td>
<td>Printable memory</td>
</tr>
<tr>
<td>4DS Memory</td>
<td>ASX</td>
<td>A$15 million</td>
<td>Non-filamentary ReRAM</td>
<td>GB silicon storage for mobile / cloud</td>
</tr>
</tbody>
</table>

Recent transactions

<table>
<thead>
<tr>
<th>Acquirer</th>
<th>Transaction</th>
<th>Date</th>
<th>Value (US$)</th>
<th>Technology</th>
<th>Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western Digital</td>
<td>Acquired startup Virident</td>
<td>2013</td>
<td>$685 million</td>
<td>Flash controllers</td>
<td>Cloud</td>
</tr>
<tr>
<td>Western Digital</td>
<td>Acquired sTec</td>
<td>2013</td>
<td>$340 million</td>
<td>Solid state drives</td>
<td>Cloud</td>
</tr>
<tr>
<td>Seagate</td>
<td>Acquired LSI</td>
<td>2014</td>
<td>$540 million</td>
<td>Flash controllers</td>
<td>Mobile</td>
</tr>
<tr>
<td>Cypress</td>
<td>Merger with Spansion</td>
<td>2015</td>
<td>$5 billion</td>
<td>Flash memory</td>
<td>Flash systems</td>
</tr>
<tr>
<td>Western Digital</td>
<td>Acquired Sandisk</td>
<td>2016</td>
<td>$19 billion</td>
<td>Flash memory</td>
<td>Cloud</td>
</tr>
</tbody>
</table>

1. Raised US$85 million to date.
2. Implied valuation upon re-listing.
Summary

• 4DS is developing a next generation non-filament based ReRAM memory solution which can store more data and can operate cooler, faster and longer compared to traditional storage memory
• Unique, patented IP, wholly owned and developed in-house over the past 10 years
• World-class team of memory specialists, material scientists and test engineers
• Consistently achieved stated milestones
• Board experienced in founding, building and exiting high tech companies
• Development accelerating through strategic partnership with the leader in digital storage
• 4DS is well positioned to target fast growing markets that require GB silicon storage

We are addressing the massive memory storage demands of tomorrow
Appendix
Penetration of mobile devices, generation of digital content, proliferation of cloud storage, the emergence of the Internet of Things and the growth of connected devices drive the need for memory storage solutions.

NAND Flash (Flash) is a 30 year old non volatile memory (NVM) technology with diminishing ability to reliably scale to meet the exponential growth of data demands.

Industry experts cite resistive random access memory (ReRAM) as the leading emerging memory candidate to overcome the limitations of Flash, creating a multi-billion-dollar emerging NVM market.

4DS is developing breakthrough ReRAM technology for next generation gigabyte (GB) storage in mobile and cloud – it enables higher density memory to run cooler, faster and longer than traditional storage technologies.

Unique, patented IP, wholly owned and developed in-house over the last 10 years.

A strategic partnership with HGST, a world leader in digital storage, is now into its 3rd year.

Experienced management team and industry respected memory specialists.
2D Flash versus 3D Flash

Flash currently dominates the US$40 billion GB silicon storage market

2D Flash
- 16nm to 20nm cell size
- Limits are # of electrons

3D Flash
- 40nm to 50nm cell size
- Limits are structural
## Two approaches to ReRAM

The 4DS memory cell uses no filament to switch therefore no scaling issues

<table>
<thead>
<tr>
<th></th>
<th>Filamentary ReRAM</th>
<th>4DS Non-filamentary ReRAM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Switching currents</strong></td>
<td>High and don’t scale with cell size</td>
<td>Low and <strong>scale with cell size</strong></td>
</tr>
<tr>
<td><strong>On-off current ratios</strong></td>
<td>Must be high due to widely fluctuating currents</td>
<td>Can be low due to much <strong>more stable currents</strong></td>
</tr>
<tr>
<td><strong>Scalability</strong></td>
<td>Limited by wire current densities due to constant switching currents</td>
<td>Lower current allows <strong>smaller cells</strong> not limited by wire current densities</td>
</tr>
<tr>
<td><strong>Cycling endurance</strong></td>
<td>Constant filament formation and destruction results in eventual cell breakdown</td>
<td>Does not rely on a destruction mechanism thereby <strong>increasing reliability</strong></td>
</tr>
<tr>
<td><strong>Data retention</strong></td>
<td>High switching currents needed for long data retention</td>
<td>Low switching currents <strong>help data retention</strong></td>
</tr>
<tr>
<td><strong>Market sweet spot</strong></td>
<td>Low density: IoT devices, small embedded memories</td>
<td>High density: GB silicon storage for mobile and cloud</td>
</tr>
</tbody>
</table>
Why is 4DS ReRAM better placed?

4DS ReRAM technology is non-filamentary therefore has no filamentary scaling issues

4DS MOHJO™
- Metal Oxide Hetero Junction – patented cell structure and operation
- Oxygen exchange across hetero-junction
- A voltage pulse reversibly changes resistance
- Reversing voltage polarity switches resistance
- Non-filamentary switching mechanism

4DS patented ReRAM
- Inherently scales well beyond mainstream memories
- Ideal candidate to replace Flash as dominant future non volatile memory
Corporate directory

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