PITT STREET RESEARCH

Weebit Nano

The importance of AEC-Q100 150C qualification cannot be overstated

Share Price: A$1.95

ASX: WBT

Sector: Semiconductor Equipment

18 March 2025

Weebit Nano (ASX:WBT) has had a big 2025 so far. It announced the third license deal for its ReRAM technology, with onsemi (NASDAQ:ON) before the market even opened on the first trading day of the year. In March, it unveiled a collaboration with EMASS to develop a combined edge AI solution. And WBT completed AEC-Q100 150C operation qualification of its ReRAM, which confirms its quality and reliability for high-temperature automotive applications, and many others.

As a reminder, ReRAM delivers lower power consumption, faster read and write speeds as well as cost advantages compared to Flash memory and other non-volatile memories (NVM).

AEC-Q100 150C qualification achieved

The importance of Weebit Nano's ReRAM receiving AEC-Q100 150C qualification cannot be overstated because it opens the door to the Automotive sector, one of the primary opportunities for the company. AEC-Q100 is the standard stress test qualification for integrated circuits used in automotive manufacturing. We believe this qualification is why onsemi signed with Weebit Nano earlier this year.

But because this qualification at 150 degrees Celsius is so stringent, it also means ReRAM is suitable for all of the company's other major target applications, including in the Industrial and Medical sectors, that have less stringent requirements than the Automotive sector.

2025 should see more licensing deals

2025 will be the year of scaling up for Weebit Nano, with the company ramping up its corporate infrastructure (i.e. procedures, processes, IT backbone etc) in anticipation of further deals. It has tied 100% of the CEO's equity remuneration to closing 3 deals with foundries/IDMs, 3 deals with product companies *and* finalising the qualification of DB HiTek in 2025. This is a clear sign of confidence by management that this will happen. Indeed, the number of inbound calls from semiconductor companies has grown substantially following the AEC-Q100 150C qualification.

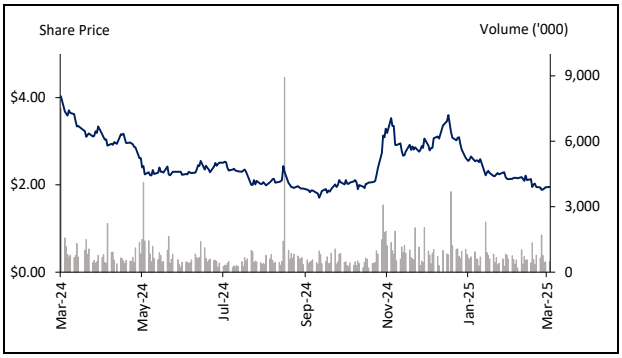
Valuation reiterated

We reiterate our valuation of Weebit Nano of A$9.56 per share. Key share price catalysts include additional commercial deals with IDM's, foundries and product companies as well as progress on qualification and the technology transfer with respect to DB HiTek and onsemi. Please see details on our valuation and key risks at the end of this note.

Market cap. (A$m)	407.2
# shares outstanding (m)	207.8
# shares fully diluted (m)	231.9
Market cap ful. dil. (A$m)	454.4
Free float	89.6%
12 months high/low	1.70 /4.23
Average daily volume (x1,000)	795.5
Website	www.weebit-nano.com

Source: Company, Pitt Street Research

Share price (A$) and avg. daily volume (k, r.h.s.)



Source: Refinitiv Eikon

Valuation metrics	
Valuation per share (A$)	9.56

Source: Pitt Street Research

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Disclosure: Pitt Street Research directors own shares in Weebit Nano.

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A recap of the Weebit Nano story

Weebit Nano is commercialising a technology known as Resistive Random Access Memory or ReRAM. ReRAM is a Non-Volatile Memory (NVM) technology, similar to today's mainstream Flash Memory. Flash Memory enables electronic devices to store data, but can't scale down below 40nm in a cost-effective way. ReRAM fulfils the same tasks as Flash memory, but is superior to Flash in offering superior performance at a much smaller process geometry, i.e. current ReRAM nodes under development are 28nm and 22nm, but will likley go well beyond 20nm in the future.

Weebit Nano is not the only company commercialising a ReRAM technology, but we have not found any documentation in the public domain that suggests its peers, specifically UMC and TSMC, have achieved AEC-Q100 150C qualification. The advantages of ReRAM versus Flash memory (and certain competing NVM technologies) have been listed in Figure 1.

Figure 1: Advantages of Weebit Nano's ReRAM

Metric	Advantages of Weebit's ReRAM
Endurance	Weebit Nano's ReRAM can handle 100k-1m read/write cycles as compared to 1-10k for today's embedded Flash applications, thus performing 10-100x better.
Data Retention	Weebit Nano's ReRAM can store data for 10 years at 125-150°C, superior to other NVM alternatives, which often have a data retention capacity of just 10 years at 85°C.
Power Consumption	Weebit Nano's ReRAM has significantly lower power consumption levels and lower voltage requirements compared to Flash memory and thus enables longer battery life.
Access time	Weebit Nano's ReRAM has a 100x faster program time than Flash.
Environmental tolerance	Weebit Nano's ReRAM can withstand up to 350x more radiation than Flash, is tolerant to electromagnetic interference (unlike Magnetoresistive Random Access Memory, or MRAM) and is thermally very stable (unlike Phase-change memory, or PCM).
Cost	Weebit Nano's ReRAM adds 5-7% to the wafer cost as compared to 10-20% for Flash and 30%, or even 40%, for MRAM.
Manufacturing and Capex	Weebit Nano's ReRAM can be produced using fab-friendly materials and does not require special equipment as compared to some other NVMs, which are more complicated and Capex-heavy to manufacture. This is especially true with regards to MRAM, which uses very unconventional materials and tools.
Security	Weebit Nano's ReRAM does not use a floating gate charge (unlike Flash), making it difficult to change its internal state. It can also withstand magnetic disturbances (unlike MRAM) and optical attacks. It is more difficult to intrude, read or modify.
Lower carbon footprint	Weebit Nano's ReRAM also has a substantially lower carbon footprint compared to competing technologies as well as better ESG credentials.

Sources: ReRAM Advantages, Technology, Company website

A three-stage revenue model

Weebit's business model is to license out its technology to semiconductor companies on a non-exclusive basis. It will generate revenue in the form of:

- License fees paid upfront, and potential follow-up license fee payments based on achieving specific milestones. License fees depend on several factors, such as the complexity and cost in developing IP, target markets and expected production volumes;
- Non-recurring Engineering (NRE) costs incurred during design-in, engineering and testing;
- A per-unit royalty fee between 1-5% of the selling price of the chip based on production volumes if the product company licenses the technology directly, or several percent of the uplifted wafer cost if the product company receives the IP through the foundry.

Weebit Nano has 3 commercial partners so far, at least 5 more expected in 2025

In the last few years, Weebit Nano has signed three commercial deals with three separate companies:

- **Skywater Technology (NDQ:SKYT)**: A semiconductor foundry based in the USA that has licensed ReRAM for production in its Complementary Metal-Oxide Semiconductor (CMOS) process. SkyWater is the first licensing partner Weebit Nano signed, which it did in September 2021.
- **DB HiTek (KRX:000990**): A South Korean semiconductor fab that services chip companies, including Intel, Sony, Mitsubishi, Mediatek, NXP, Samsung, Texas Instruments, Infineon, Analog Devices, Toshiba and BYD. This collaboration was signed in October 2023 and provides for ReRAM to be made avaliable in DB HiTek's 130nm Bipolar-CMOS-DMOS (BCD) process – ideal for many analog, mixed-signal and power designs in consumer, industrial, automotive and other IoT devices.
- **Onsemi (NDQ:ON):** An Integrated Device Manufacturer (IDM) that doesn't just design its own semiconductors but manufactures them too. Onsemi aims to integrate Weebit Nano's ReRAM in its Treo platform and analogue and mixed-signal applicaions, such as chips for power management, sensor interfaces and communication devices. These have their end uses in areas such as Automotive, factory automation, robotics and healthcare.

The company's focus right now is to continue to add to its licensing partners, aiming to add at least another 2 fabs or IDM's in 2025, on top of onsemi, as well as a minimum of 3 product companies in 2025.

Momentum is building in 2025

Weebit Nano is in a pivotal position with 3 licensing partners. It is aiming for at least another 5 in 2025.

Weebit Nano is in a pivotal position with 3 licensing partners so far. With Skywater, it has completed the qualification process. For DB HiTek, the company is testing demonstration chips with qualification underway and expected to be finalised by mid-2025. With onsemi, Weebit Nano is currently working throught the usual technology transfer, design and qualification work.

Weebit Nano closed CY24 with a A$97m cash balance, boosted by a A$50m capital raise, which was completed at a 6.5% premium to the five-day VWAP.

And it has two other major, recent achievements to boast of:

- Achieving AEC-Q100 150C qualification,
- Collaborating with EMASS.

Weebit Nano has achieved AEC-Q100 150C Qualification

AEC-Q100 is the standard automotive stress test for integrated circuits (ICs).

AEC-Q100 is the standard automotive stress test for integrated circuits (ICs). AEC was designed by Chrysler, Ford and GM to establish common part-qualification and quality-system standards, and since then many key players in the automotive industry have adopted it too.

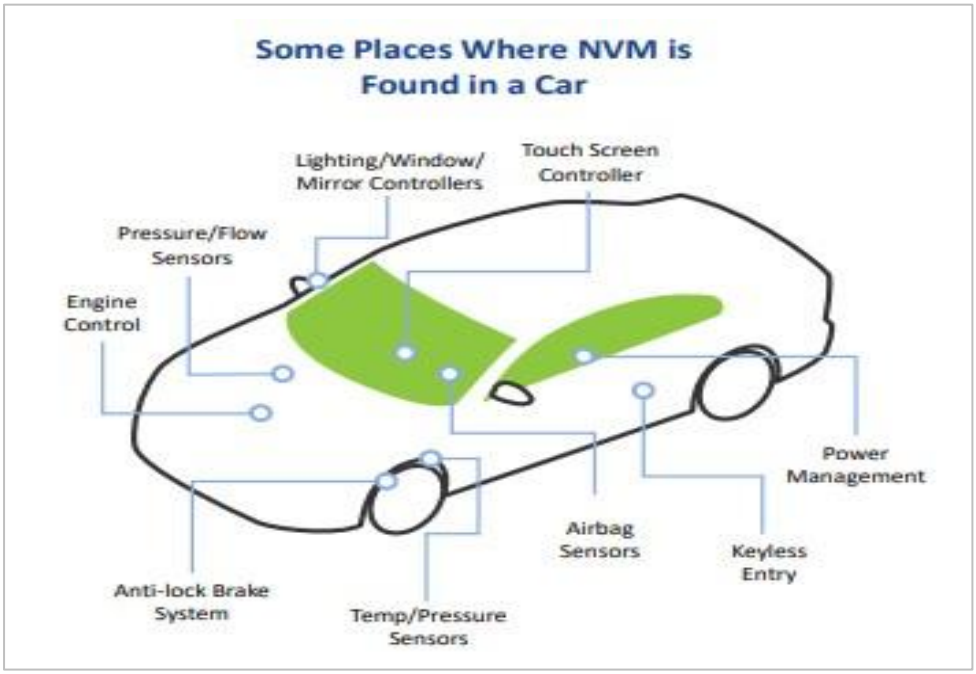
On 11 March 2025, Weebit Nano announced that its ReRAM module (specifically the module in SkyWater Technology's 130nm CMOS process) had achieved this certification. This achievement confirms the quality and reliability of Weebit Nano's embedded ReRAM non-volatile memory (NVM) technology for high-temperature automotive applications.

Weebit Nano's ReRAM was qualified according to the AEC-Q100 standard for NVM, including Program/Erase Endurance, Data Retention and High-Temperature operating Life (HTOL) qualification tests. The qualification was achieved using a one-transistor one-resistor (1T1R) cell architecture, demonstrating stability at 150C operation for up to 100K endurance cycles, including cycling and post-cycling high-temperature data retention.

The automotive sector is a massive market opportunity

The automotive sector is a major opportunity for WBT. Many features of today's motor vehicles require multiple chips that need memory technology to perform various functions, such as storing code and collected data in demanding environmental conditions (Figure 2). Data loss or delays in processing data can be catastrophic.

Figure 2: The applicability of NVM to a typical car



Source: Company

Weebit Nano's ReRAM can deliver superior performance and better endurance at high temperatures (150°C) compared to Flash and other alternatives. It is much better scalable and less costly to implement, making it a suitable alternative for the Automotive/Industrial market.

Weebit Nano's 3 licensing partners (SkyWater, DB HiTek and onsemi) all have automotive companies as clients.

Even though Weebit Nano has not signed a specific licensing deal with individual automotive companies, SkyWater has automotive customers that could now incorporate semiconductors that include Weebit Nano's ReRAM into their own processes. In turn, so do DB HiTek and onsemi.

Whilst SkyWater does not publicly name any of its automotive customers (nor does onsemi), DB HiTek's customers include Tesla, which uses a chip made by DB HiTek, as well as other chip companies that make chips for car companies. For instance, Samsung Electronics, which supplies chips to companies like Hyundai[1], thus demonstrating the importance of NVM solutions for the next generation of automobiles.

The automotive sector will be important for Weebit Nano. According to Yole Intelligence, the market for semiconductors in the automotive sectors will grow from US$52bn currently to US$97bn in 2029, with the number of semiconductor devices per car also continuing to grow.

AEC-Q100 150C qualification means that Weebit Nano's ReRAM is now qualified for just about all automotive applications through SkyWater.

AEC-Q100 qualification opens up other sectors too

The AEC-Q100 150C qualification for automotive semiconductors is very stringent. Consequently, once a semiconductor technology, like ReRAM in this case, has passed this qualification, it is almost by default also suitable for other applications that have far less stringent requirements. Some of those applications include industrial, robotics and medical applications.

In other words, we believe this AEC-Q100 qualification doesn't just open doors to the automotive sector, but will most likely lead to opportunities in many other sectors as well. This is why we think the importance of AEC-Q100 150C qualification for Weebit Nano cannot be overstated.

Collaborating with EMASS

Earlier in March, Weebit Nano announced a collaboration with EMASS, for the companies to work together on a combined solution that brings together Weebit Nano's ReRAM and EMASS for Edge AI (Artificial Intelligence) applications. EMASS has recently been acquired by ASX-listed Nanoveu (ASX:NVU), which we initiated coverage on in late February 2025. We encourage readers interested in a more comprehensive overview of EMASS to read that report.

Weebit Nano announced a collaboration with EMASS to work together on a combined solution that brings together ReRAM and EMASS for Edge AI.

For the purposes of noting what is in this deal for Weebit Nano, we think it is sufficient to note that EMASS has developed Intellectual Property (IP), including five core SoC (system on a chip[2]) technologies covering algorithmic transformation, hardware support, system architecture and AI-specific hardware accelerators. These SoCs are 20x more energy efficient compared to competitor Edge AI chips and can handle 13 million AI parameters and process them at 30 Giga Operations per second (GOPS). It does this at less than 2 milliwatts of power consumption.

Prior to this collaboration, EMASS used MRAM (Magnetoresistive RAM) technology, but it is transitioning to ReRAM because ReRAM is better able to

[1] In June 2023, a collaboration between Samsung and Hyundai Motors was announced whereby the Exynos Auto V920 processor would be implemented in Hyundai's next-generation in-vehicle infotainment (IVI) systems

[2] A highly integrated semiconductor that consolidates all essentiall components of a computer in a single chip, allowing devices to perform complex tasks in just one chip rather than multiple.

support next-generation systems in IoT, automotive and consumer electronics. By developing an integrated solution, the companies will be able to push the limits of EMASS' Edge AI chip in terms of performance and efficiency.

EMASS' product will be manufactured at the 22m process note and will enhance energy efficiency, reduce power consumption and enable instant system wake-up for AI-driven applications. The integrated technologies were presented at the embedded world 2025 Conference & Exhibition, held earlier in March 2025 in Nuremberg, Germany.

2025 is to be the year of scaling up

2025 is set to be a major year for Weebit Nano. The company has ramped up its corporate infrastructure to cater for more clients. It is aiming to close at least 2 more deals with foundries/IDMs and 3 deals with product companies in 2025. Additionally, it aims to finalise the qualification with DB HiTek by mid-2025. As part of the corporate ramp up, the company has recently appointed Lilach Zinger as VP Customer Success who will be responsible for all Fab engagements. She has very extensive operational experience as VP of Operations at TowerJazz's Fab1 and other roles at TowerJazz prior to that.

WBT has tied 100% of the CEO's equity remuneration to these goals. If the company achieves them, 2025 will be the biggest year in the company's history yet and incentivising these goals is a bold step on one hand, but also illustrates confidence on the part of the company.

As we noted in our note on Weebit Nano in January 2025, we expect the onsemi deal to be a major pacesetter for the market. TSMC, the world's leading semiconductor foundry, started moving away from MRAM and towards ReRAM as a viable replacement of Flash memory. The consensus in the industry is that ReRAM is the best option to replace Flash.

Weebit Nano is scaling up its corporate structure to accommodate the expected influx of new customers.

Barring the unlikely event TSMC chooses to let rival companies use TSMC's proprietary ReRAM, Weebit Nano's ReRAM will be one of a very few (if not the only) alternative to TSMC. Companies that compete with onsemi in one way or another (like NXP, STM and Texas Instruments) have a very high interest in integrating ReRAM into their products now that onsemi has gone with Weebit Nano.

And with ~$100m in the bank, as of 1 January 2025, Weebit Nano is very well positioned to expedite its corporate scaling-up to accommodate the expected of its customer base in the near term.

Reiterating valuation at A$9.56 per share

We continue to reiterate our valuation for Weebit Nano of A$9.56 per share, from our June 2023 report. There are multiple catalysts that could drive Weebit Nano's share price higher in the next 12 months:

- Additional commercial agreements and/or collaborations with large foundries, IDM's and product companies.
- Progress towards qualification mid-2025 with DB HiTek following the tape-out in 2024.
- Progress on the technology transfer to onsemi.
- Commercial progress/deal with GlobalFoundries.

Key risks

- **Competition risk:** Alternative emerging memory technologies are being developed by Weebit's competitors. These technologies could potentially be superior in nature and/or could be commercialised sooner than Weebit's technology, which could inhibit the company's future growth.
- **Funding risk:** Although Weebit now seems adequately funded for the medium term, the company may need to raise further capital in the medium to longer-term. That may be required, for instance, if development programmes and technology transfers/qualifications take longer than currently anticipated or multiple growth opportunities arise, resulting in dilution for existing shareholders.
- **Macroeconomic and geopolitical risks:** The semiconductor industry is quite vulnerable to macroeconomic and geopolitical risks – in particular, downturns in the global economy and tensions between China and the West. The prices of semiconductor stocks can fluctuate substantially in response to mere media reports of deteriorating conditions.
- **Operational risks:** Weebit Nano's success is assumed on its ability to successfully produce and market the ReRAM technology. A failure in either regard for whatever reasons, such as supply chain issues or departure of key personnel, may lead to a deterioration in investor sentiment.
- **Investment risks:** Since the stock's inclusion into the ASX300 and ASX200 indices in 2023, we have seen short sellers come into the stock. This has had a substantial negative effect on the share price. Additional short selling may push the share price down further.

Appendix I – Analyst certification

Marc Kennis has been an equities analyst since 1996.

- Marc obtained an MSc in Economics from Tilburg University, Netherlands, in 1996 and a postgraduate degree in investment analysis in 2001.
- Since 1996, he has worked for various brokers and banks in the Netherlands, including ING and Rabobank, where his focus has been on the technology sector, including the semiconductor sector.
- After moving to Sydney in 2014, he worked for several Sydney-based brokers before setting up TMT Analytics Pty Ltd, an issuer-sponsored equity research firm.
- In July 2016, with Stuart Roberts, Marc co-founded Pitt Street Research Pty Ltd, which provides issuer-sponsored research on ASX-listed companies across the entire market, including technology companies.

Nick Sundich is an equities research analyst at Pitt Street Research.

- Nick obtained a Bachelor of Commerce/Bachelor of Arts from the University of Sydney in 2018. He has also completed the CFA Investment Foundations program.
- He joined Pitt Street Research in January 2022. Previously he worked for over three years as a financial journalist at Stockhead.
- While at university, he worked for a handful of corporate advisory firms.

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