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THE NEXT NVM IS HERE

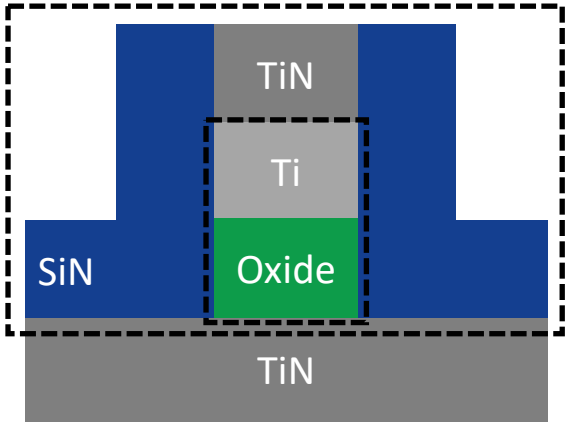
ReRAM: Emerging as the New Embedded NVM Standard

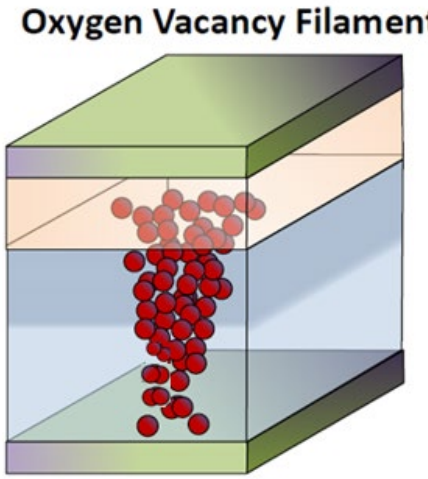
Amir Regev, VP Quality and Reliability

FMS
the Future of Memory and Storage

ReRAM: A Cost-Effective NVM

- **Fab-friendly materials**
  - No contamination risk, special handling, etc.
- **Using existing deposition techniques and tools**
  - Easy to integrate into any CMOS fab
- **2-mask adder**
  - Very few added steps
- **BEOL technology**
  - Stack between any 2 metal layers
  - No interference with FEOL
  - Easy to scale from one process variation to another





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State of Weebit ReRAM Today

Modules proven for toughest industrial & automotive mission profiles

- Retention at 175°C for automotive Grade 0 operation
- Completed AEC-Q100 qualification (150°C and 100K cycles)

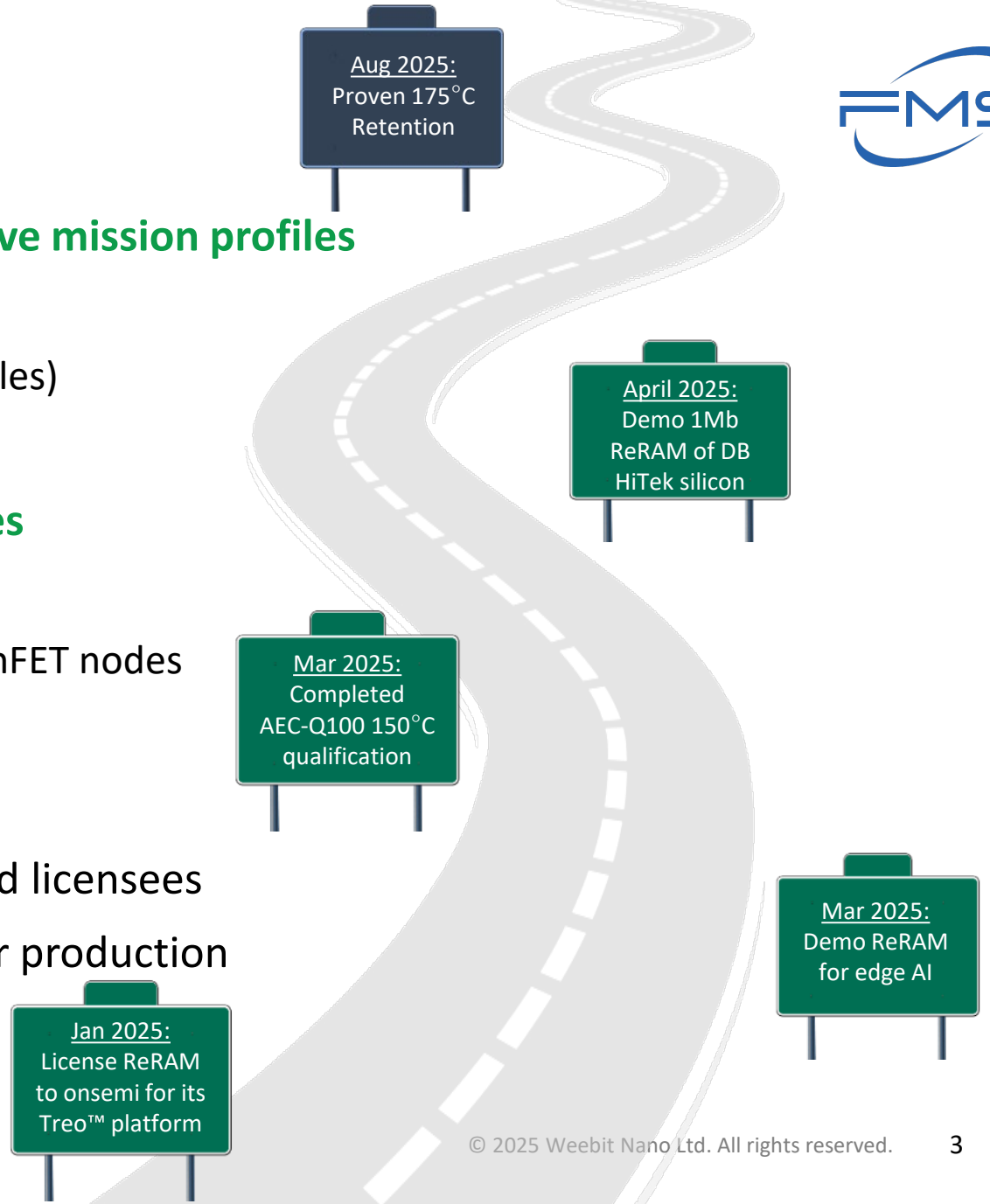
Technology demonstrated on multiple process nodes

- From 130nm to 22nm, Al / Cu, 200mm / 300mm
- Analyzed & developed on 20+ PDKs; 130nm down to FinFET nodes

onsemi: Technology transfer underway

DB HiTek: Qualification starting; available for selected licensees

SkyWater: ReRAM module qualified and available for production



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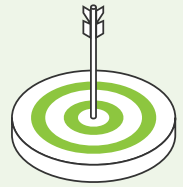
The ReRAM Difference

ReRAM is the Emerging Memory Best Positioned to Lead the Next NVM Wave

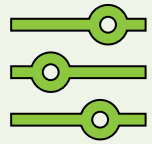
		eFlash	MRAM	PCM	ReRAM
Performance	Low power consumption	🔴	🟢	🔴	🟢
	Fast programming	🔴	🟢	🟢	🟢
	High endurance	🟡	🟢	🟢	🟢
Cost	Low cost to manufacture	🟡	🔴	🟡	🟢
	Small die size	🟡	🟢	🟢	🟢
Reliability	High-temp reliability	🟢	🟢	🟢	🟢
	EMI immunity	🟢	🔴	🟢	🟢
Scalability	Scalable to advanced nodes	🔴	🟢	🟢	🟢
Integration	Ease of fab integration	🟡	🔴	🟡	🟢
Maturity	Mature technology	🟢	🟡	🟡	🟡

Weebit is the only independent provider of qualified ReRAM



We can license our technology to any fab*

We can customize Weebit ReRAM per customer requirements



* Except US blacklisted

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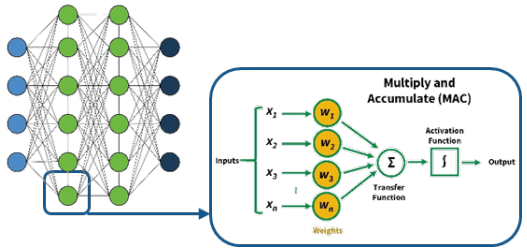
ReRAM for AI

ReRAM perfectly fits in brain inspired systems, in a timely manner:

Embedded, Edge AI

Short Term



ReRAM used as eNVM to store synaptic weights of the NN

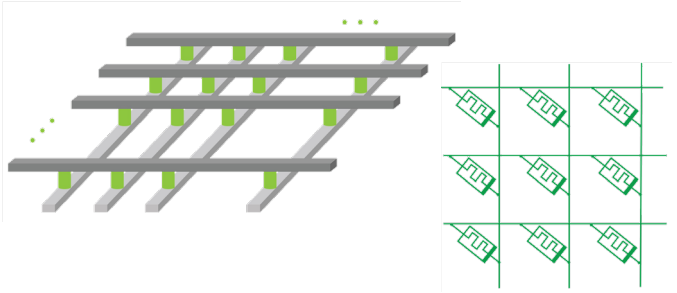
In-Memory Compute: AI and ML

Mid Term

Computing is done within the ReRAM array itself

MAC Operations

Longer Term



Large ReRAM arrays for Vector Matrix Multiplication

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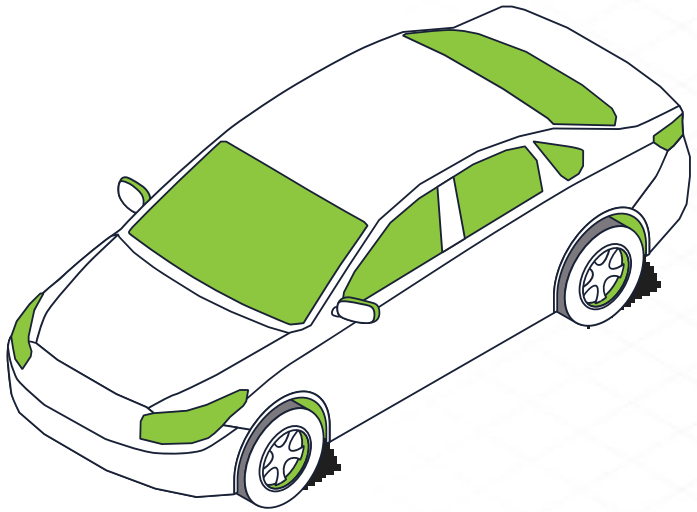
Embedded NVM for Automotive



APPLICATIONS

Motor control, power management, microcontrollers
NVM for code storage, data tables, data logging, configuration

TREND: SCALING TO ADVANCED NODES

Increasing number of semiconductors per car, performance requirements increasing; NVM must effectively scale <28nm

REQUIREMENTS

High-temp reliability (150°C), high endurance (100K), high density (2-32MB), EMI immunity, fast switching speed, secure

ALTERNATIVES

eFlash can no longer scale <28nm
MRAM (not immune to EMI, high complexity and cost)
ReRAM (EMI immunity, high-temp stability)

** Flash equivalent*

Weebit ReRAM is qualified for AEC-Q100 150°C operation for up to 100K endurance cycles

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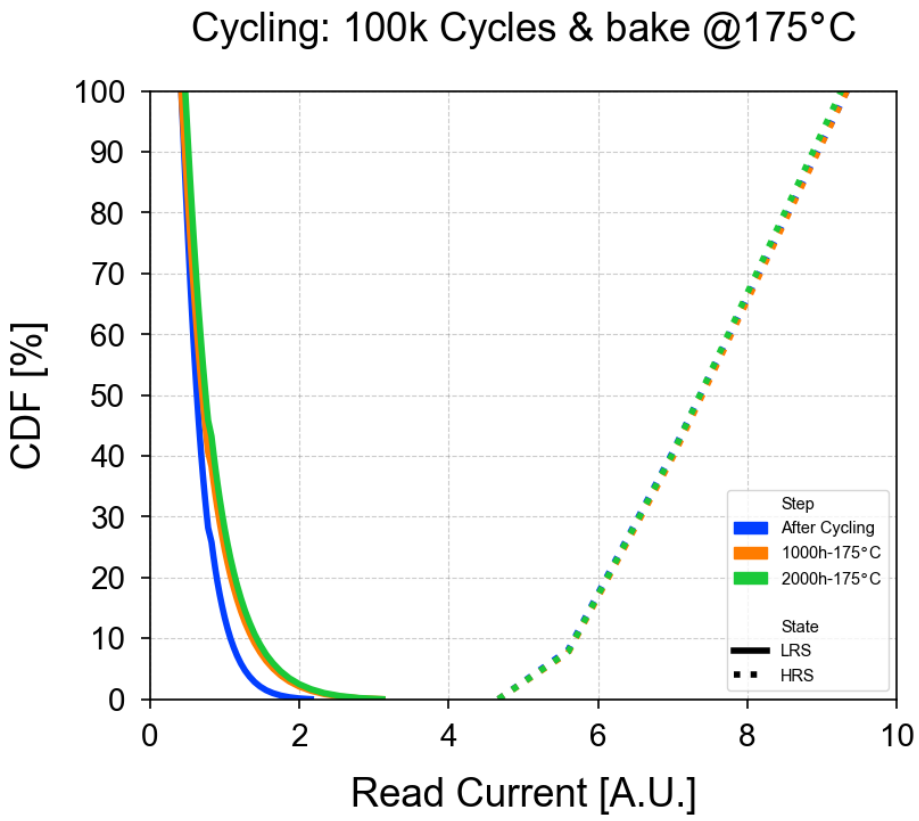
Addressing Demanding Automotive Mission Profiles

- Many automotive electronics operate in **extreme thermal environments**
  - Powertrain control units, Engine control units (ECUs), EV inverters, under-the-hood sensors, battery management systems (BMS)
- Weebit ReRAM – high stability in 175°C retention
  - Supports **AEC-Q100 Grade 0** and beyond
  - Aligns with next-gen vehicle requirements
- ELFR (Early Life Failure Rate) data:
  - Total samples (2,400) to claim very low failure rates confidently (often 0 DPPM to single-digit DPPM)
    - Lot 1 - 0/800
    - Lot 2 – 0/800
    - Lot 3 - 0/800

✓ Covering **lot-to-lot variations** to show process consistency
✓ Aligned with AEC-Q100 guidelines



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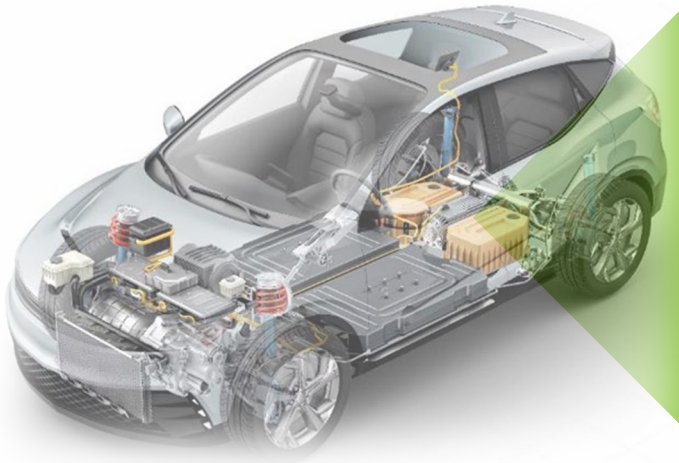
Completed AEC-Q100 Operation Qualification for Automotive

Confirms quality & reliability of Weebit ReRAM for high-temp automotive applications



AEC-Q100: Key to Getting Designed Into Automotive MCUs & Other Components

- Demonstrated **stability at 150°C operation for up to 100K endurance cycles**, including cycling and post-cycling high-temp data retention at **175°C**
- Completed qual in SkyWater S130 using module with **1T1R cell architecture**
- Parameters of Weebit ReRAM align with automaker specifications

Test Name	Test Description	Stress Conditions	Sample Size	Results
NVCE	High Temp Cycling Endurance	100K cycles @ $T_{Cycling}$ = 150°C	3 lots; 77 units from each lot	0 fails
PCHTDR	High Temp Post Cycle Data Retention	100K cycles @ $T_{Cycling}$ = 150°C T_{Bake} = 175°C for 2000h	3 lots; 77 units from each lot	0 fails
HTOL	High Temperature Operating Life	Post 100K cycles @ $T_{Cycling}$ = 150°C Read @ 150°C for 1000 hours	3 lots; 77 units from each lot	0 fails
ELFR	Early Life Failing Rate	48h Bake at 150°C	3 lots; 800 units from each lot	0 fails

Conclusions

- Weebit completed AEC-Q100 qualification targeting automotive applications
  - Retention up to 175°C
  - 100K endurance cycles
- Weebit ReRAM is in various engagement stages with commercial fabs
  - DB HiTek qualification starting
  - onsemi technology transfer underway
- Various AI architectures are being developed for edge applications
  - 2 live demonstrations available, running on Weebit ReRAM in silicon

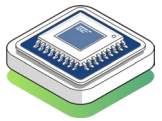
Weebit: Leading Licensor of ReRAM IP

Leading developer of innovative next-generation memory technologies for the global semiconductor industry

We are enabling a leap forward in memory technology for a new era of connected devices

Founded: 2015
Located in Israel & France
ASX: WBT

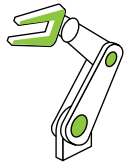
R&D partner
CEA-Leti, leading micro-electronics research institute



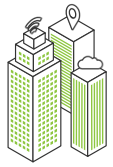
Silicon-proven technology
Volume production expected 2026
Proven in multiple production-fab lots

World-leading team
>50 personnel (90% engineers/ scientists)

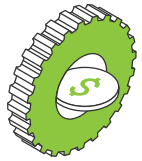
Signed multiple commercial deals
Engaged with most top-tier foundries, IDMs and customers



Qualified for 85°C, 125°C, 150°C
Fully qualified per JEDEC
Fully qualified per AEC-Q100 150°C
Available for chip designers



Financial strength
>A$100m cash end of 2024
Well-funded going forward



Current business model
Product & IP licensing to semiconductor companies & fabs

Process nodes
130nm, 65nm, 28nm, 22nm and below
Bulk, BCD, FD-SOI, FinFET

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