

MACRONIX

CORPORATE PROFILE

2022Q1





Global Leading NVM Solutions Provider:

Comprehensive Portfolio of ROM, NOR Flash and SLC NAND Flash.



First semiconductor company to apply full-computerized manufacturing management, SuperNOVA, enabling Macronix RMA performance to advance from PPM level to **PPB level**.



ISO26262 certified in 2020, representing Macronix automotive Flash's full compliance of highest international automotive electronic standard.

NO.1

No.1 in ROM & NOR Flash market. Widely adapted for 5G, Autonomous driving/ADAS/digital cluster and data center...



Macronix Education Foundation, established in 2001, aims to foster technology talent of young students with Macronix Silicon Awards, Macronix Science Awards and other technology plans.

Macronix at a Glance

1989 Founded in Taiwan

8,600+ Patents Granted (~Dec., 2021)

US\$ 1,805 Million 2021 Revenue

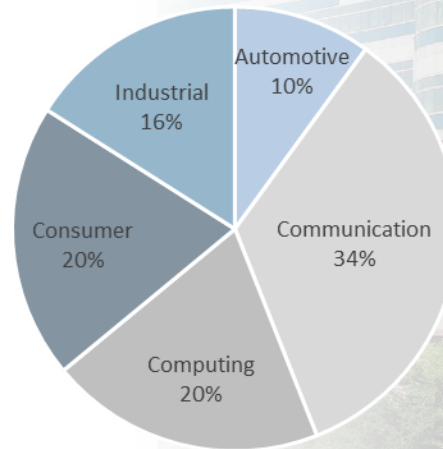
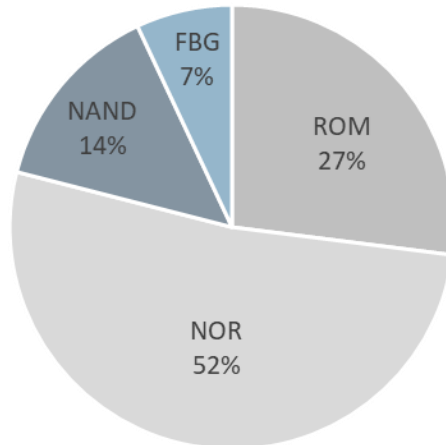
4,000+ (22% in R&D) Employees Worldwide

2 in-house Fabs Complete In- house Wafer Manufacturing

200mm Fab: NOR ~50K

300mm Fab: NOR/NAND ~50K Design Capacity (wafer/month)

■ 2021 Revenue by Products ■ 2021 Flash Revenue by Applications



Worldwide Locations and Manufacturing



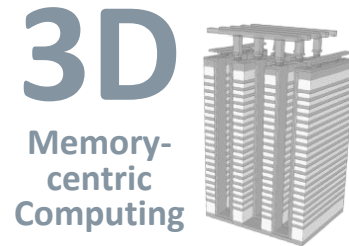


Market Performance

Market Position Leadership



**Value-added
Segments**



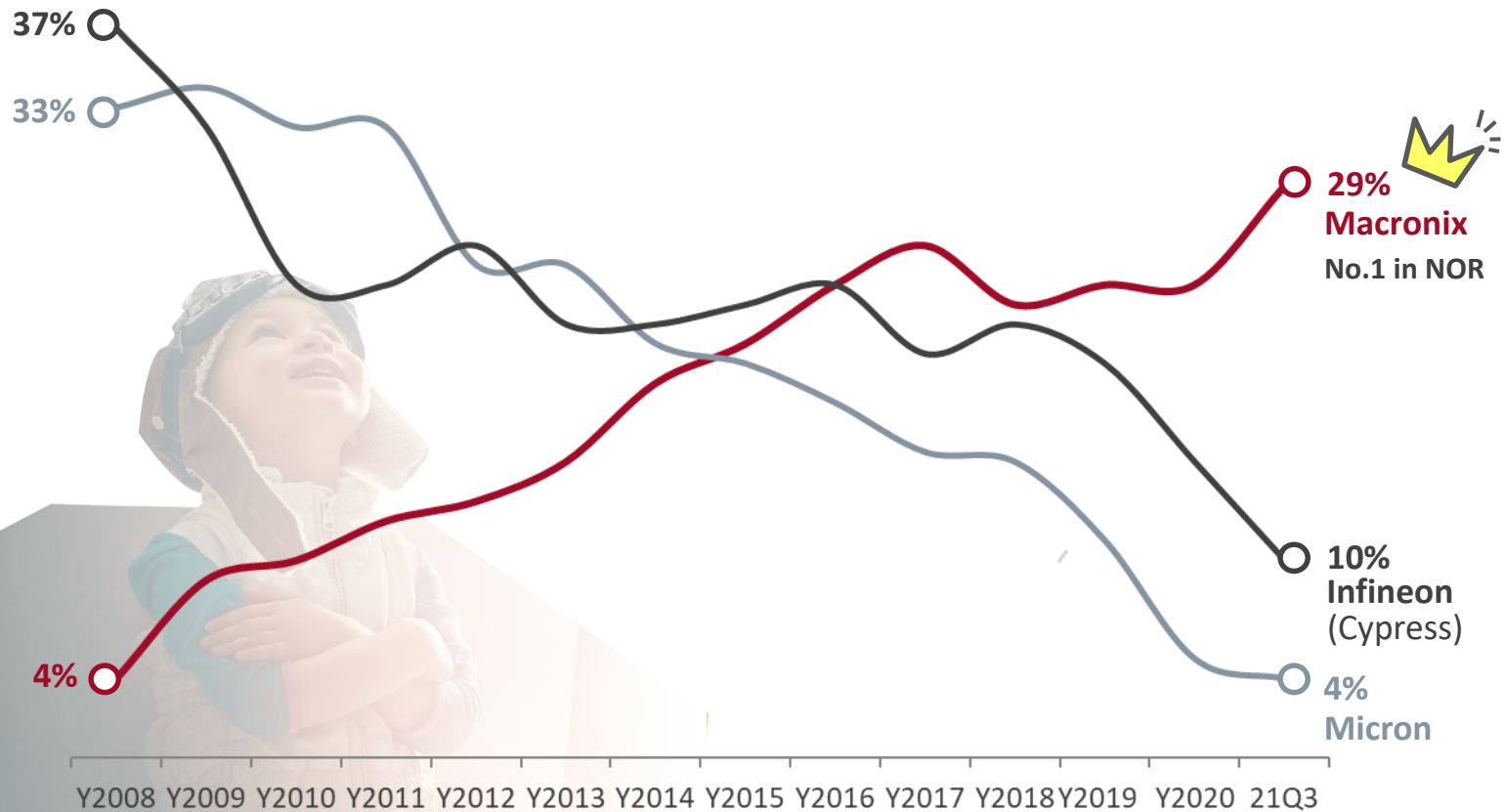
**Constant
Innovation**



**Uncompromised
Quality**

Leading Position in NOR Market

NOR Market Share

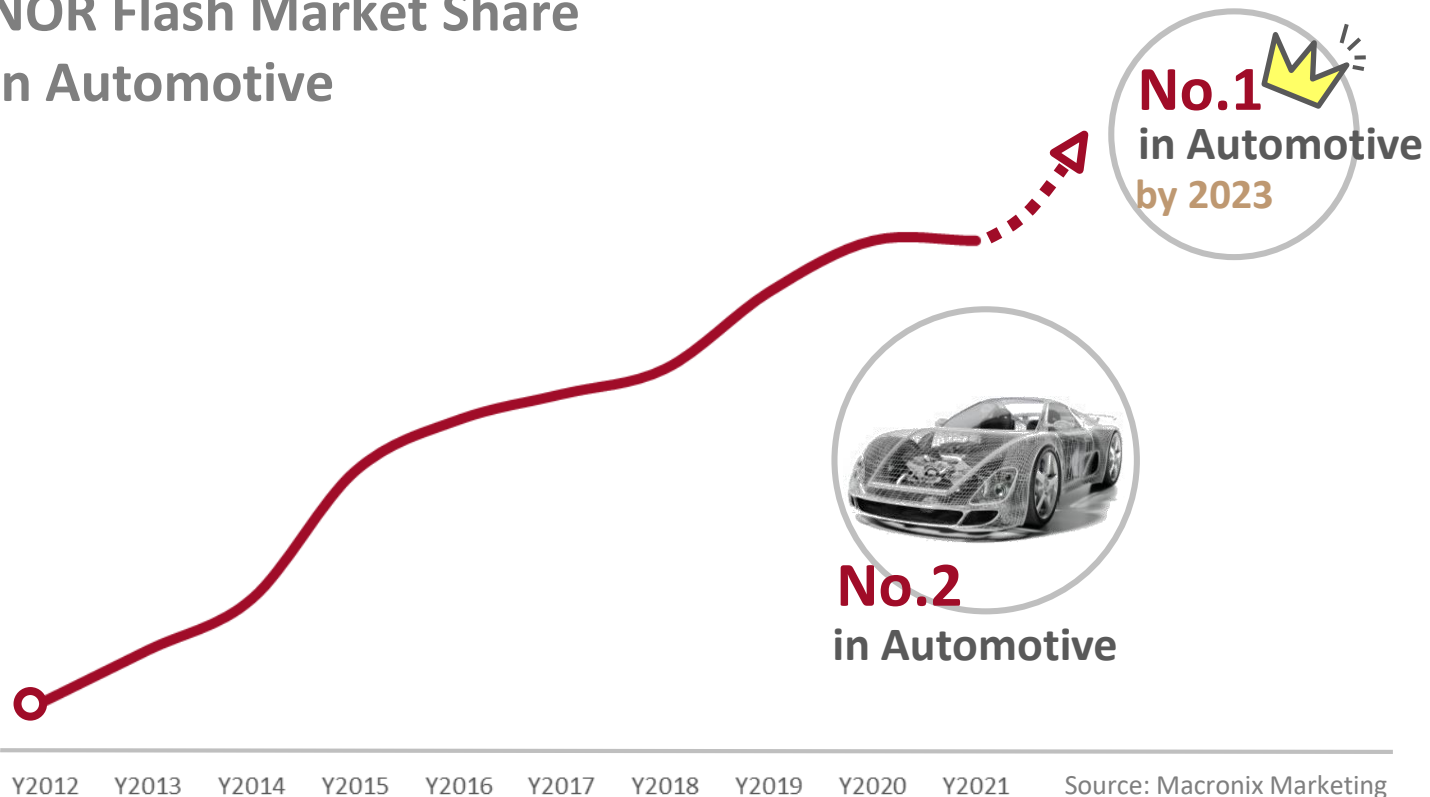


Source: Omdia (iHS Markit) , Macronix Marketing

Gaining Influence with Quality Recognition

350+ Million Automotive-grade parts shipment since 2012

NOR Flash Market Share
in Automotive



5G



80%

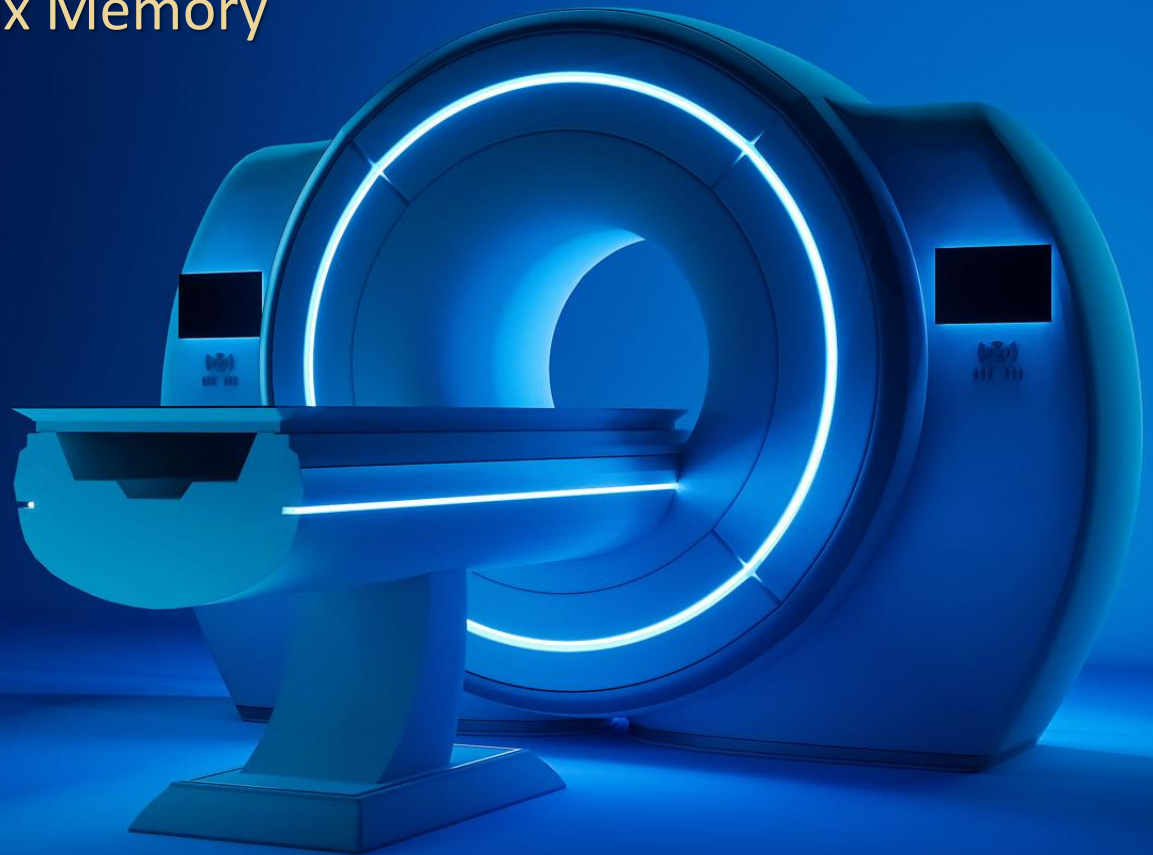
Telecom Infrastructure Providers
are Adopting Macronix Memory



80%

Server & Data Center
are Adopting Macronix Memory

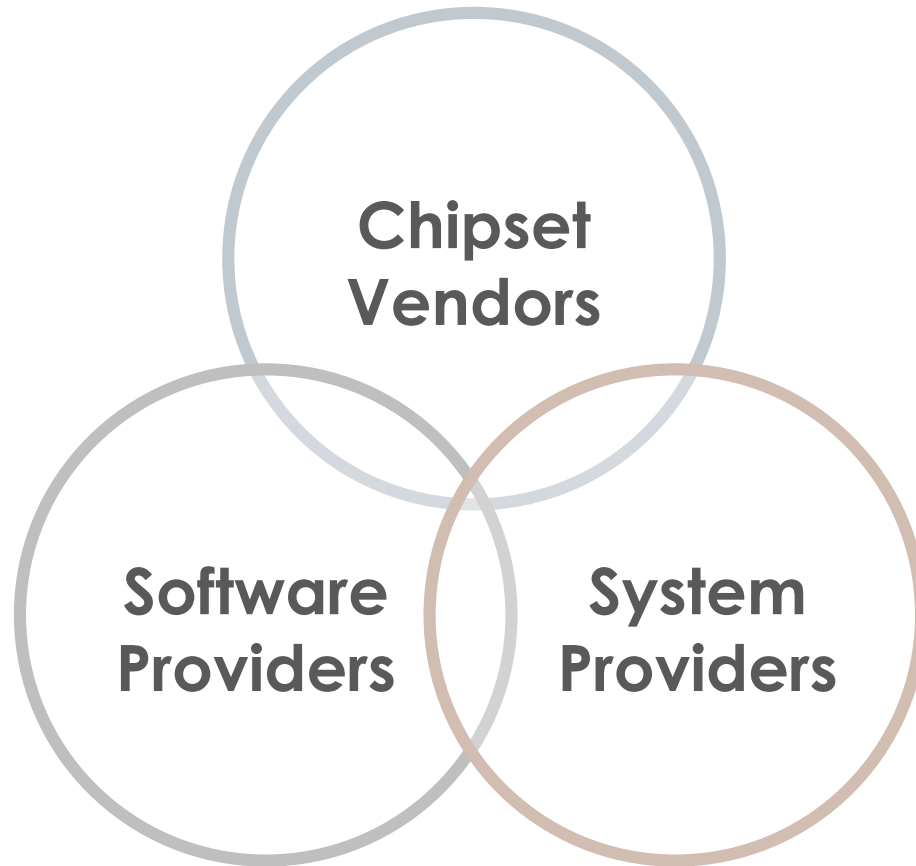
Top 10 Global Medical Device Companies are Adopting Macronix Memory





Ecosystem Relationship

Ecosystem Engagement



Key Global Partnership

Chipset Vendor

AMD
Broadcom
CirrusLogic
Intel
Mediatek
Nordic
nVidia
NXP
Qualcomm
Renesas
STMicro
TI
Xilinx

⋮

System Providers

Abbott
Bosch
Cardinal Health
Continental
Denso
Fujitsu
Fresenius Medical
Garmin
GE Medical
Google
IBM
Medtronic
NEC
Nokia
Panasonic
Siemens

⋮

Software Providers

AMI
Insyde
Phoenix

BPM Microsystems
Data I/O
Dediprog
Eltec
Hi-Lo Systems

Conax
Nagravision
NDS

QNX

⋮

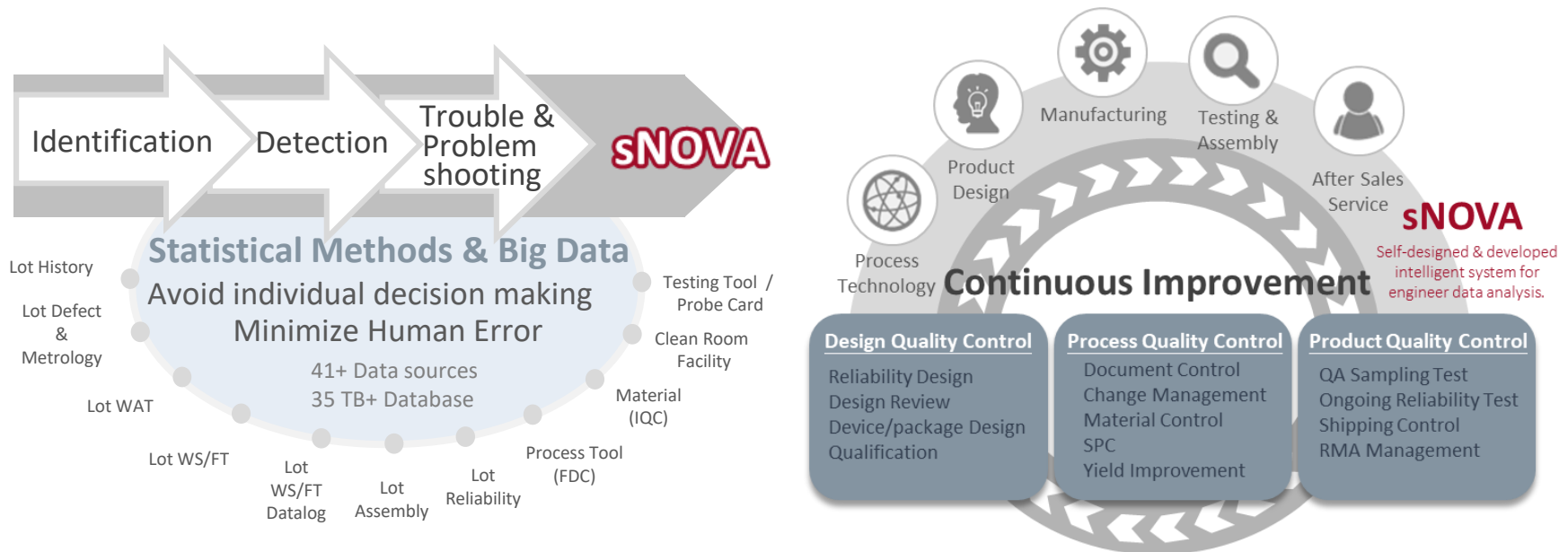
MACRONIX



Quality

Reliability & Efficiency Improvement: sNOVA

In 1989, Macronix built its own full-computer quality management system. Statistical Methodology supports facts finding in timely fashion.

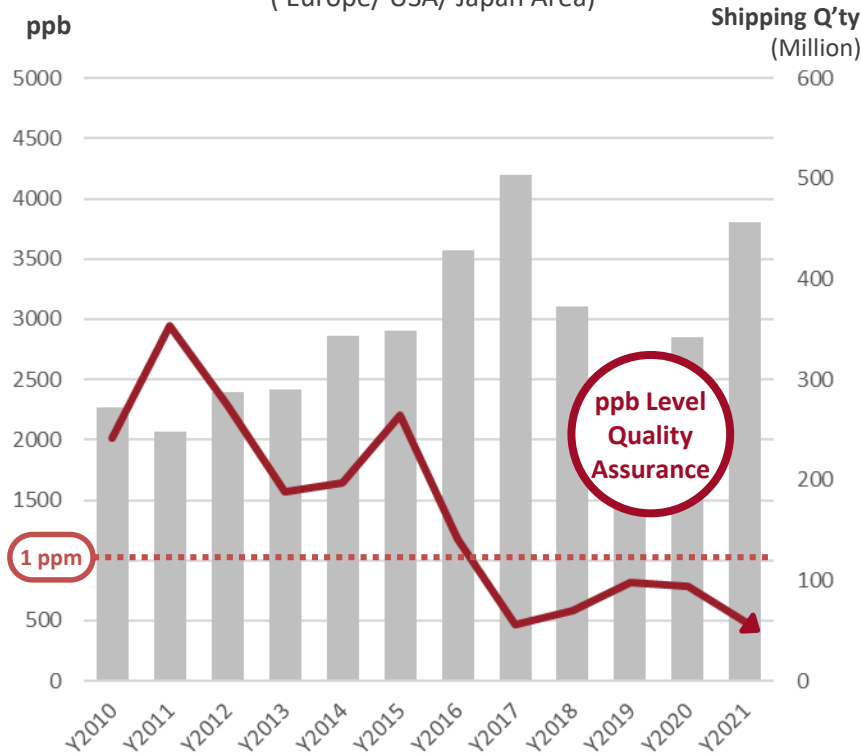


Superior Quality Performance

❑ Quality Certifications: AEC-Q100 compliant , IATF 16949, ISO 26262

NVM-NOR Quality Performance

(Europe/ USA/ Japan Area)



Note: 1 ppm = 1000 ppb



Selected as the best flash memory supplier with superior quality performance for 5 consecutive years (2016 – 2020) by Denso, one of the global leading automotive components manufactures.

Product Longevity Program

- **Reliable and dependable long term supply**

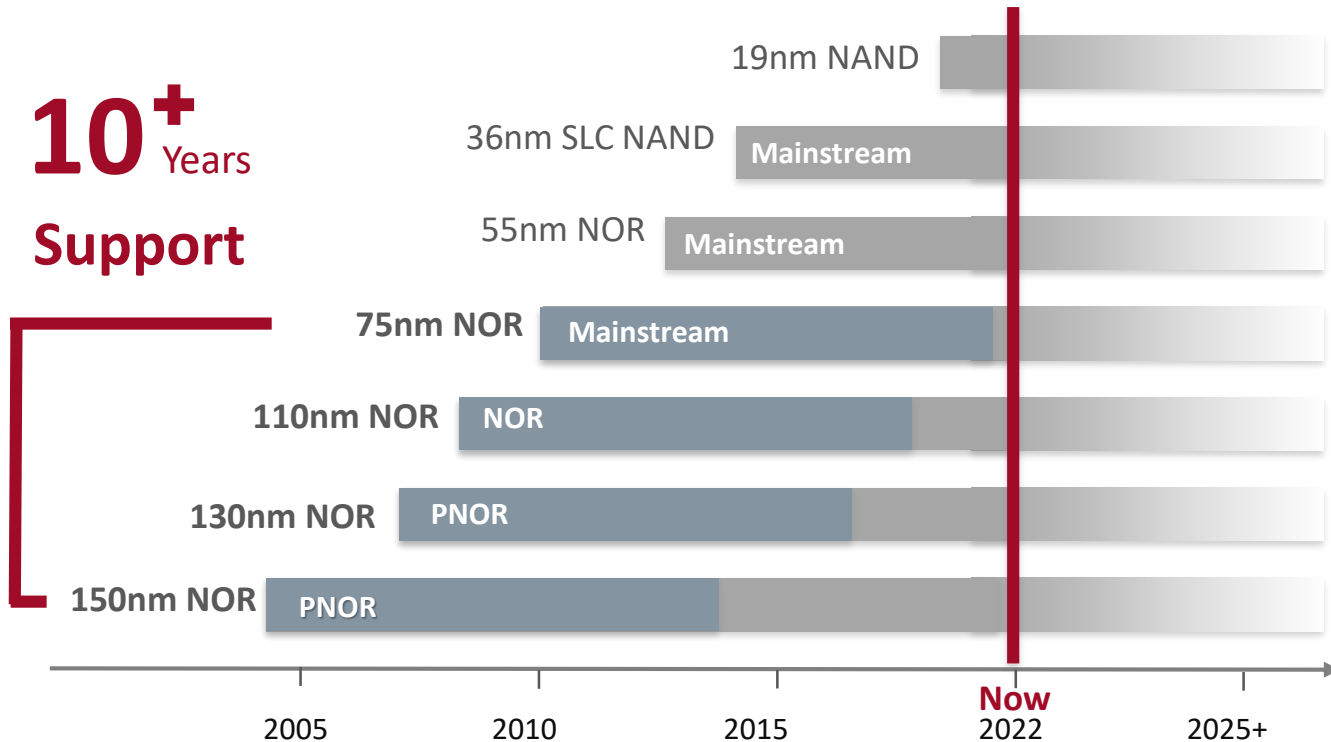
Macronix owns 2 wafer fabrication facilities with full control of manufacturing assuring the reliability.

- **MPLP (Macronix Product Longevity Program)**

provides product up to 10 years support for customers requiring long term lifecycle systems.



“Proven” Product Longevity



MACRONIX



Innovation

Continuous Innovation

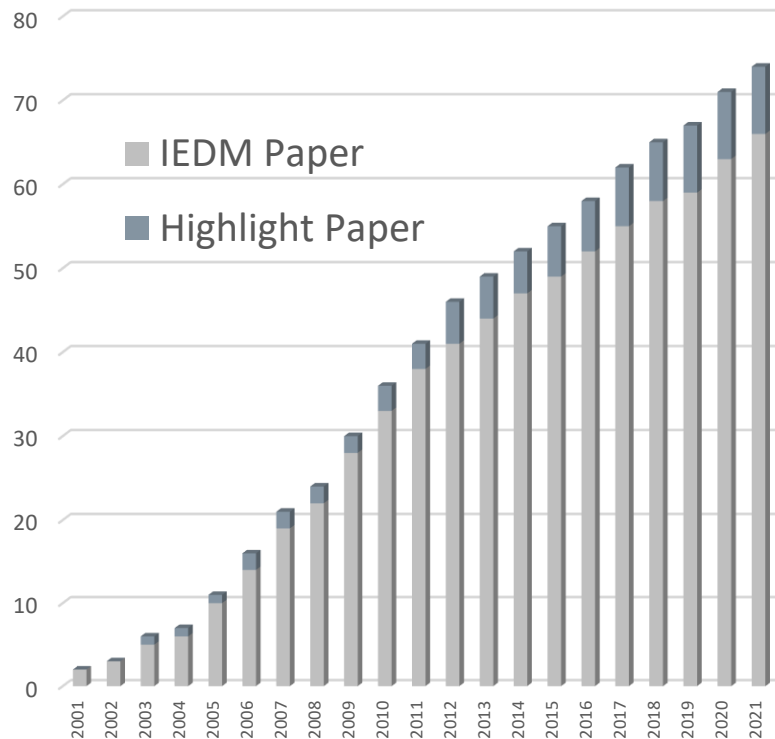
- ❑ **No.18** worldwide in overall patent strength
- ❑ **Over 8600 patents granted** worldwide (Dec., 2021)
- ❑ Win two major ITC court rulings against **No.1 NOR and No.1 NAND suppliers** at that time. Collectively receive more than 100 million U.S. dollars in compensation.

Rank	Company	Tech. Strength
1	IBM	1537.2
2	Samsung Group	1531.6
3	Intel Corp	1523.0
18	Macronix	385.2
23	TSMC	350.6

Note: The Patent Board scorecard ranks 240 semiconductor companies worldwide and selected the top 50 firms. Reported by the Patent Board (2011 – last data published)

IEDM Contribution

- 70+ papers, 8 Highlight papers in IEDM since 2001
- Macronix has published 10+ papers about 3D stacked memory on IEDM over the past 5 years.



2019 - 21 IEDM Paper Contribution Ranking (Corp. only)

2019		2020		2021	
Intel	13	Intel	11	Samsung	10
IBM	11	Samsung	10	IBM	8
TSMC	7	IBM	10	TSMC	8
Samsung	6	TSMC	5	Intel	6
Kioxia	6	Macronix	4	Macronix	3
Sony	4	Global Foundries	3	STMicro	3
Global Foundries	2	ARM	2	Sony	3
Macronix	2	Kioxia	2	Hitachi	2
STMicro	2	Sony	2	Hynix	2
Akoustis Technologies	1	STMicro	2	Renesas	2



Product and Technology

Flash Process Technology

NOR

130nm 110nm 75nm 68nm

55nm 45nm



NAND

75nm 36nm
SLC SLC

19nm
SLC&MLC

3D
Gen.1
TLC

3D
Gen.2
TLC - 2022



Highlight Products



Security

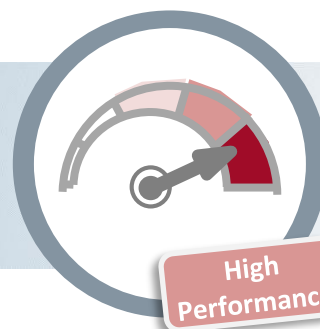
ArmorFlash

- AEC-Q100 Compliant
- NIST Cryptographic Algorithm Validation Program



LybraFlash

- High Reliability & Longevity
- The Optimum Solution for Gigabit Flash Memory



High Performance

OctaBus Memory

- Extreme Speed: 250 MHz with 500 MB/s
- Power “Instant-on” GUI Application



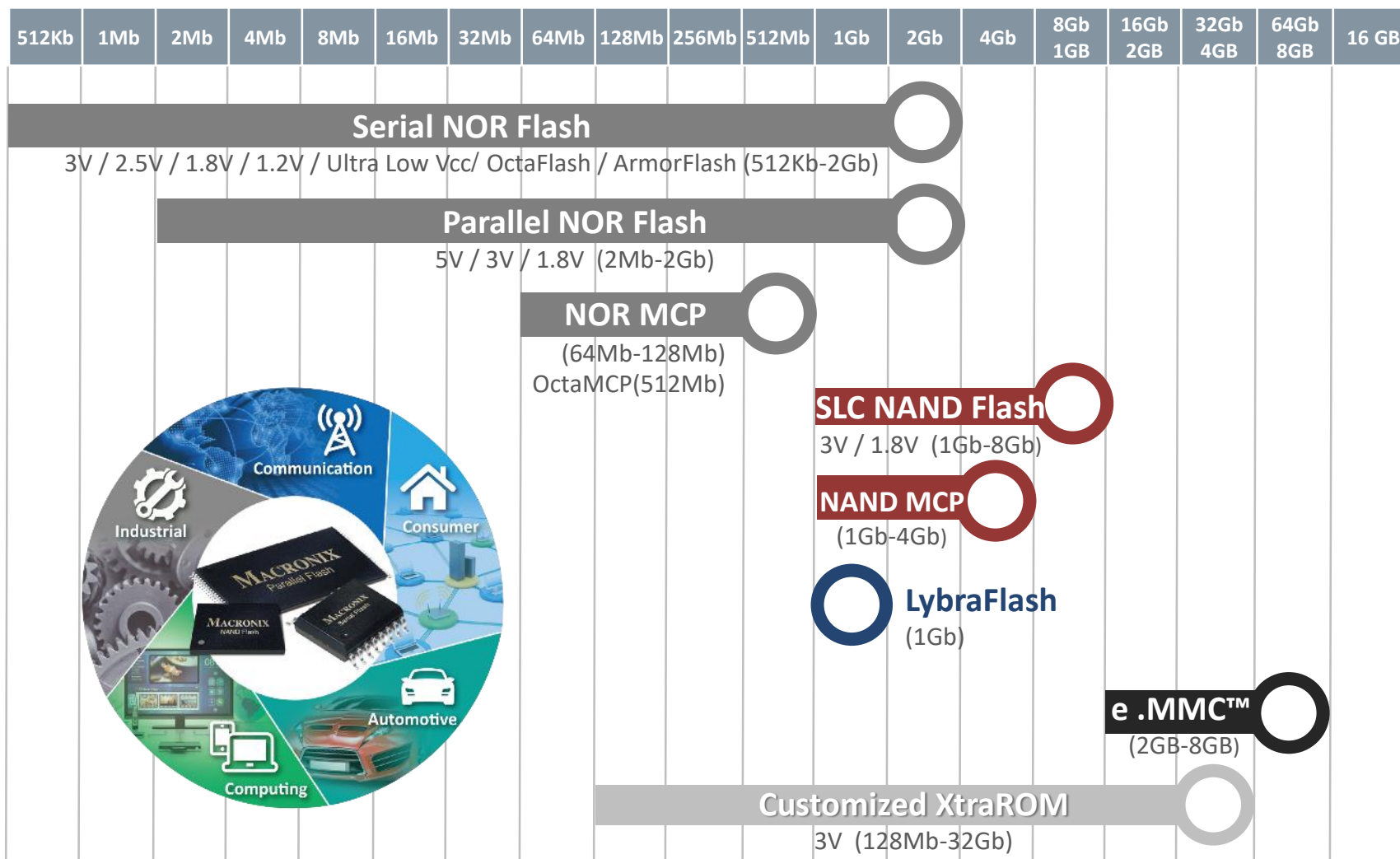
Low Power

Ultra Low Vcc

- Wide Range Vcc 1.65 – 3.6V
- Ultra Low Vcc 1.2 V
- Power Saving & Simple System Design

Reliable & Comprehensive NOR / NAND Portfolio

Comprehensive Product Portfolio



Green Products

- **100% Halogen-Free (HF) & Lead- Free**

- In compliance with major HF standards (IEC 61249-2-21, JPCA-ES01 2003, IPC 4101)

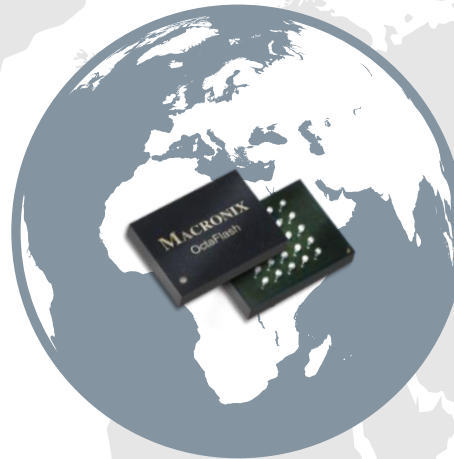
- **Testing Reports**

- Deliver products to ISO 17025 certified, credible domestic and foreign laboratories for testing

- **No Hazardous Substances**

- Comply with the EU's RoHS Directive and the Regulation for Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
- Received IECQ QC 080000 Certification

- **No use of Conflict Minerals**



- **RBA Recognition**

Complete the RBA (Responsible Business Alliance) VAP (Validated Audit Process) , achieving the highest recognition level of **PLATINUM** Status, a score of 200/200.



The Validated Audit Process (VAP) is conducted by RBA (Responsible Business Alliance) and its approved independent third-party audit firms, providing companies assurance in identifying risks and driving improvements and robust management systems for labor, ethics, health, safety, and environmental conditions in the supply chain.

* Macronix fabs were audited by TUV-Rheinland, and received best audit score (200/200) in 2019.

Contribution to Society

Macronix has continuously found opportunities to give back to our society and deeply believes that education is a major program of lasting importance and the 21st century's future can only be built by improving knowledge.

We have devoted longtime efforts to community involvement through the Macronix Education Foundation and also contribute to the establishment of Innovation Center and Learning Resource Center of National Cheng-Kung University and National Tsing-Hua University, both regarded as top universities in Taiwan.



NTHU Learning Resource Center



Miin Wu School of Computing



NCKU Innovation Center



安心感

Your Trustworthy
Partner

MACRONIX

MACRONIX



**MACRONIX
INTERNATIONAL Co., LTD.**

Copyright© Macronix International Co., Ltd. 2022. All rights reserved, including the trademarks and tradename thereof, such as Macronix, MXIC, MXIC Logo, MX Logo, Integrated Solutions Provider, Nbit, Macronix NBit, HybridNVM, HybridFlash, HybridXFlash, XtraROM, KH Logo, BE-SONOS, KSMC, Kingtech, MXSMIO, RichBook, OctaBus, ArmorFlash, LybraFlash. The names and brands of third party referred thereto (if any) are for identification purposes only.