

Company Profile

Aug. 2024



Agenda

- **Puya Company Profile**
- **EEPROM & NOR Flash Product Introduction**
- **MCU Product Introduction**
- **SPD Product Introduction**

Puya Semiconductor

- Founded in Shanghai in 2016. Puya is the industry's leading supplier of NVM and microcontroller chips.
- Specialized in IoT, consumer, wearable, mobile phone, industrial, automotive and other fields.
- Listed on Shanghai Stock Market in 2021 (688766.sh).



\$160 Million
2023



21.7 billion pcs
Total shipments



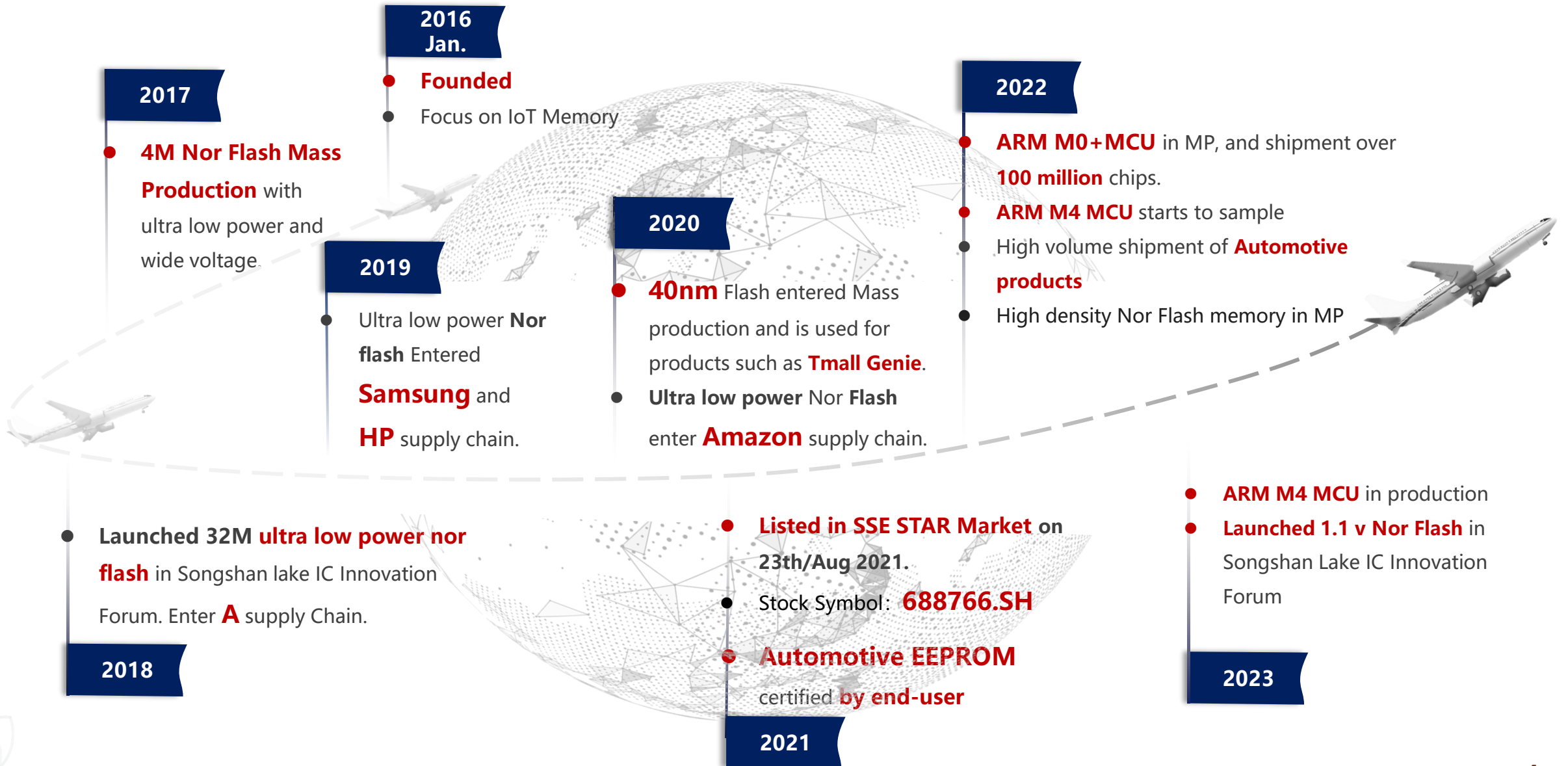
380+
R&D 200+



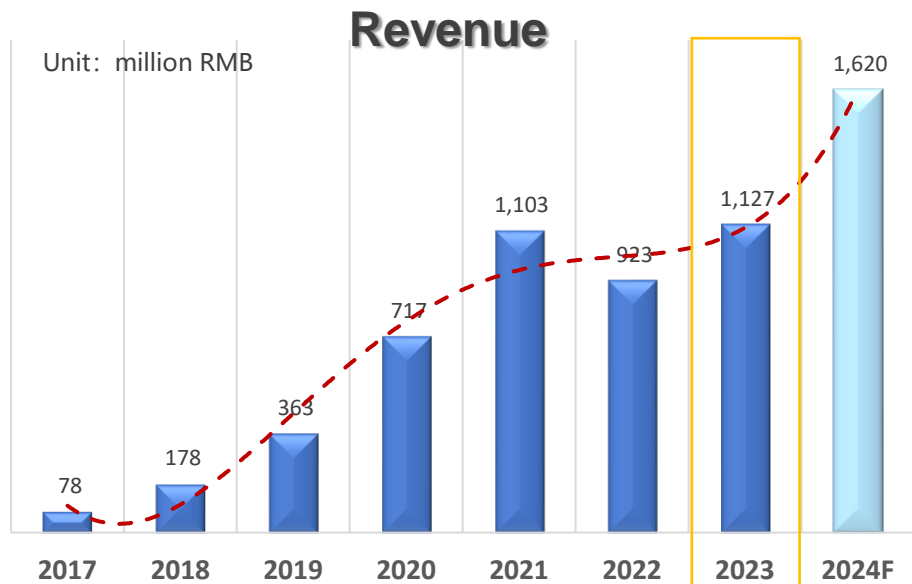
800+
Device



Milestones

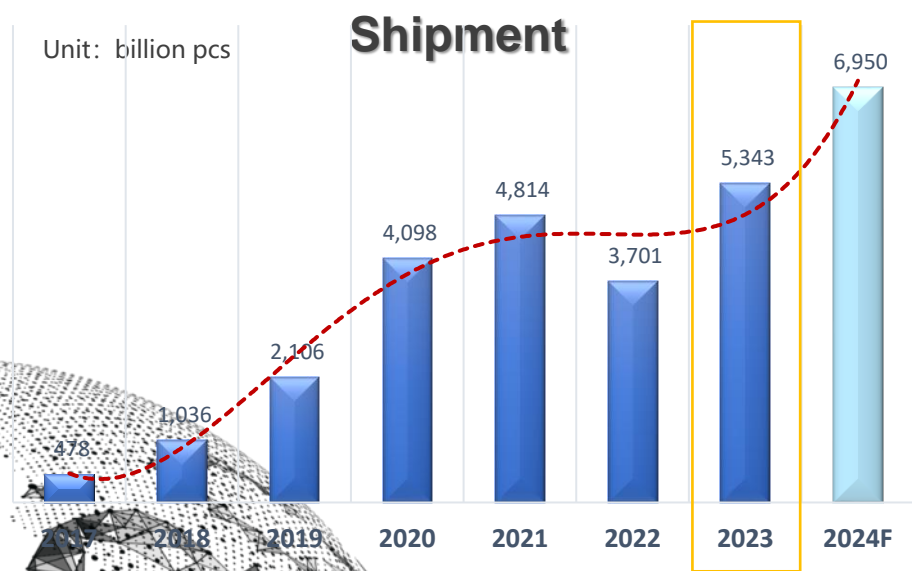


Revenue & Shipment

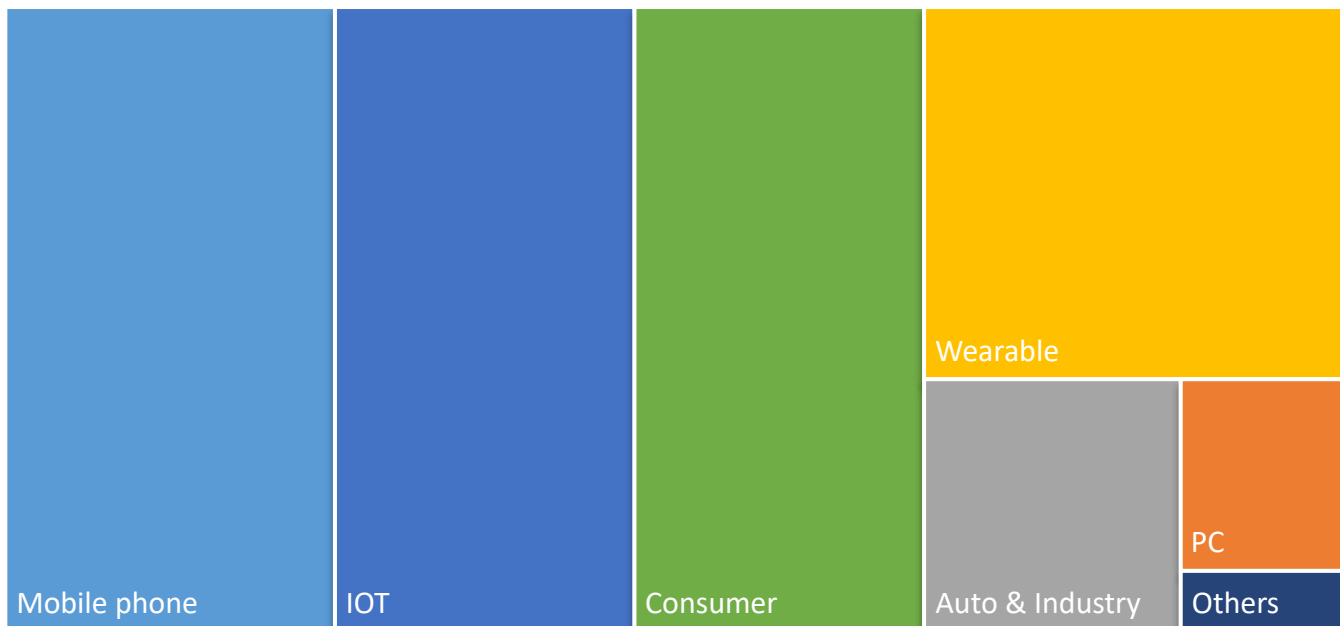


2023
Revenue: 160 million USD

2023
Shipment: 5.3 billion pcs

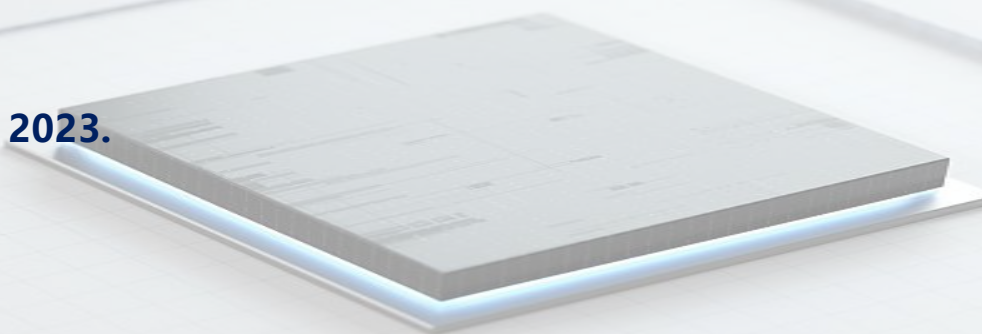


Application



Global Ranking

- Both Nor flash and EEPROM ranked **sixth globally** in 2023.
- Achieved a significant growth rate in Nor Flash.

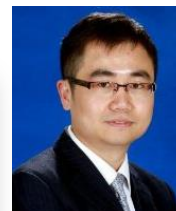


Global Ranking		NOR Flash	Rev.	Growth
2022	2023			
1	1	Winbond	644	(22.7%)
3	2	GigaDevice	442	(26.0%)
2	3	Macronix	389	(43.0%)
4	4	Infineon	290	(7.90%)
5	5	Micron	140	(3.40%)
6	6	Puya Semiconductor	110	19.6%
7	7	Adesto	55	(8.30%)
8	8	ISSI	50	(9.10%)
9	9	EON	40	(4.80%)

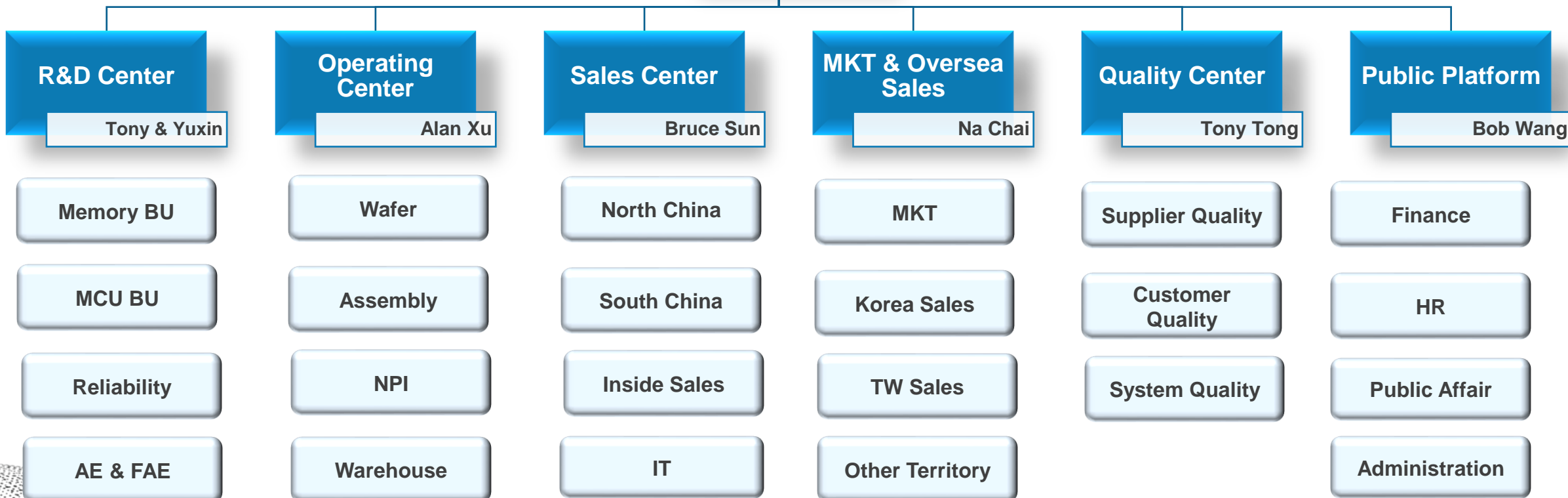
Global Ranking		EEPROM	Rev.	Growth
2022	2023			
1	1	STM	322	(1.50%)
2	2	Microchip	140	2.90%
3	3	Giantec	91	(31.7%)
4	4	Onsemi	71	2.90%
5	5	ABLIC	55	4.00%
6	6	Puya Semiconductor	37	(15.7%)
7	7	Rohm	28	(3.40%)
8	8	FMSH	27	(3.60%)
9	9	FMD	25	(3.80%)

Source: Web-Foot Research

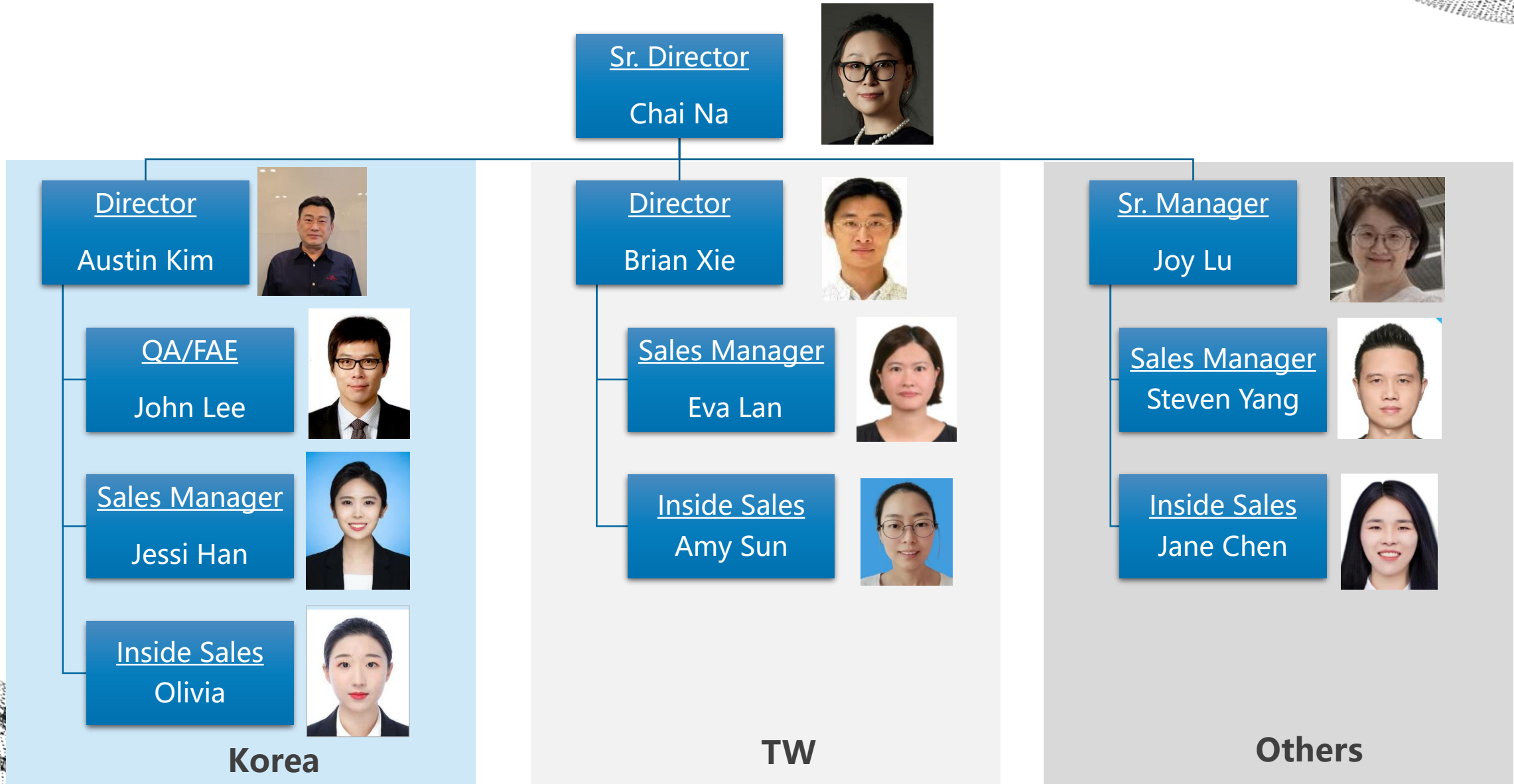
Puya Organization



CEO
Bob Wang



Puya Worldwide Support



Supply Chain Partner



Shanghai 200mm Fab
Beijing 300mm Fab



Taiwan 300mm Fab



Shanghai 300mm Fab



Taiwan 300mm Fab

Wafer Foundry Partner

- HLMC:
 - SPI NOR Flash (55nm, 50nm & 40nm)
 - EEPROM (55nm)
 - MCU (55nm & 40nm)
- SMIC:
 - EEPROM (130nm Shrink)
 - NOR Flash (55nm)
 - VCM Driver (180nm)
- PSMC:
 - NOR Flash (48nm)
- TSMC:
 - OIS/MCU (90nm)



SJSEMI



Huatian
Technology



ASE



JCET

Assembly House



Strategic Assembly partner with HuaTian SJSEMI, JCET and ASE.

- HuaTian: SOP, USON, DFN, TSSOP, DIP, WLCSP
- SJSEMI: WLCSP
- JCET: 1.5*1.5 USON, SOM
- ASE: USON

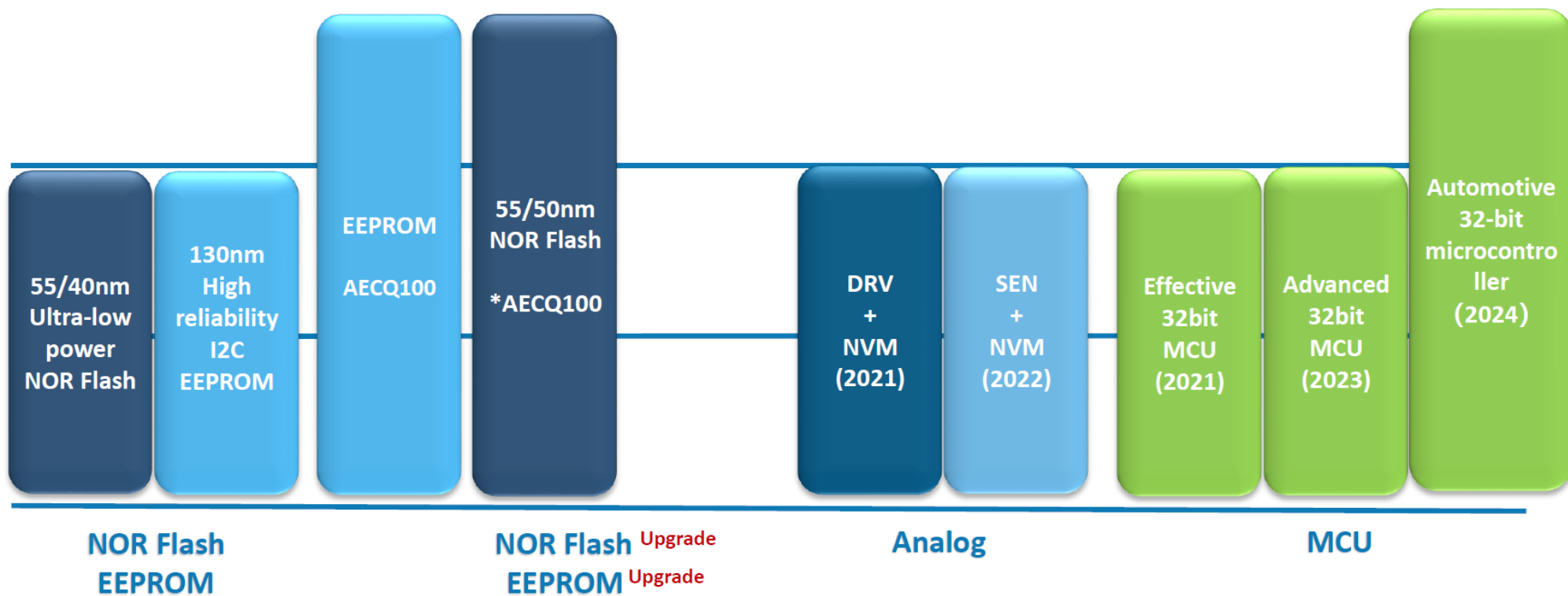
PUYA Plan



Automotive electronics

Industrial control

A-IoT/
Consumer/Home appliances...





Product Group



EEPROM

- I²C / SPI/SPD5
- Vcc: 1.1V~5.5V
- 85/105/125°C
- 2kbit~2Mbit
- Full line WLCSP
- Retention 100 Year
- Cycling 1kk
- Automotive Grade I
- **55nm/130nm**

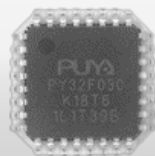
1



NOR Flash

- SPI/QPI/DTR
- Vcc: 1.1V~3.6V
- 85/105/125°C
- 512kbit~1Gbit
- Endurance 200K
- Automotive Grade I/II
- KGD for SIP
- **40nm/50nm/55nm**
- Small package support

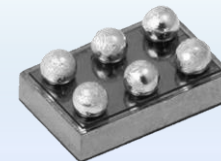
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MCU

- ARM Cortex **M0+/M4**
- Vcc: 1.7V~5.5V
- 32/48/72/144 MHz
- 85/105°C
- 16~384KB Flash
- 2~64KB SRAM
- 12bit ADC/DAC
- OPA/CMP
- USB2.0/CANFD/LCD...
- 8/10/16/20/24/32/48 /64/100pin

3



VCM Driver

- OLAF**
- Uni-direction/Bi-direction
- Driver +EEPROM
- Close Loop**
- long stroke
- OIS**
- VOIS
- 3.4Mbit I²C

4

Agenda

- Puya Company Profile
- **EEPROM & NOR Flash Product Introduction**
- MCU Product Introduction
- SPD Product Introduction

NOR Flash

Type

Package

		Supply Voltage	512k	1M	2M	4M	8M	16M	32M	64M	128M	256M	512M	1G
Muti I/O	High Voltage		●	●	●	●	●	●	●	●	●	●	●	●
	Low Voltage		●	●	●	●	●	●	●	●	●	●	●	●
	Wide Voltage			●	●	●	●	●	●	●				
	Ultra Low Voltage					●	●	●	●	●	●	●		
	Automotive Grade II/I					●	●	●	●	●	●	●		
SOP	150mil		●	●	●	●	●	●	●	●	●			
	208mil					●	●	●	●	●	●	●	●	●
	300mil										●	●	●	●
TSSOP	8-lead		●	●	●	●	●	●	●	●	●			
USON	1.5x1.5			●	●	●	●	●	●	●	●			
	2x3			●	●	●	●	●	●	●				
	3x4					●	●	●	●	●				
	4x4					●	●	●	●	●	●			
WSON	6x5			●	●	●	●	●	●	●	●	●		
	8x6								●	●	●	●	●	
WLCSP			●		●	●	●	●	●	●	●			

1.1V Nor Flash Roadmap

Serial	Supply Voltage	Density	Q1'24	Q2'24	Q3'24	Q4'24	Q1'25	Q2'25	Q3'25	Q4'25	
P GS Serial	1.1v-2.0v	4M		Sample	P25Q40SN						
		8M		Sample	P25Q80SN						
		16M		Sample	P25Q16SN						
		32M	P25Q32SN								
		64M	P25Q64SN								
		128M	P25Q128SN								
		256M		Sample	P25Q256SN						



40nm



MP



Sample

Flash Package Type I

USON6
(1.0×0.72×0.45mm)
(UF)



USON6
(1.2×0.72×0.45mm)
(US)



USON6
(1.2×1.2×0.45mm)
(UT)



Up to 8Mb

USON8
(1.5×1.5×0.45mm)
(SV)



Up to 16Mb

USON8
(1.5×1.5×0.55mm)
(SX)



USON8
(3×2×0.45mm)
(UW)



USON8
(3×2×0.5mm)
(UG)



USON8
(3×2×0.55mm)
(UX)



Up to 64Mb

DFN8
(3×3×0.55mm)
(DF)



Up to 128Mb

DFN8
(3×3×0.75mm)
(DX)



USON8
(3×4×0.55mm)
(NX)



USON8
(4×4×0.45mm)
(QV)



WSON8
(6×5×0.75mm)
(WX)



WSON8
(8×6×0.75mm)
(WZ)



SOP8
(150mil)
(SS)



SOP8
(208mil)
(SU)



SOP16
(300mil)
(SM)



TSSOP8
(TS)



TFBGA 24ball
(5×5 Array)
(TF)



TFBGA 24ball
(4×6 Array)
(TB)



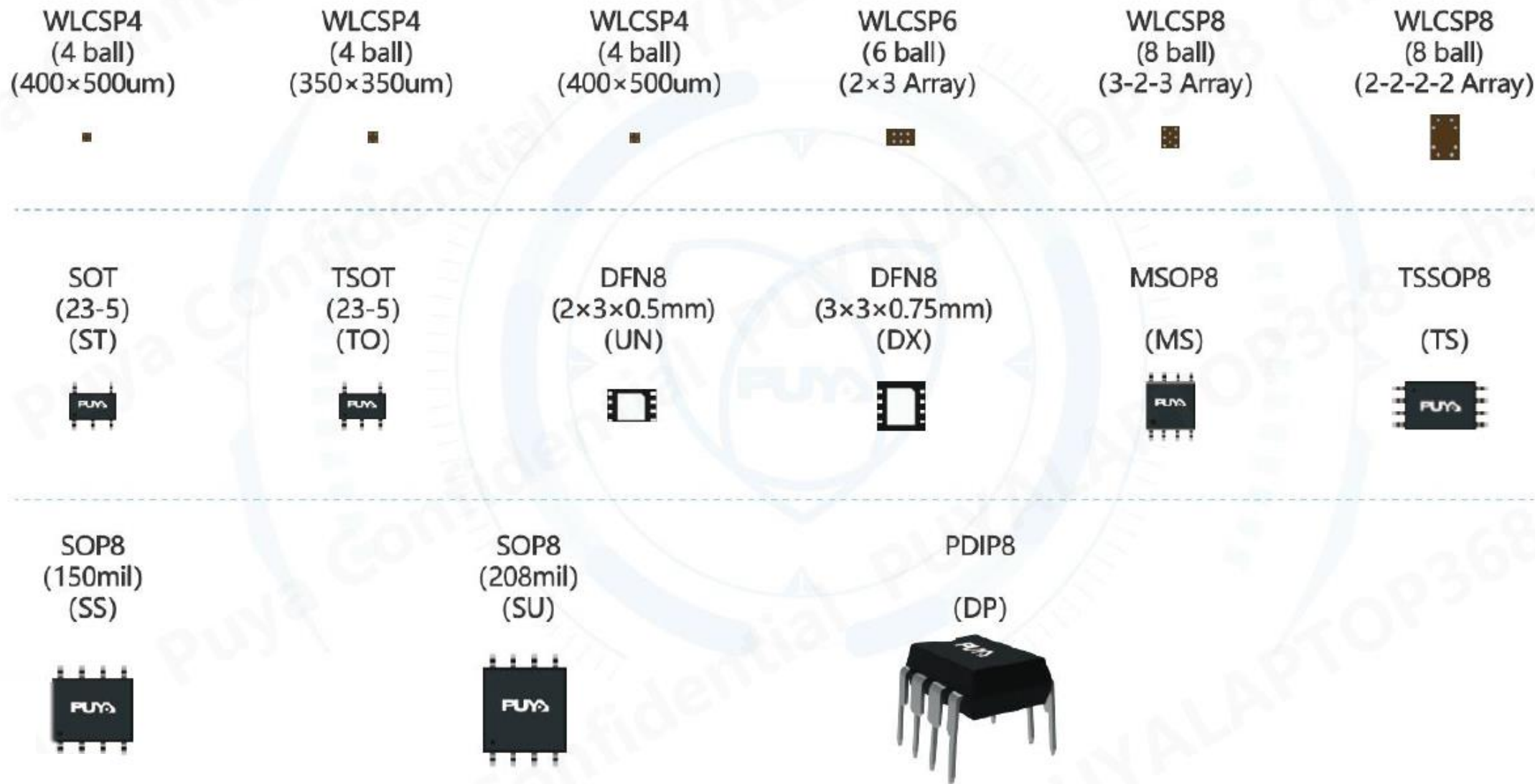
EEPROM

Type

Package

	Supply Voltage	2k	4k	8k	16k	32k	64k	128k	256k	512k	1M	2M	4M
I ² C	1.7v-5.5v	●	●	●	●	●	●	●	●	●	●		
	1.65v-3.6v						●	●	●	●	●	●	
SPI	1.65v-3.6v						●	●	●	●	●	●	
	1.7v-5.5v			●	●	●	●	●	●	●	●	●	●
SOP	150mil	●	●	●	●	●	●	●	●	●	●	●	●
PDIP	8-lead	●	●	●	●	●	●						
TSSOP	8-lead	●	●	●	●	●	●	●	●	●	●	●	●
UDFN	2x3	●	●	●	●	●	●	●	●	●	●	●	●
MSOP	8-lead					●	●	●	●	●			
SOT23	5-lead	●	●	●	●								
WLCSP	4 ball					●	●	●	●	●			
	6 ball	●	●	●	●				●				
	8 ball									●	●	●	

EEPROM Package Type I



Agenda

- Puya Company Profile
- EEPROM & NOR Flash Product Introduction
- **MCU Product Introduction**
- SPD Product Introduction

MCU Positioning

- ✦ **8b WORLD** - pioneer ARM M0+ to replace 8051/PIC/STM8
- Leverage Advanced process & Superior memory technology
- ✦ **32b WORLD** - ARM M0+/M4 for General Purpose MKT

Flash

MTP

OTP

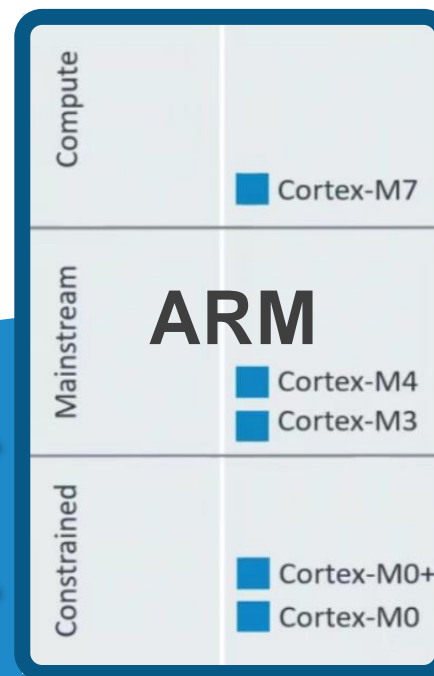
8051

PIC

STM8

Puya M4

Puya M0+



RISC-V

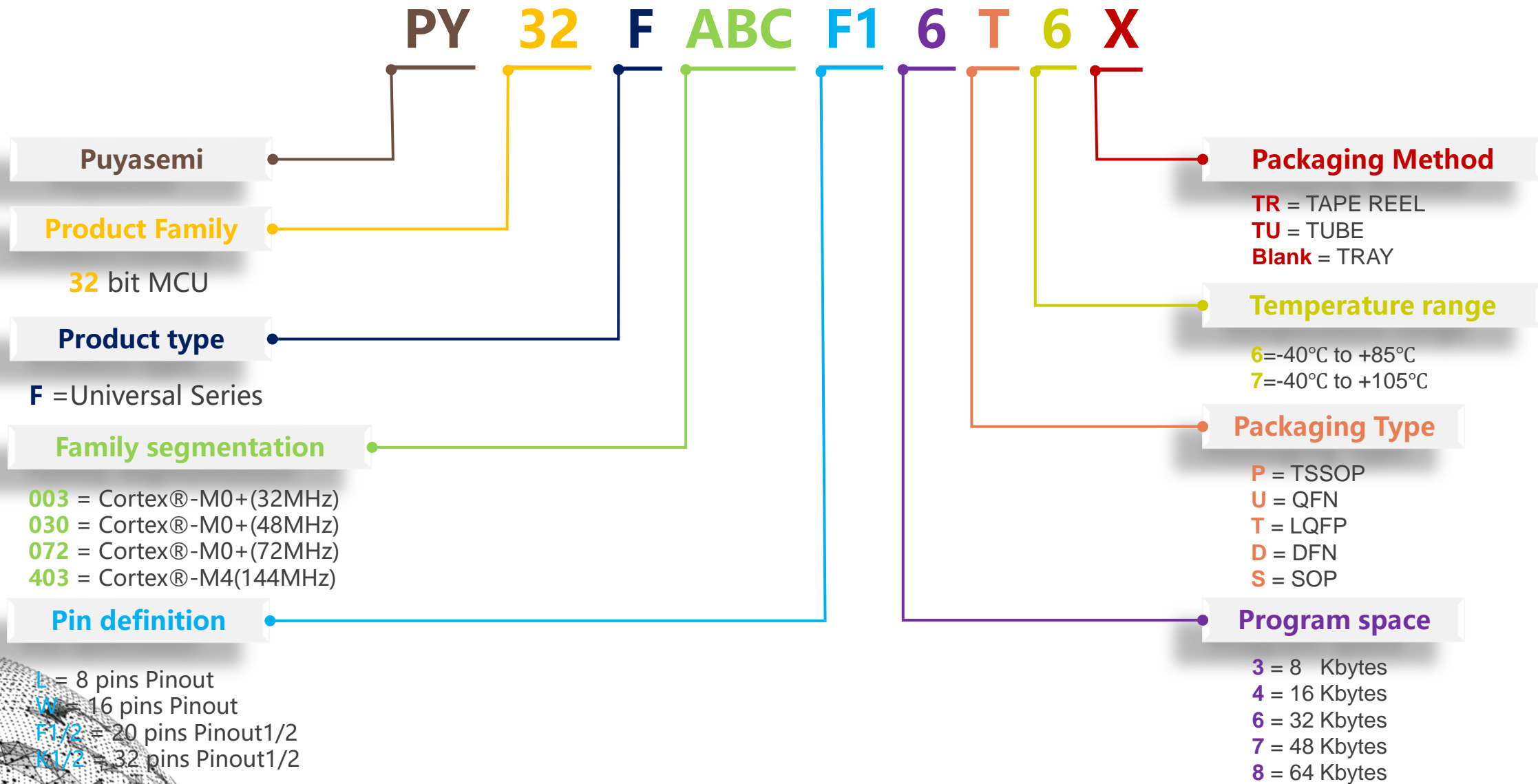
L020/F003**

F030**/F040

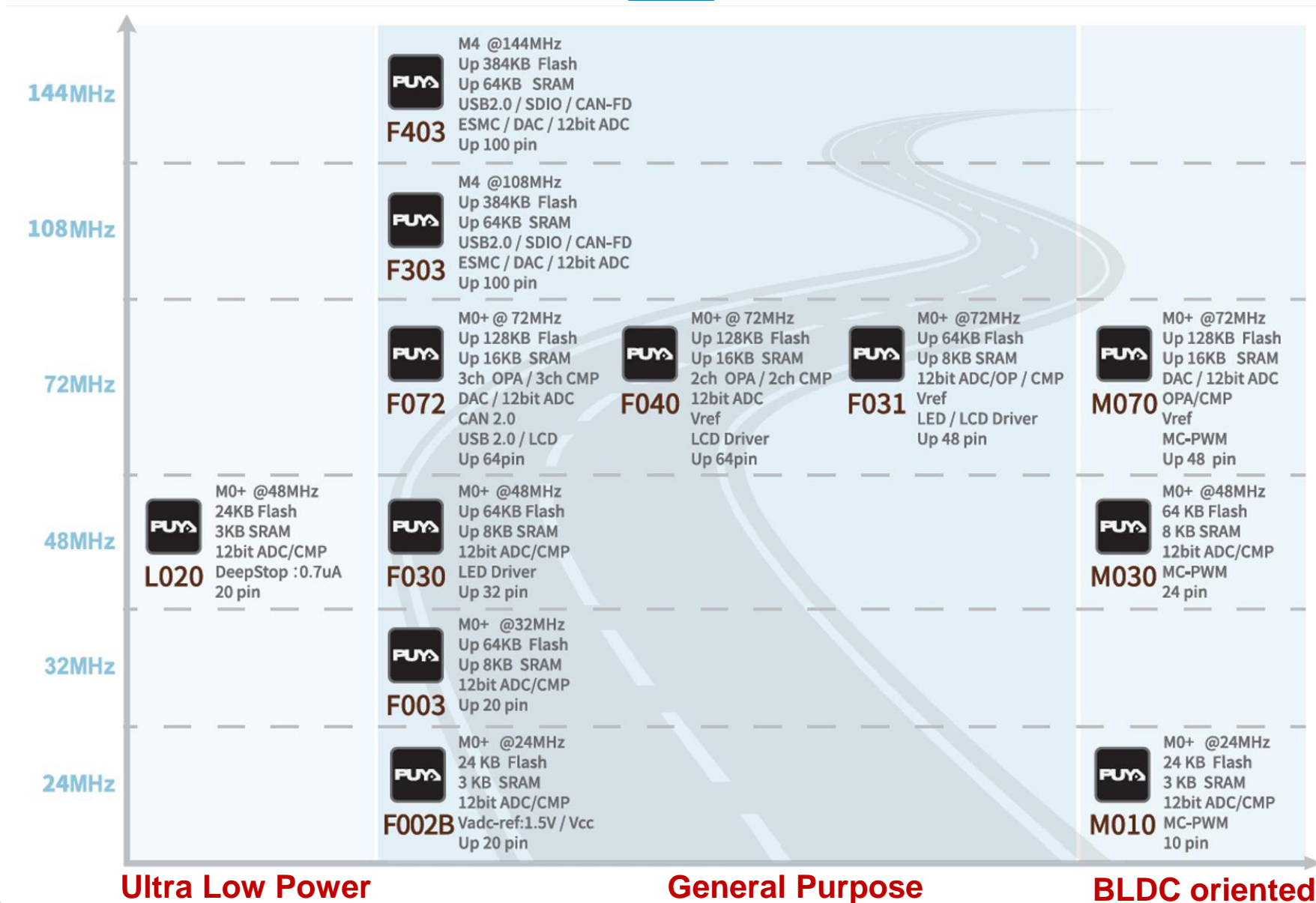
F071/072

F403 ...

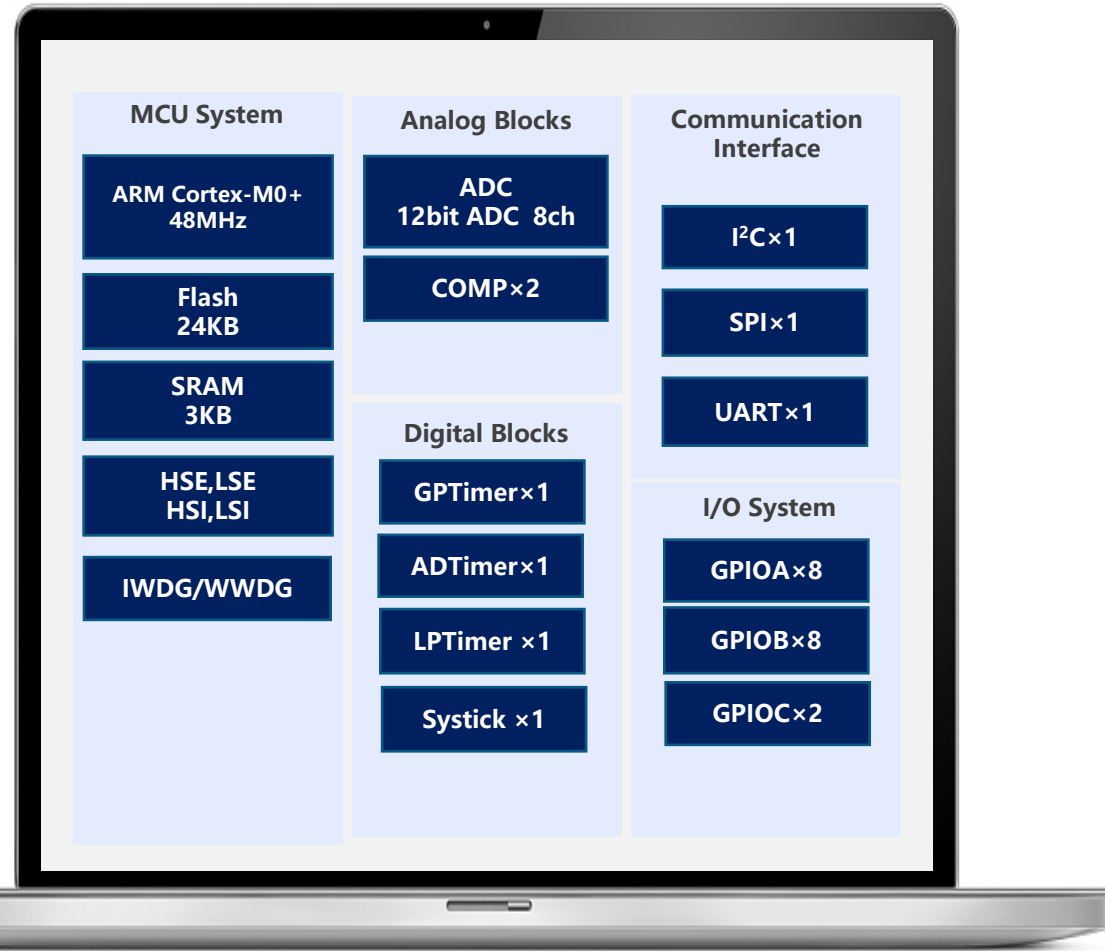
MCU Naming Rule



MCU Roadmap



PY32L020 Series



Typical applications

Fire sensor、 Remote control 、 Small H/A etc

Core

- 32 bit ARM Cortex-M0+

Low power consumption

- Icc @ Stop mode: 1.7µA
- Wake up from Stop: 10.6µs

Peripheral resources

- Up to 18 GPIO
- 1*IIC, 1*SPI, 1*USART
- 1*16bit GPTimer,
- 1*ADTimer (BLDC/PMSM)
- 1*LPTimer,
- 1*12bit ADC(8CH),
- 2*COMP
- Unique UID

Flash

- 24K bytes flash
- 3K bytes SRAM

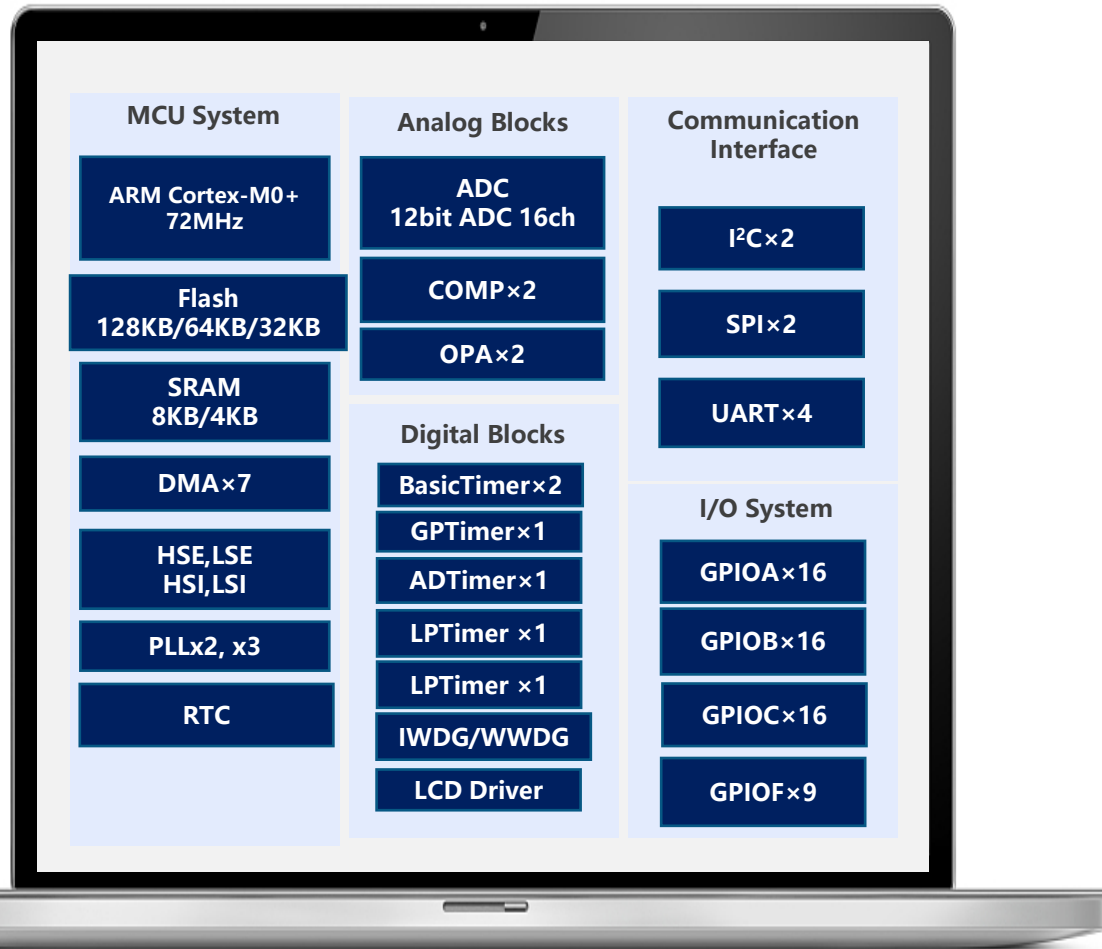
System

- System Clock: HSI,HSE,LSI,LSE
- Frequency up to: **48MHz**
- Voltage supply: 1.7V ~ 5.5V
- Temperature -40°C ~ 85°C
- -40°C ~ 105°C

Package

- QFN20(3*3)
- TSSOP20(6.5*4.4)

PY32F040 Series



Typical applications

Small H/A, Industrial Instruments, Wireless Charger, Pet trainer, Laser distance measurer, BMS, etc.

Core

- 32 bit ARM Cortex-M0+

Low power consumption

- Icc @ Stop mode : 5.7µA
- Wake up from Stop : 7µs

Peripheral resources

- Up to 57 GPIO
- 2*IIC, 2*SPI, 4*USART, 1*32bit GPTimer, 2*16bit Basic Timer, 1*ADTimer (BLDC/PMSM)
- 1*LPTimer, 2*WDT, RTC
- 1*12bit ADC(16CH),
- 2*COMP, 2*OPA, LCD Driver
- Unique UID

Flash

- 32 ~ 128K bytes flash
- 4 ~ 16K bytes SRAM

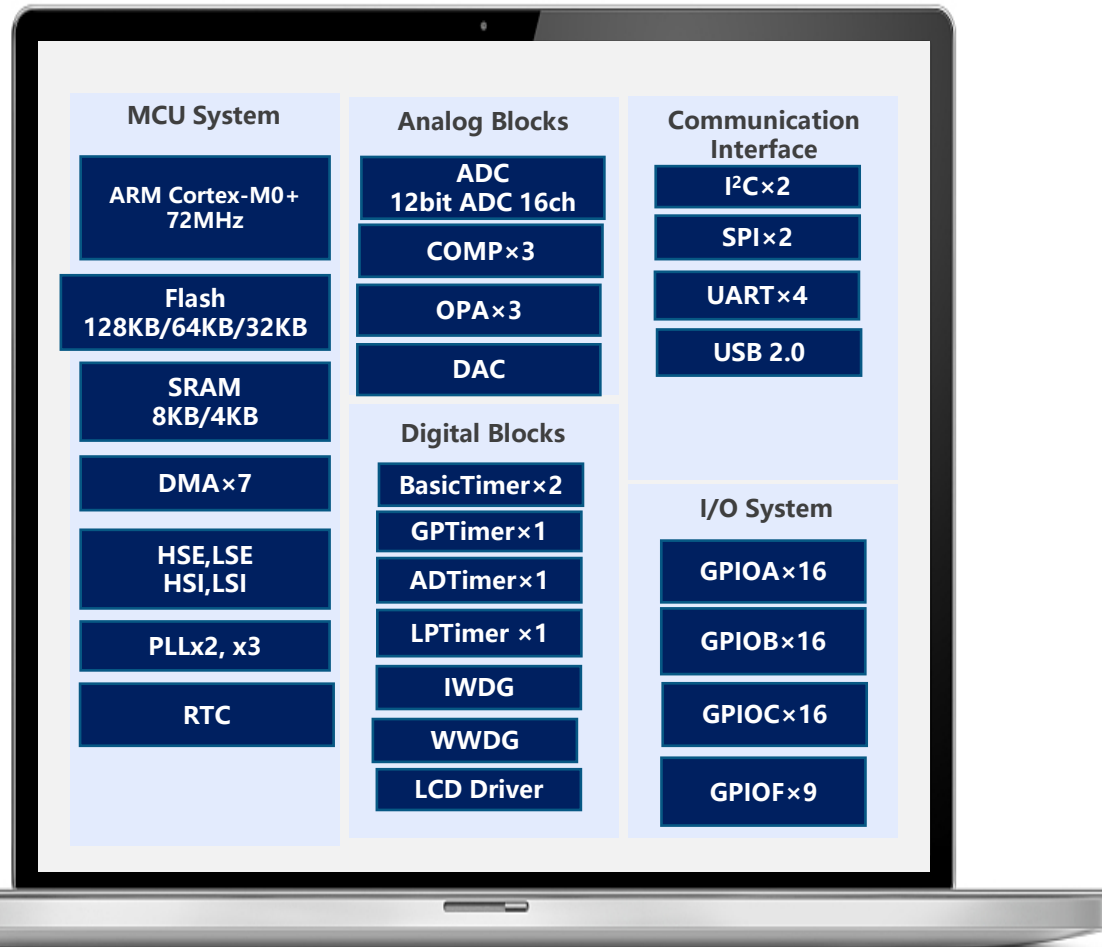
System

- System Clock: HSI,HSE,LSI,LSE,PLL
- Frequency up to: **72MHz**
- Voltage supply: 1.7V ~ 5.5V
- Temperature -40°C ~ 85°C

Package

- QFN32(4*4)
- QFN32(5*5)
- LQFP48(9*9)
- LQFP64 (12*12)

PY32F071 Series



Typical applications

Game hand, Mouse, Keyboard for PC, IPC, Massage device, Industrial etc

Core

- 32 bit ARM Cortex-M0+

Flash

- 32 ~ 128K bytes flash
- 4 ~ 16K bytes SRAM

Low power consumption

- Icc @ Stop mode: 5.7µA
- Wake up from Stop mode: 7µs

System

- System Clock: HSI,HSE,LSI,LSE,PLL
- Frequency up to : **72MHz**
- Voltage supply : 1.7V ~ 5.5V
- Temperature -40°C ~ 85°C

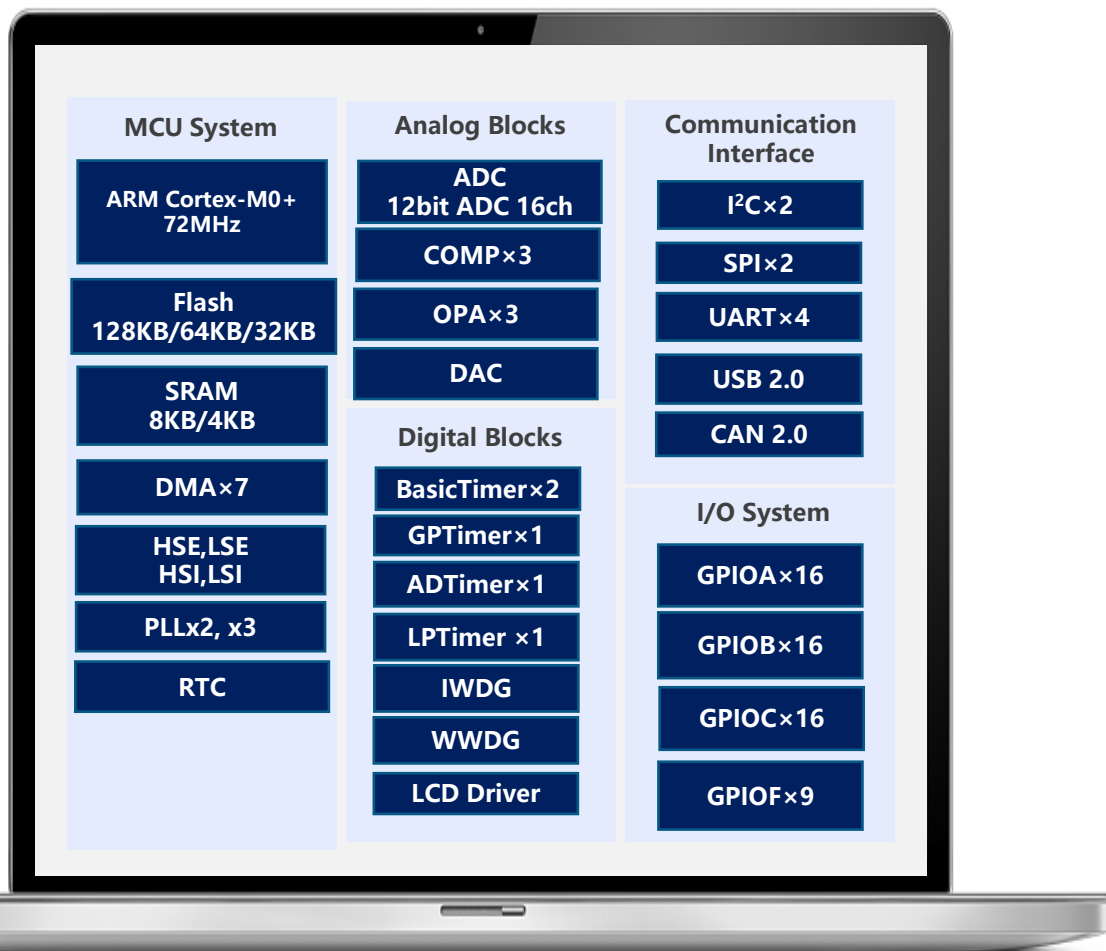
Peripheral resources

- Up to 57 GPIO
- 2*IIC, 2*SPI, 4*USART, 1*32bit GPTimer, 2*16bit Basic Timer, 1*ADTimer (BLDC/PMSM)
- 1*LPTimer, 2*WDT, RTC
- 1*12bit ADC(16CH),
- 3*COMP, 3*OPA, LCD Driver
- USB 2.0
- Unique UID

Package

- QFN32(5*5)
- QFN48(6*6)
- QFN64(8*8)
- LQFP48(9*9)
- LQFP64 (12*12)

PY32F072 Series



Typical applications

LoE gateway, E-scooter controller, E-scooter panel, Industrial, etc

Core

- 32 bit ARM Cortex-M0+

Flash

- 32 ~ 128K bytes flash
- 4 ~ 16K bytes SRAM

Low power consumption

- Icc @ Stop mode: 5.7µA
- Wake up from stop mode: 7µs

System

- System Clock: HSI,HSE,LSI,LSE,PLL
- Frequency up to : **72MHz**
- Voltage supply : 1.7V ~ 5.5V
- Temperature -40°C ~ 85°C

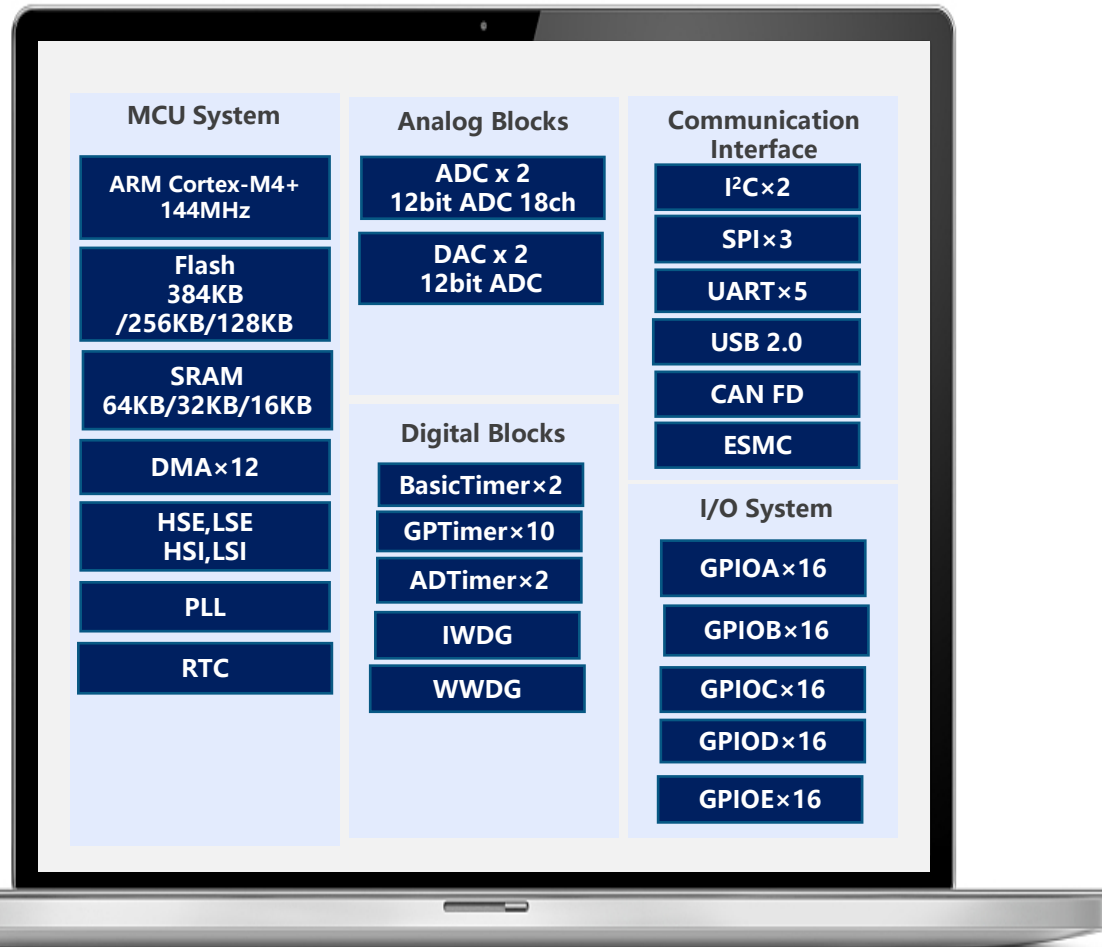
Peripheral resources

- Up to 57 GPIO
- 2*IIC, 2*SPI, 4*USART, 1*32bit GPTimer, 2*16bit Basic Timer, 1*ADTimer (BLDC/PMSM)
- 1*LPTimer, 2*WDT, RTC
- 1*12bit ADC(16CH),
- 3*COMP, 3*OPA, LCD Driver
- USB 2.0, CAN 2.0
- Unique UID

封装

- QFN32(5*5)
- QFN48(6*6)
- QFN64(8*8)
- LQFP48(9*9)
- LQFP64 (12*12)

PY32F403 Series



Typical applications

Label printer, Stage lights, Walkie-talkie, Water dispenser, Wireless charger, BMS, Industrial. etc.

Core

- 32 bit ARM Cortex-M4F

Flash

- 128 ~ 384K bytes flash
- 16 ~ 64K bytes SRAM

Low power consumption

- I_{cc} @ Stop mode: 5.8μA ()
- Wake up from stop mode: 79.5μs

System

- System Clock: HSI, HSE, LSI, LSE, PLL
- Frequency up to : **144MHz**
- Voltage supply : 1.7V ~ 3.6V
- Temperature -40°C ~ 85°C

Peripheral resources

- Up to 80 GPIO
- 2*IIC, 3*SPI, 5*USART, 1*32bit GPTimer, 2*16bit Basic Timer, 2*ADTimer (BLDC/PMSM)
- 10*GPTimer, 2*BasicTimer
- 2*WDT, RTC
- 2*12bit ADC(18CH),
- USB 2.0, CAN FD
- Unique UID

Package

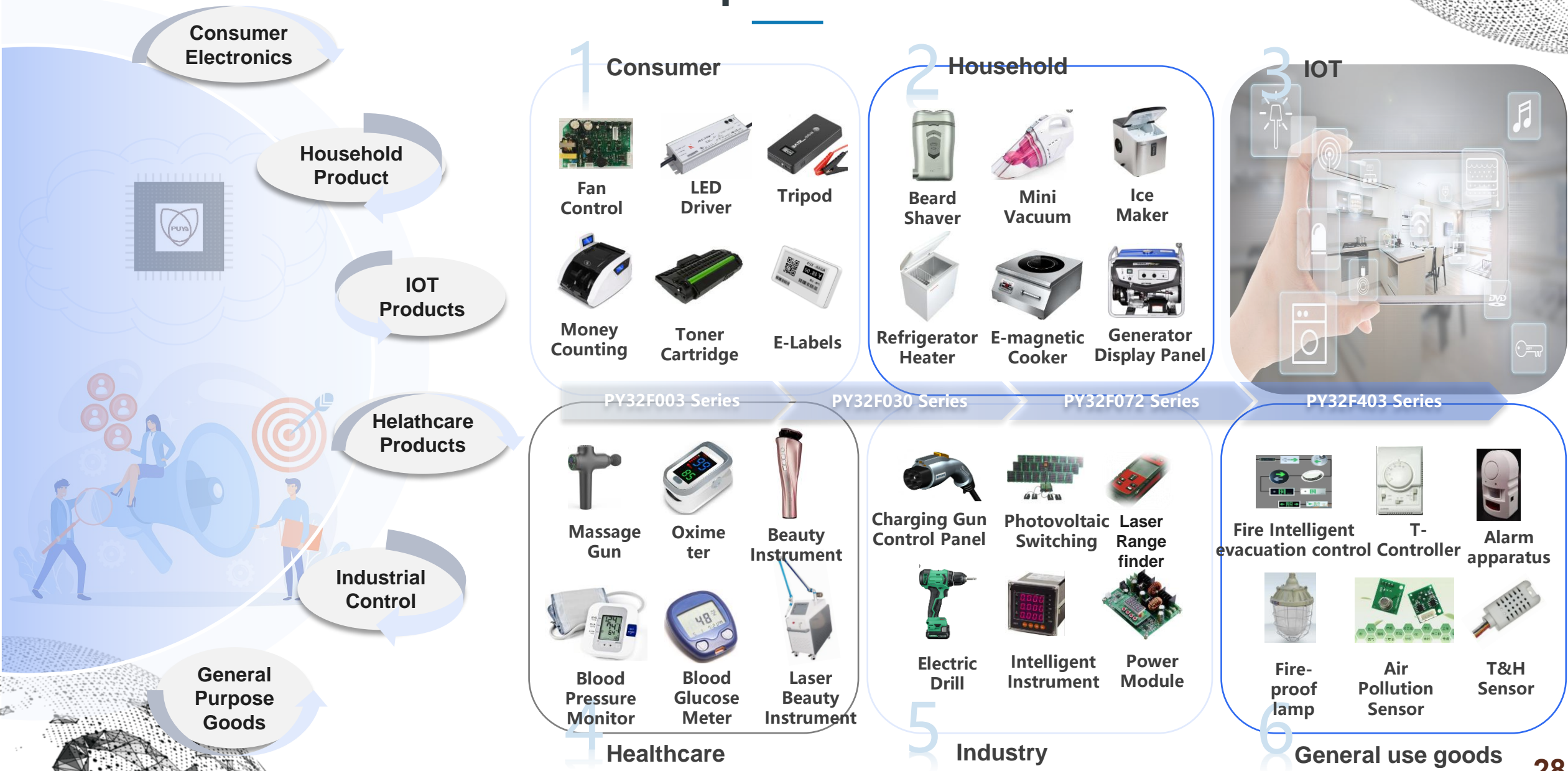
- QFN32(4*4)
- LQFP48(7*7)
- LQFP64 (10*10)
- LQFP100 (14*14)

MCU Business Planning

Puya 32-bit General Purpose MCU Roadmap

	2020	2021	2022	2023	2024	2025	2026	2027
Technology node	55nm eFlash (5V)							
	40nm eFlash (3.3V)			40nm-enhanced 5V				
							28nm 3.3V	
MCU Core (ARM)	M0+			M23				
	M4			M33				M7
Entrance level (+ replace 8b MCU)		F003 M0+ 32MHz 64KB Flash 8 to 20pin	F002A M0+ 24MHz 24KB Flash 8 to 20pin	F002B/M010 M0+ 24MHz 24KB Flash 8 to 20pin				
Main stream		F030/031 M0+ 72MHz 64KB Flash 8 to 48pin	F040/072/M070 M0+ 72MHz 128KB Flash 16 to 64pin	F303/403/M090 M4 144MHz 384KB Flash 32 to 100pin	PT088 M0+ 72MHz 256KB Flash 20 to 64pin			
Ultra Low power				L020/T020 M0+ 48MHz 24-32KB Flash 8 to 28pin	L040 M0+ 48MHz 64KB Flash 20 to 48pin	L060 M23 72MHz 256KB Flash 32 to 100pin	L080 M33 200MHz 1MB Flash 32 to 144pin	
High performance					G430/530 M4 200MHz 1MB Flash 32 to 144pin	A530 (AUTO) M33 200MHz 1MB Flash 32 to 144pin	G730 M7 360MHz 2MB Flash 64 to 144pin	H700 M7 400MHz, w/ M4 2MB+ Flash 64 to 144pin
Total Product line Shipment (Target)			100M pcs	260M pcs	900M+ pcs (T)	1.5B+ pcs (T)	2.5B+ pcs (T)	40B+ pcs (T)

General Purpose MCU Market





Water dispenser



Game Handle



Motor Application



IPC



Industrial Instruments



Wireless Charger



Laser Distance Measurer



Label Printer



Massage Device



Stage Light

Ecological support

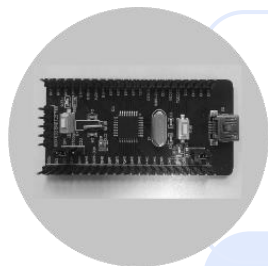
Development Environment



Operation System

Development Tool

Development Kits



- Support Keil uVision v5.28 or higher version development environment
- Support PY32F full range of HAL/LL library development
- 3.3V/5V power supply
- Offer USB interface power for emulator or target MCU
- Abundant I/O port resources

PY-Compiler

- Support Windows operating systems. No driver is required in Win10
- Support Keil uVision v5.28 or higher version development environment
- Support PY32F programming environment
- Support for UART with asynchronous serial communication
- USB cable connected to computer to offer 3.3V/5V power supply
- Target chip adaptive, support PY32 programming via SWD debug port



PY-Burner



- Support self-start, stop and offline burning
- Support various erasing methods, auto empty chip skip, no need to wait
- Support 3.3V and 5V voltage output
- Support touch screen and multiple languages
- Thousands of programming storage capacity
- HID+ WinUSB-level dual-mode driverless architecture
- Millisecond chip response

ARM
Universal
platform

Mature
engineering
cases

Software
Library

Application
Documents

FAE
Support

project
supports

Program Support

Agenda

- **Puya Company Profile**
- **EEPROM & NOR Flash Product Introduction**
- **MCU Product Introduction**
- **SPD Product Introduction**

SPD Introduction

➤ SPD(Serial Presence Detect)

Every DIMM should have a SPD data, which records many important information about the memory. For example, the chip and module manufacturer of the memory, operating frequency, operating voltage, speed, capacity, voltage and address bandwidth of rows and columns, etc. The SPD data is usually written into the EEPROM by the DIMM manufacturer according to the actual performance of the memory before it is shipped from the factory.

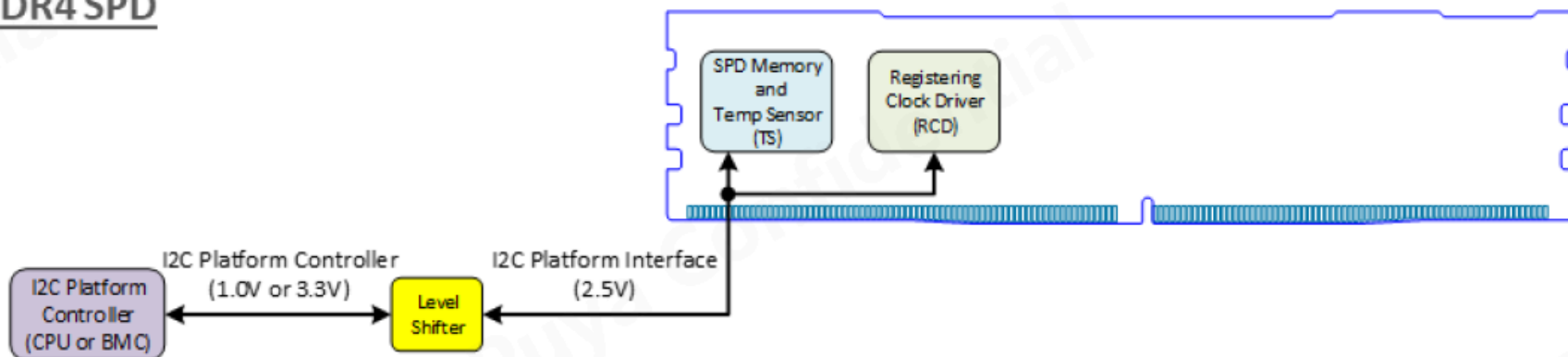
➤ SPD vs DDR

DRAM Type	EE Capacity	Protection	TS	Hub	Interface
DDR 1	256 Byte	128 Byte			I ² C
DDR 2	256 Byte	128 Byte			I ² C
DDR 3	256 Byte	128 Byte			I ² C
DDR 4	512 Byte	128 Byte each	Yes		I ² C
DDR 5	1024 Byte	64 Byte each	Yes	Yes	I ² C & I ³ C

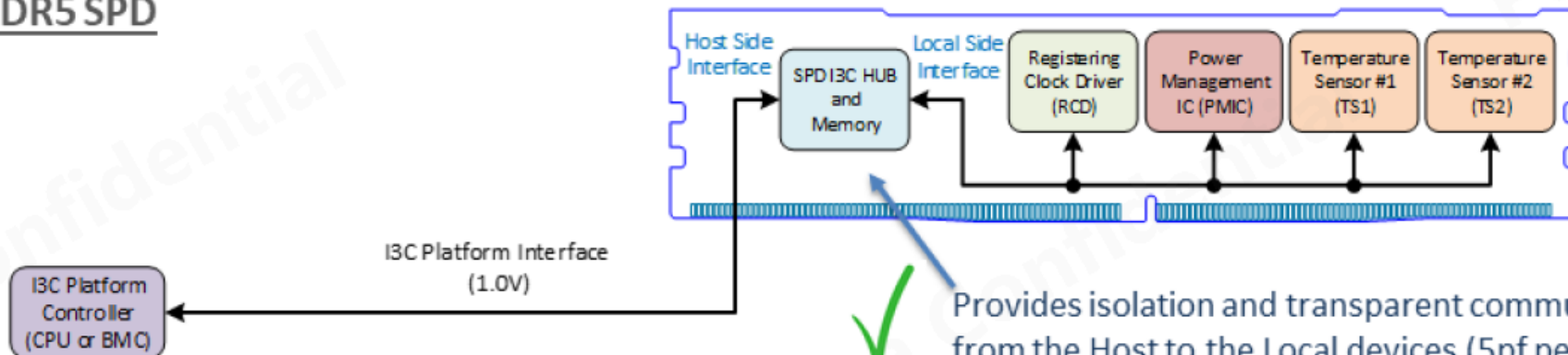
DDR 4 SPD Vs DDR 5 SPD in DIMM

Function	SPD4	SPD5
EEPROM Size	512 Byte	1024 Byte
TS	Optional	Yes
I2C	Yes	Yes
I3C	No	Yes
Hub	No	Yes

DDR4 SPD



DDR5 SPD

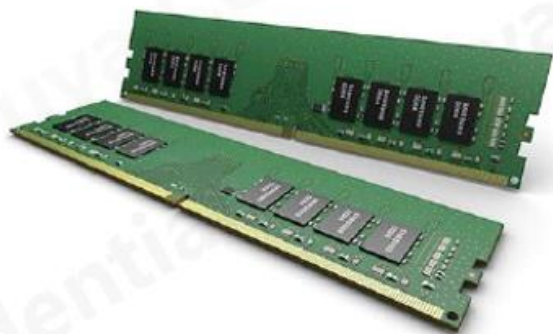


Provides isolation and transparent communication from the Host to the Local devices (5pf per device)

Source: Intel

Puya SPD 5 in DIMM Market

UDIMM for desktop



RDIMM and LRDIMM for servers



SODIMM for laptops

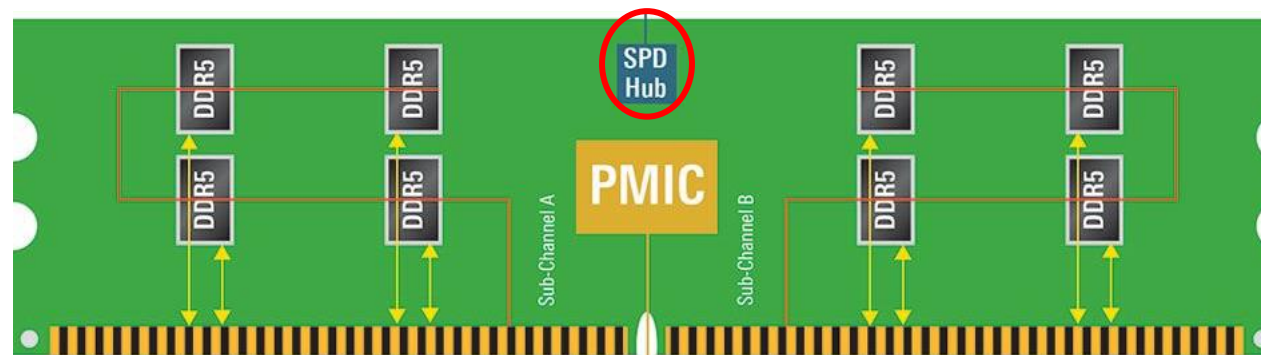


DIMM	Application	Requirements	
UDIMM	Desktop	SPD5	
SODIMM	Laptop	SPD5	
RDIMM	Server	SPD5	TS
LRDIMM	Server	SPD5	TS

Puya SPD5

- ✦ SPD HUB Chip + Thermal Sensor & 8Kb EEPROM
- ✦ SPD HUB Chip +8Kb EEPROM
- ✦ Temperature Sensor

Part number	Functionality
PYSPD5118	HUB + Thermal Sensor + SPD EEPROM
PYTS5111	Temperature Sensor
PYSPD5108	HUB + SPD EEPROM



PYSPD5118

SPD Hub with TS & SPDEE for DDR5 Memory Modules

SPD HUB Features

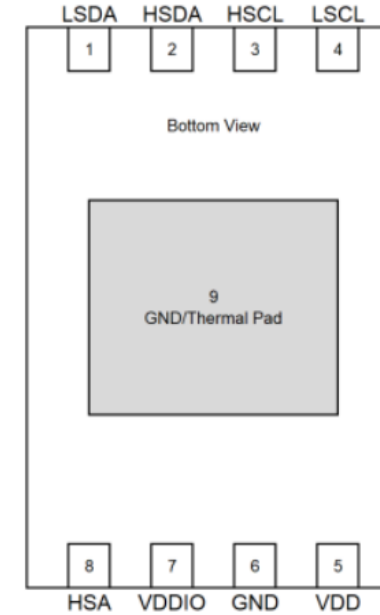
- Hub function with single 5pF max load to the Host bus
- Up to 8 slaves supported with pass-through function and address translation
- Two wires programmable I2C Open-Drain or I3C Push-Pull serial bus interface
- JEDEC DIMM Serial Presence Detect (SPD5) + TS compliant
- 1.8V power supply and 1.0V IO supply
- Up to 1MHz in I2C and 12.5MHz in I3C serial bus speed
- 0.9V – 1.1V Push-Pull IO levels
- One pin selectable Hub address feature via resistor
- Packet Error and Parity Error Check capable
- In Band Interrupt (IBI) feature
- Bus Timeout supported
- Low operating current ~ 1mA (typical)

SPD EEPROM Features

- 8-Kbits of Serial EEPROM organized as 16 blocks of 64 bytes each
- Individual block write protection via software commands on 16 blocks
- Override protection feature during factory programming
- Read/Write operations via the Hub interface
- Supports partial Page and full Page write operations
- Endurance: 100k write cycles | Data retention: 100 years @ 25c

Temperature Sensor Features

- Same as PY5111



D9-TDFN2x3

PYTS5111

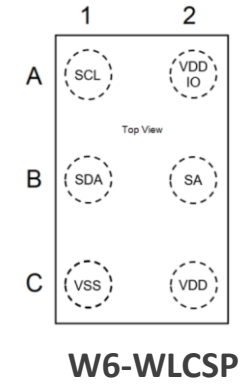
Temperature Sensor for DDR5 Memory Modules

Serial Interface Features

- Two wires programmable I2C Open-Drain or I3C Push-Pull serial bus interface
- 1.8V power supply and 1.0V IO supply
- Up to 1MHz in I2C and 12.5MHz in I3C serial bus speed
- 0.9V – 1.1V Push-Pull IO levels
- One pin selectable device address
- Packet Error and Parity Error Check capable
- In Band Interrupt (IBI) feature
- Bus Timeout supported
- Low operating current ~ 1mA (typical)
- 6-Ball WLCSP 0.8mm X 1.3mm & 9-pad Thin DFN (2 x 3 x 0.8mm) with thermal pad

Temperature Sensor Features

- Highly accurate B-grade digital temperature measurements
- $\pm 1.0^{\circ}\text{C}$ accuracy (maximum) over the $+75^{\circ}\text{C}$ to $+95^{\circ}\text{C}$ range
- $\pm 2.0^{\circ}\text{C}$ accuracy (maximum) over the $+40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ range
- $\pm 3.0^{\circ}\text{C}$ accuracy (maximum) over the -40°C to $+125^{\circ}\text{C}$ range
- ADC temperature-to-digital converter with 0.25°C resolution
- Low/High and Critical Low/High temperature monitoring events with dedicated configuration registers
- Read/Write operations via the Hub interface



PYSPD5108

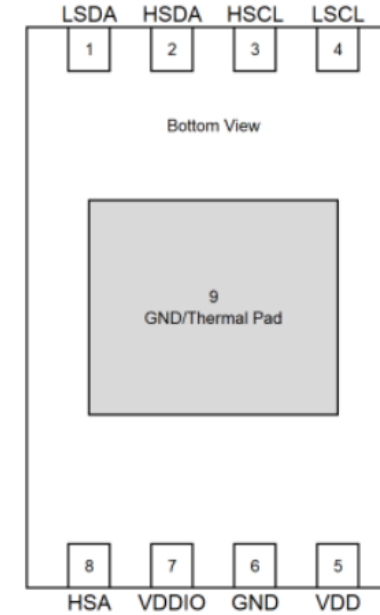
SPD Hub without TS for DDR5 Memory Modules

SPD HUB Features

- Hub function with single 5pF max load to the Host bus
- Up to 8 slaves supported with pass-through function and address translation
- Two wires programmable I2C Open-Drain or I3C Push-Pull serial bus interface
- JEDEC DIMM Serial Presence Detect (SPD5) + TS compliant
- 1.8V power supply and 1.0V IO supply
- Up to 1MHz in I2C and 12.5MHz in I3C serial bus speed
- 0.9V – 1.1V Push-Pull IO levels
- One pin selectable Hub address feature via resistor
- Packet Error and Parity Error Check capable
- In Band Interrupt (IBI) feature
- Bus Timeout supported
- Low operating current ~ 1mA (typical)

SPD EEPROM Features

- 8-Kbits of Serial EEPROM organized as 16 blocks of 64 bytes each
- Individual block write protection via software commands on 16 blocks
- Override protection feature during factory programming
- Read/Write operations via the Hub interface
- Supports partial Page and full Page write operations
- Endurance: 100k write cycles | Data retention: 100 years @25c



D9-TDFN2x3

Puya SPD – Supplier Chain

PN	Foundry	Assembly
PYSPD51XXA		
PYSPD51XXB		

Puya SPD – Supplier Chain Plan

Part number	Functionality	Foundry	Mass Production
PYSPD5118A	SPD HUB with Thermal Sensor	SMIC	MP
PYSPD5111A	Temperature Sensor	SMIC	MP
PYSPD5108A	SPD HUB w/o Thermal Sensor	SMIC	MP
PYSPD5118B1	SPD HUB with Thermal Sensor	GlobalFoundries	Oct-24
PYSPD5111B1	Temperature Sensor	GlobalFoundries	Oct-24
PYSPD5108B1	SPD HUB w/o Thermal Sensor	GlobalFoundries	Oct-24

- Has set up GF as second source
- Customer Sample from Aug 2024

Puya SPD – Customer Situation

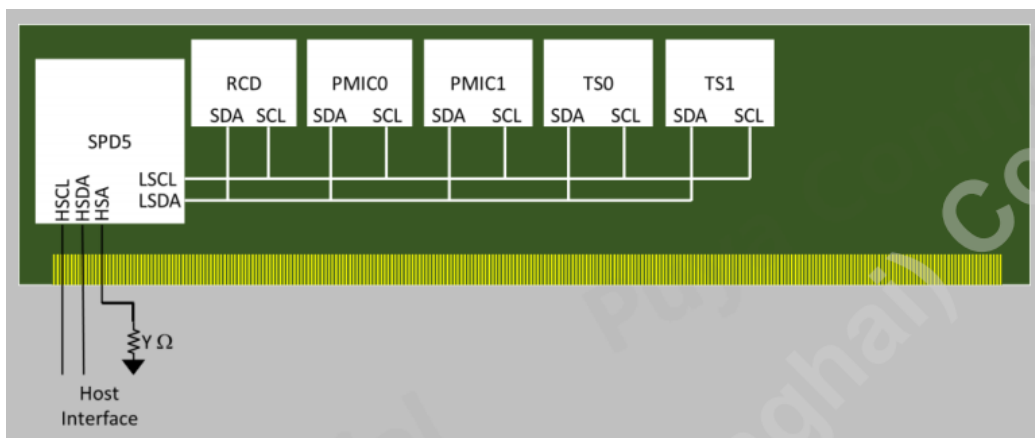
Customer Name	Location	Situation
博帝 Patriot Memory	TaiWan	PP
傲騰 Auton	TaiWan	PP
瑞勝特 Ramcenter	TaiWan	PP
金百达 KingBank	Shenzhen	Sample Test
嘉合 KingPower	Shenzhen	MP
记忆科技 Ramaxel	Shenzhen	Sample Test

2024

Thank you!

Puya SPD HUB Application – In UDIMM (LID)

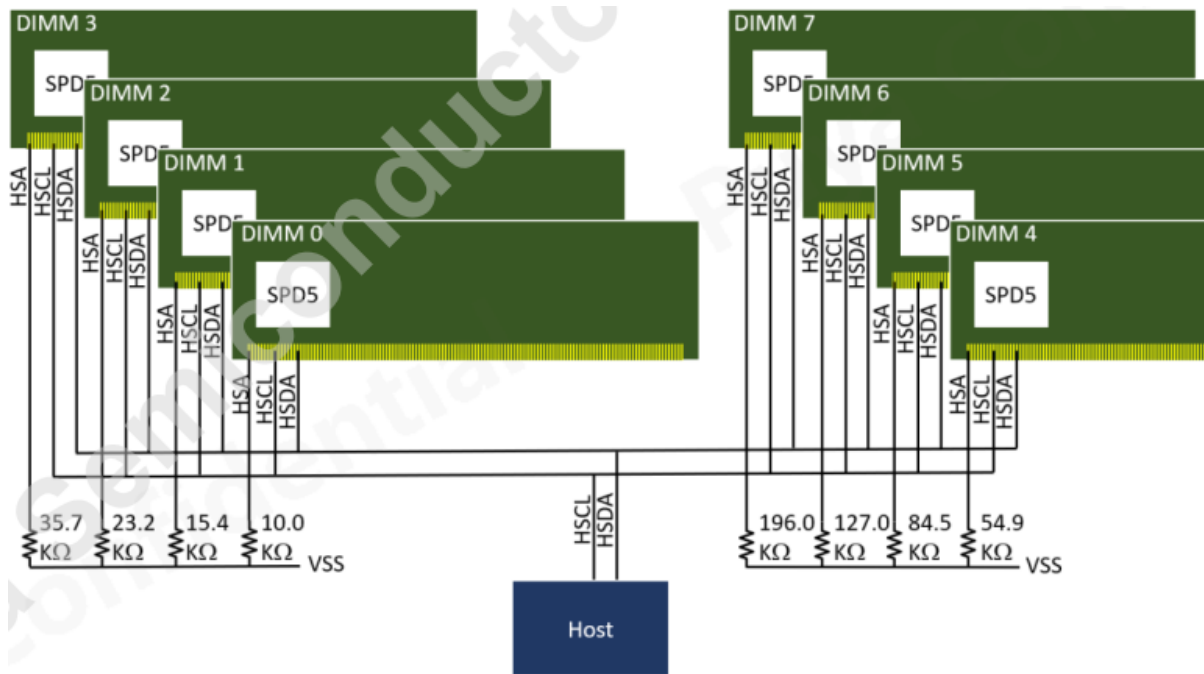
- Each local device behind the SPD5 Hub device has a unique 4 bit local device ID code.



Device	Target Device LID Code	Target Device HID Code
N/A	0000	N/A
RFU	0001	111
TS0	0010	111
RFU	0011	111
RFU	0100	111
RFU	0101	111
TS1	0110	111
RFU	0111	111
PMIC1	1000	111
PMIC0	1001	111
SPD Hub	1010	HID
RCD	1011	111
PMIC2	1100	111
RFU	1101	111
RFU	1110	111
N/A	1111	N/A

Puya SPD HUB Application – In UDIMM(HID)

- These RDIMMs are addressed up to 8 modules per Sideband Bus by assigning each a slot ID using resistor values on the HSA pin for each slot.



Host Access to:	7-bit Address
DIMM 0 SPD Hub	1010 000
DIMM 1 SPD Hub	1010 001
DIMM 2 SPD Hub	1010 010
DIMM 3 SPD Hub	1010 011
DIMM 4 SPD Hub	1010 100
DIMM 5 SPD Hub	1010 101
DIMM 6 SPD Hub	1010 110
DIMM 7 SPD Hub	1010 111

PUYA PYSPD5118 Compared with Renesas SPD5118

MFRS	DIFF1	DIFF2	DIFF3	DIFF4																																																																																																												
JEDEC	<p>VDDIO power supply must provided by PMIC</p>	<p>Local side embedded only one 1kΩ pullup resistor</p> <p>Table 115 — MR14</p> <table border="1"> <thead> <tr> <th>Addr</th> <th>MR14</th> <th>Attr</th> <th>Default</th> <th>Device Configur</th> </tr> </thead> <tbody> <tr> <td>7:6</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[7:6]:Reserved</td> </tr> <tr> <td>5</td> <td>RWE</td> <td></td> <td>0</td> <td>MR14[5]: LOCAL_INF_PULLUP_CO Local Interface - Pull Up Resistor Conf 0 = Internal (on die) Pullup Resistor³ 1 = External (board) Pullup Resistor</td> </tr> <tr> <td>4:0</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[4:0]: DO NOT USE</td> </tr> </tbody> </table> <p>NOTE 1 DIMM Vendor configures this register during assembly based on the DIM Host can alter the setting through this register. NOTE 2 The write (or update) transaction to this register must be followed by STO setting. NOTE 3 Typical value of on die pullup resistor is 1 KΩ. The minimum and maximum respectively.</p>	Addr	MR14	Attr	Default	Device Configur	7:6	RV		0	MR14[7:6]:Reserved	5	RWE		0	MR14[5]: LOCAL_INF_PULLUP_CO Local Interface - Pull Up Resistor Conf 0 = Internal (on die) Pullup Resistor ³ 1 = External (board) Pullup Resistor	4:0	RV		0	MR14[4:0]: DO NOT USE	<p>Do not need set MR to indicate IO level</p> <p>Table 115 — MR14</p> <table border="1"> <thead> <tr> <th>Addr</th> <th>MR14</th> <th>Attr</th> <th>Default</th> <th>Device Configuration- Local Interface</th> </tr> </thead> <tbody> <tr> <td>7:6</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[7:6]:Reserved</td> </tr> <tr> <td>5</td> <td>RWE</td> <td></td> <td>0</td> <td>MR14[5]: LOCAL_INF_PULLUP_CONF Local Interface - Pull Up Resistor Configuration 0 = Internal (on die) Pullup Resistor³ 1 = External (board) Pullup Resistor</td> </tr> <tr> <td>4:0</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[4:0]: DO NOT USE</td> </tr> </tbody> </table>	Addr	MR14	Attr	Default	Device Configuration- Local Interface	7:6	RV		0	MR14[7:6]:Reserved	5	RWE		0	MR14[5]: LOCAL_INF_PULLUP_CONF Local Interface - Pull Up Resistor Configuration 0 = Internal (on die) Pullup Resistor ³ 1 = External (board) Pullup Resistor	4:0	RV		0	MR14[4:0]: DO NOT USE	<p>GETSTATUS CCC command gives PEC_Err, P_err and Pending Interrupt information</p> <p>Table 70 — GETSTATUS CCC - Direct</p> <table border="1"> <thead> <tr> <th>Start</th> <th>Bit 7</th> <th>Bit 6</th> <th>Bit 5</th> <th>Bit 4</th> <th>Bit 3</th> <th>Bit 2</th> <th>Bit 1</th> <th>Bit 0</th> <th>A/N/T</th> <th>Stop</th> </tr> </thead> <tbody> <tr> <td>S or Sr</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>W=0</td> <td>A¹</td> </tr> <tr> <td colspan="11" style="text-align: center;">0x90 (Direct)</td> </tr> <tr> <td>Sr</td> <td colspan="7">DevID[6:0]</td> <td>R=1</td> <td>A¹</td> <td colspan="2"></td> </tr> <tr> <td></td> <td>PEC_Err</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>T</td> <td></td> </tr> <tr> <td></td> <td>0</td> <td>0</td> <td>P_Err</td> <td>0</td> <td colspan="5">Pending Interrupt</td> <td>T</td> <td>Sr² or P</td> </tr> </tbody> </table>	Start	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	A/N/T	Stop	S or Sr	1	1	1	1	1	1	0	0	W=0	A ¹	0x90 (Direct)											Sr	DevID[6:0]							R=1	A ¹				PEC_Err	0	0	0	0	0	0	0	T			0	0	P_Err	0	Pending Interrupt					T	Sr ² or P
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RENESAS	<p>SPD can generate VDDIO power supply by it self or provided by PMIC</p>	<p>Local side embedded selectable pull up resistors through MR15[3:0], i.e. 0.5kΩ,1kΩ,2kΩ,4kΩ</p> <p>Table 125. MR15</p> <table border="1"> <thead> <tr> <th>Addr</th> <th>MR15</th> <th>Attr</th> <th>Default</th> <th>Local Interface - Pull-up Resistor</th> </tr> </thead> <tbody> <tr> <td>7:4</td> <td>RV</td> <td></td> <td>0</td> <td>MR15[7:4]: Reserved</td> </tr> <tr> <td>3:2</td> <td>RWE</td> <td></td> <td>01</td> <td>MR15[3:2]: LSDA_PU_RES LSDA or LSDA Pull-up Resistor Select (Note 4) 00 = 0.5kΩ 01 = 1kΩ 10 = 2kΩ 11 = 4kΩ</td> </tr> <tr> <td>1:0</td> <td>RWE</td> <td></td> <td>01</td> <td>MR15[1:0]: LSCL_PU_RES LSCL or LSCL Pull-up Resistor Select (Note 4) 00 = 0.5kΩ 01 = 1kΩ 10 = 2kΩ 11 = 4kΩ</td> </tr> </tbody> </table>	Addr	MR15	Attr	Default	Local Interface - Pull-up Resistor	7:4	RV		0	MR15[7:4]: Reserved	3:2	RWE		01	MR15[3:2]: LSDA_PU_RES LSDA or LSDA Pull-up Resistor Select (Note 4) 00 = 0.5kΩ 01 = 1kΩ 10 = 2kΩ 11 = 4kΩ	1:0	RWE		01	MR15[1:0]: LSCL_PU_RES LSCL or LSCL Pull-up Resistor Select (Note 4) 00 = 0.5kΩ 01 = 1kΩ 10 = 2kΩ 11 = 4kΩ	<p>Need set registers MR14[4:2] to indicate IO level</p> <p>Table 124. MR14</p> <table border="1"> <thead> <tr> <th>Addr</th> <th>MR14</th> <th>Attr</th> <th>Default</th> <th>Device Configuration- Local Interface</th> </tr> </thead> <tbody> <tr> <td>7:6</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[7:6]: Reserved</td> </tr> <tr> <td>5</td> <td>RWE</td> <td></td> <td>0</td> <td>MR14[5]: LOCAL_INF_PULLUP_CONF Local Interface - Pull Up Resistor Configuration 0 = Internal (on die) Pull-up Resistor (Notes 3, 4) 1 = External (board) Pull-up Resistor (Note 5)</td> </tr> <tr> <td>4:2</td> <td>RWE</td> <td></td> <td>000</td> <td>MR14[4:2]: LOCAL_INF_IO_LEVEL Local Interface - IO Voltage Level (Note 6) 000 = 1.0V 001 = 1.1V 010 = 1.2V 011 = 1.8V 100 = 2.5V 101 = 3.3V 110 = Reserved 111 = Reserved</td> </tr> <tr> <td>1:0</td> <td>RV</td> <td></td> <td>0</td> <td>MR14[1:0]: Reserved</td> </tr> </tbody> </table>	Addr	MR14	Attr	Default	Device Configuration- Local Interface	7:6	RV		0	MR14[7:6]: Reserved	5	RWE		0	MR14[5]: LOCAL_INF_PULLUP_CONF Local Interface - Pull Up Resistor Configuration 0 = Internal (on die) Pull-up Resistor (Notes 3, 4) 1 = External (board) Pull-up Resistor (Note 5)	4:2	RWE		000	MR14[4:2]: LOCAL_INF_IO_LEVEL Local Interface - IO Voltage Level (Note 6) 000 = 1.0V 001 = 1.1V 010 = 1.2V 011 = 1.8V 100 = 2.5V 101 = 3.3V 110 = Reserved 111 = Reserved	1:0	RV		0	MR14[1:0]: Reserved	<p>GETSTATUS CCC command gives PEC_Err, INF_SEL, P_err and Pending Interrupt information</p> <p>Table 80. GETSTATUS CCC - Direct</p> <table border="1"> <thead> <tr> <th>Start</th> <th>Bit 7</th> <th>Bit 6</th> <th>Bit 5</th> <th>Bit 4</th> <th>Bit 3</th> <th>Bit 2</th> <th>Bit 1</th> <th>Bit 0</th> <th>A/N/T</th> </tr> </thead> <tbody> <tr> <td>S or Sr</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>1</td> <td>0</td> <td>0</td> <td>W = 0 A (Note 1)</td> </tr> <tr> <td colspan="10" style="text-align: center;">0x90 (Direct)</td> </tr> <tr> <td>Sr</td> <td colspan="7">DevID[6:0]</td> <td>R = 1</td> <td>A¹</td> <td></td> </tr> <tr> <td></td> <td>PEC_Err</td> <td>INF_SEL</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>T</td> </tr> <tr> <td></td> <td>0</td> <td>0</td> <td>P_Err</td> <td>0</td> <td colspan="4">Pending Interrupt</td> <td>T</td> </tr> </tbody> </table>	Start	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0	A/N/T	S or Sr	1	1	1	1	1	1	0	0	W = 0 A (Note 1)	0x90 (Direct)										Sr	DevID[6:0]							R = 1	A ¹			PEC_Err	INF_SEL	0	0	0	0	0	0	T		0	0	P_Err	0	Pending Interrupt				T		
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