

# Ultra-low Power IoT Analog IP Platform Based on SiFive RISC-V Core



# Contents

## CONTENTS

**IoT Market & Application**

**ACTT ULP Analog IPs**

**ACTT eNVM Solution**

# Everything Got Linked in the Future



**Internet of Things**

**Mobile Internet**

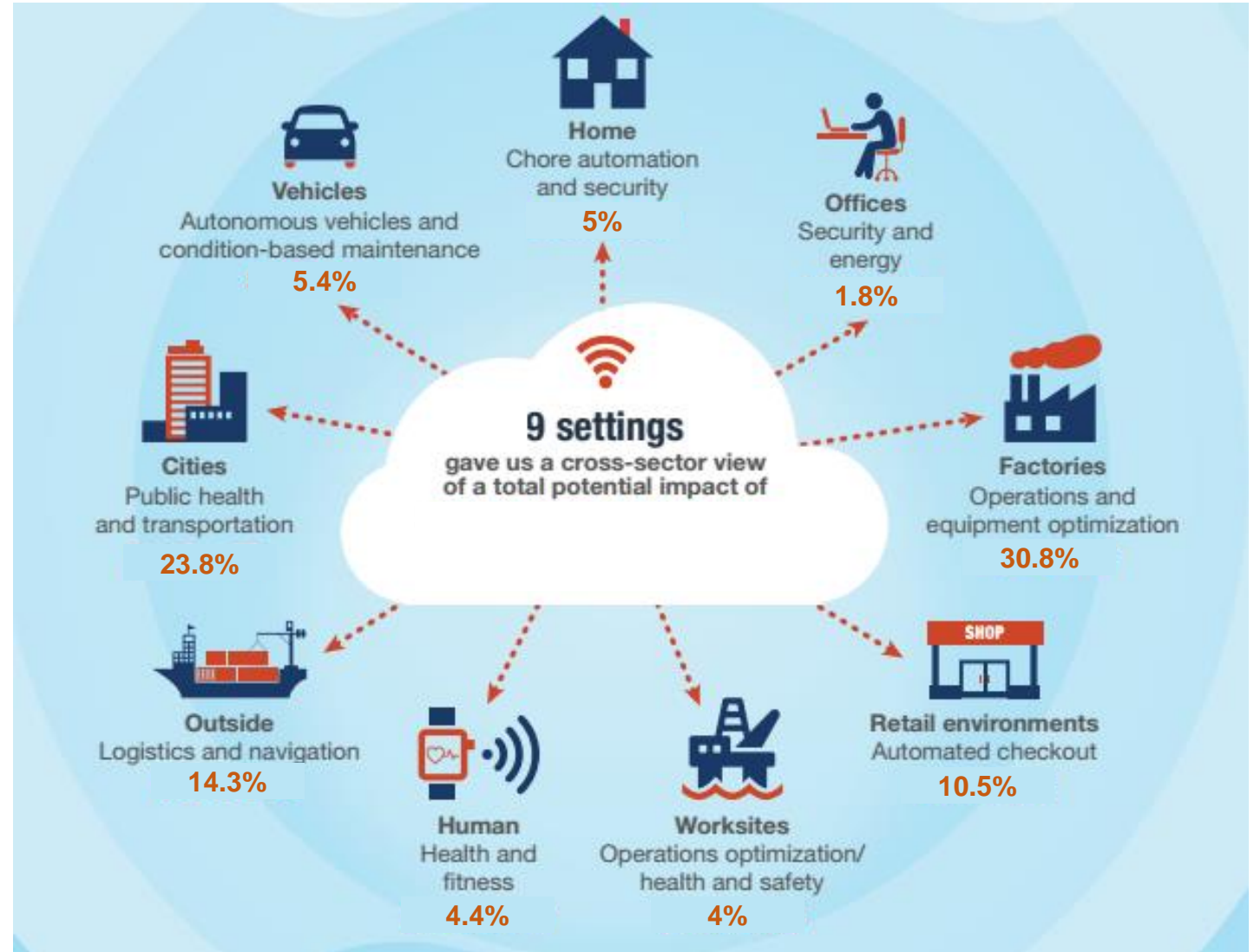
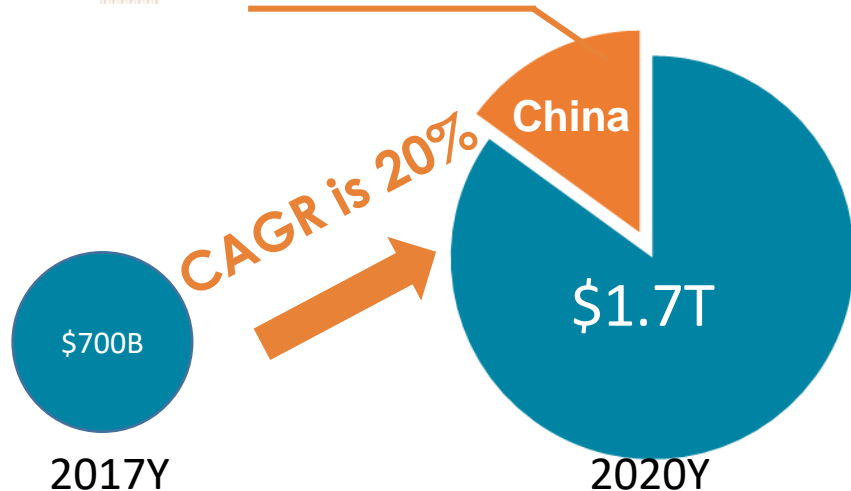
**Internet**

# Fast Growing in IoT World

## IoT Market of Global



China  
Share of Market is  
**15.9%**



# Typical Application of IoT/AIoT/NB-IoT

Positioning



Auto



Metering



Smart  
Access Control



Big  
Data



Street Lamp



Industry



Healthcare



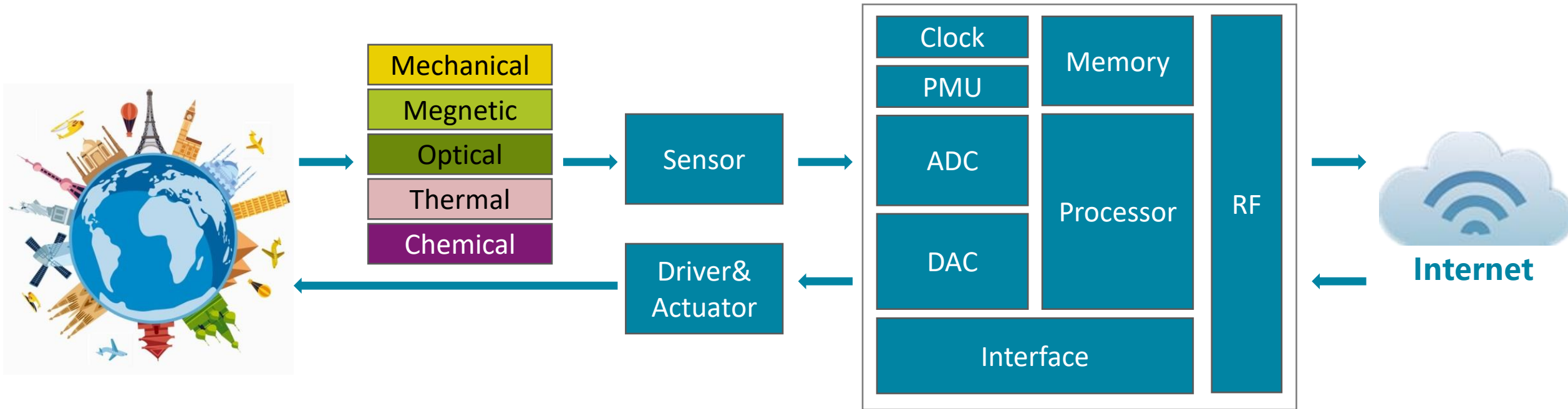
Sensitive  
Tracking



Agriculture



# Key Features of IoT/AIoT/NB-IoT Module



## ➤ Market Segment

For the huge market potential, IoT products can be categorized into high-end, mid-end and low-end applications

## ➤ Low power

This is the absolute demand for all IoT products

## ➤ Cost effective

The big data application need huge terminal device, that is driving point for low cost device

## ➤ High Reliability

Position  
Outside Monitor  
Sensitive goods tracking

# Contents

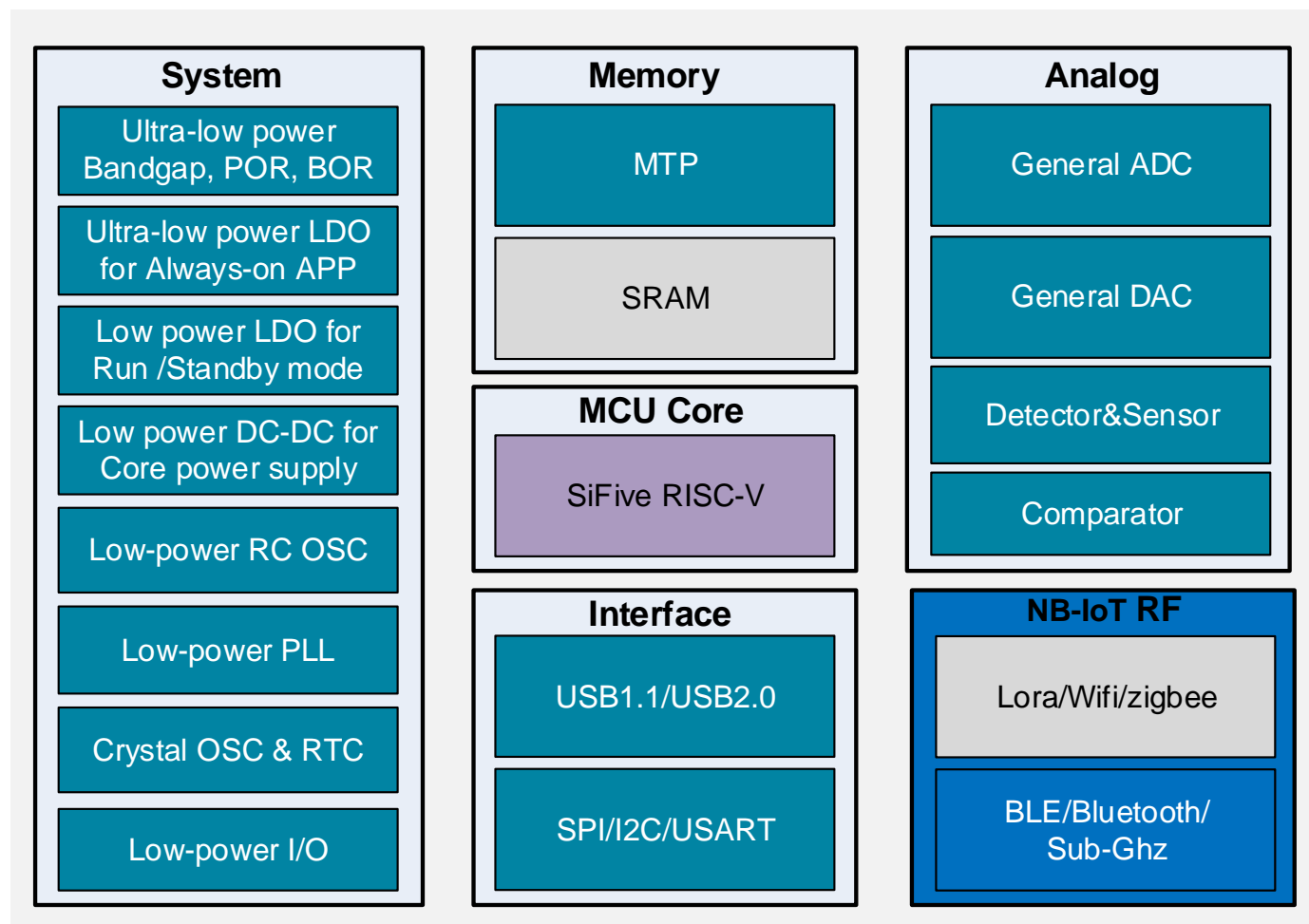
## CONTENTS

**IoT Market & Application**

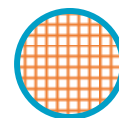
**ACTT ULP Analog IPs**

**ACTT eNVM Solution**

# IoT/AIoT/NB-IoT Floor Plan



Completed IoT analog IP platform



Platform are silicon proven or Mass Production



Functional Optimization for IoT & MCU



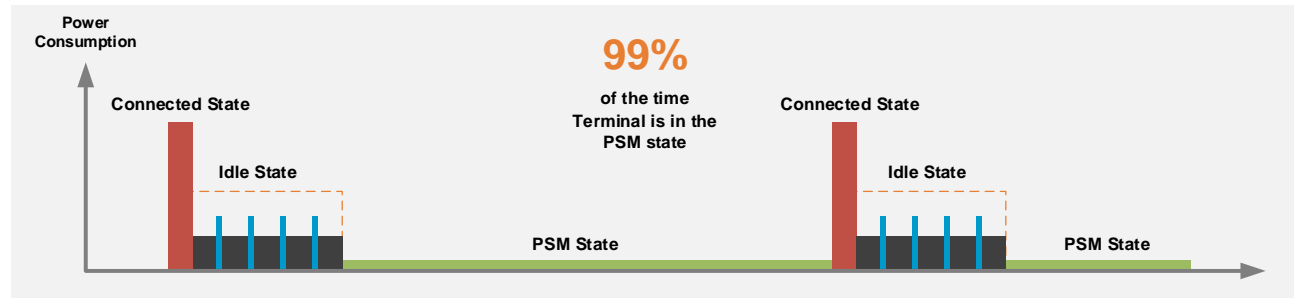
Cost effective for IoT & MCU



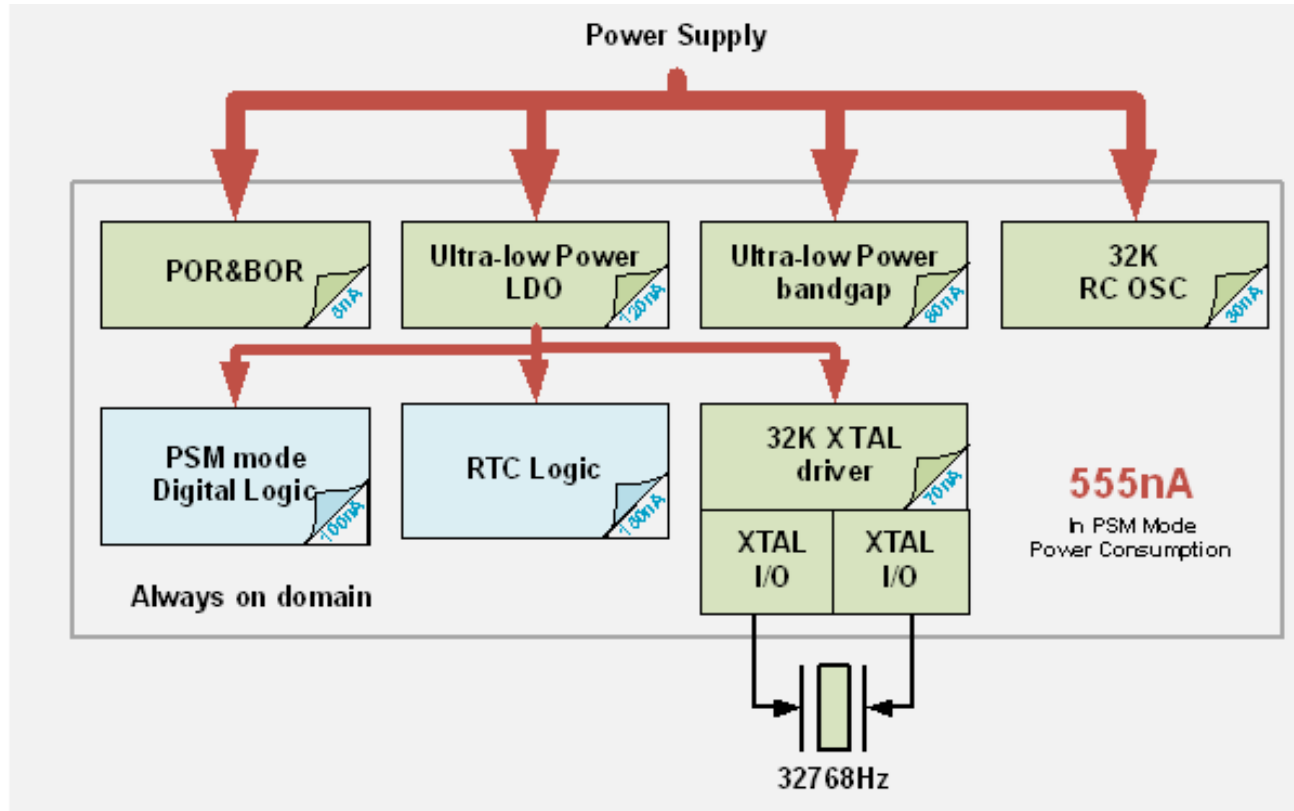
Power consumption Optimized for IoT & MCU

Available Partner Available Not Available

# Breakthrough innovation Ultra-low Power PMU Design



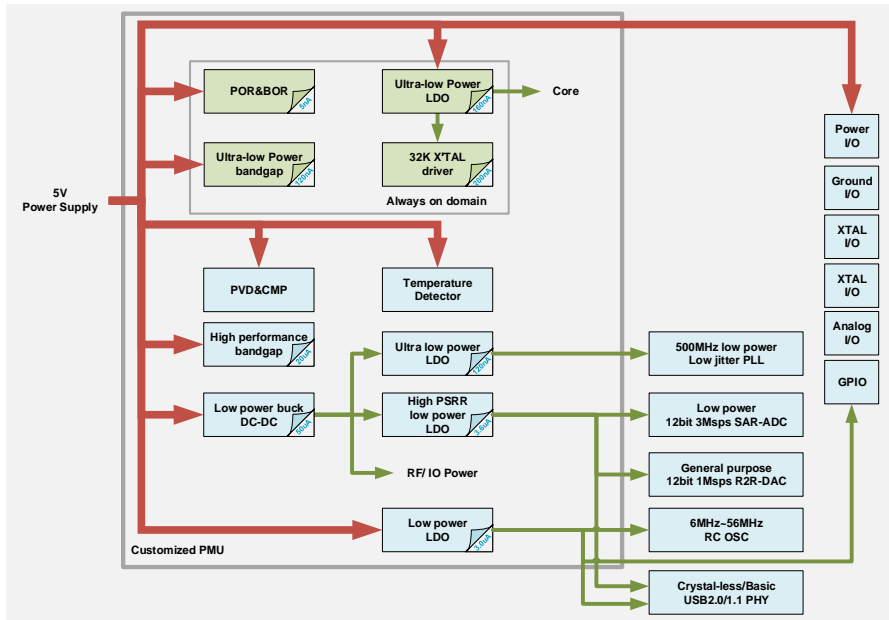
**555nA**  
In PSM mode



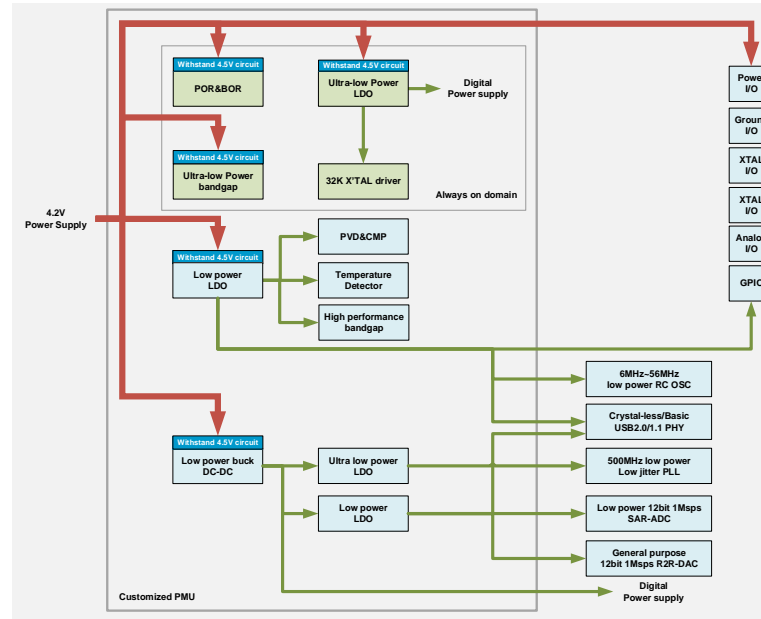
**NB-IoT**  
Optimization  
For NB-IoT

# Ultra-low Power PMU Solution for various power source

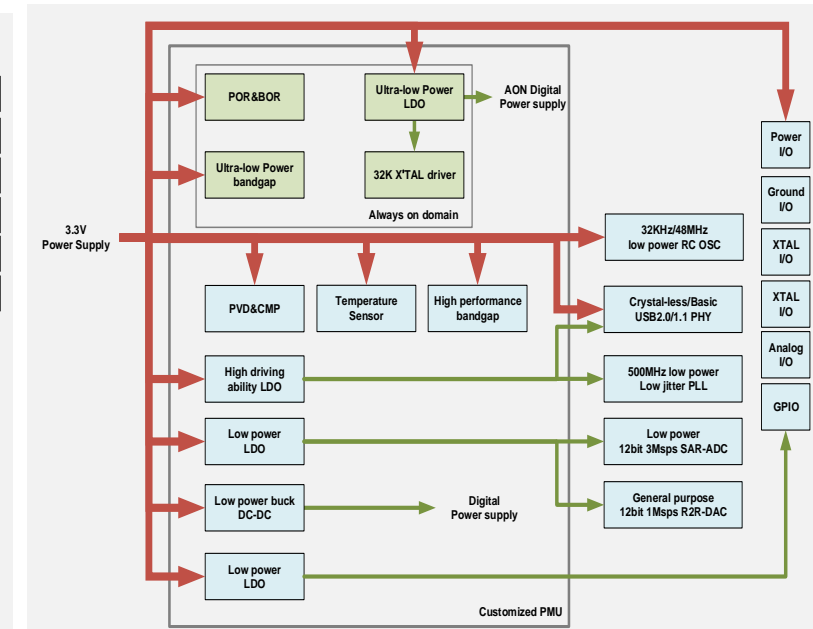
MCU/IoT Platform for 5V power supply  
With 5V device



MCU/IoT Platform for 4.2V power supply  
Without 5V device



MCU/IoT Platform for 3.3V power supply



## Customization

Rich experiences in  
Complex PMU customization

## Compatibility

Can be achieved in  
a variety of processes

## Flexibility

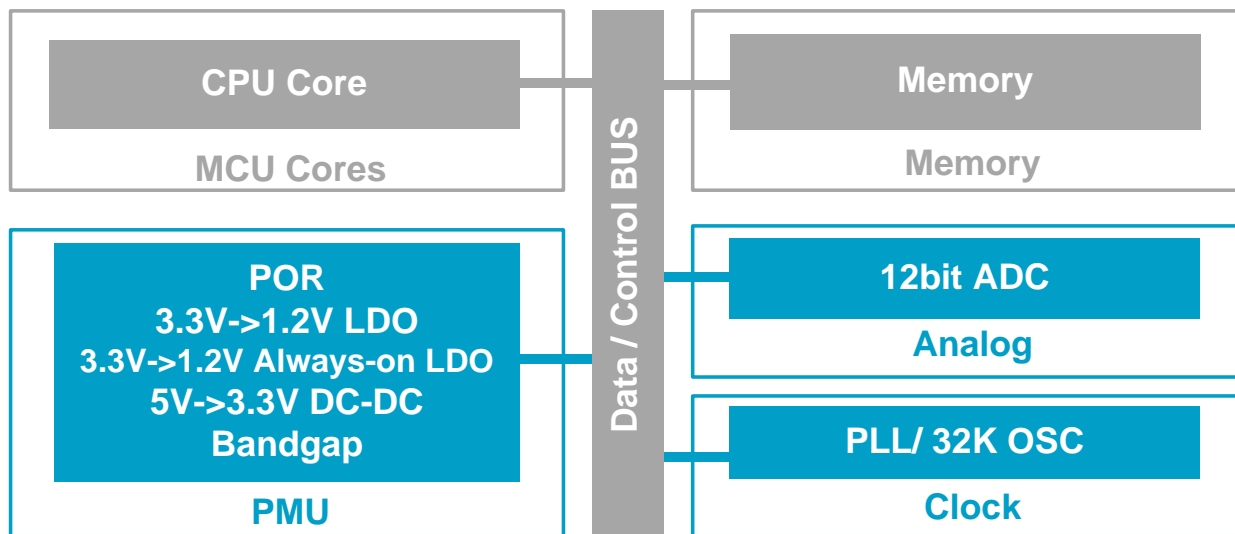
Support complex power domain design  
Support complex low power mode design

## Quality

Mass Production  
on various Fabs & Processes

# Low Power Design

**IP with Low power design** from ACTT will help customer to obtain better performance of energy efficiency



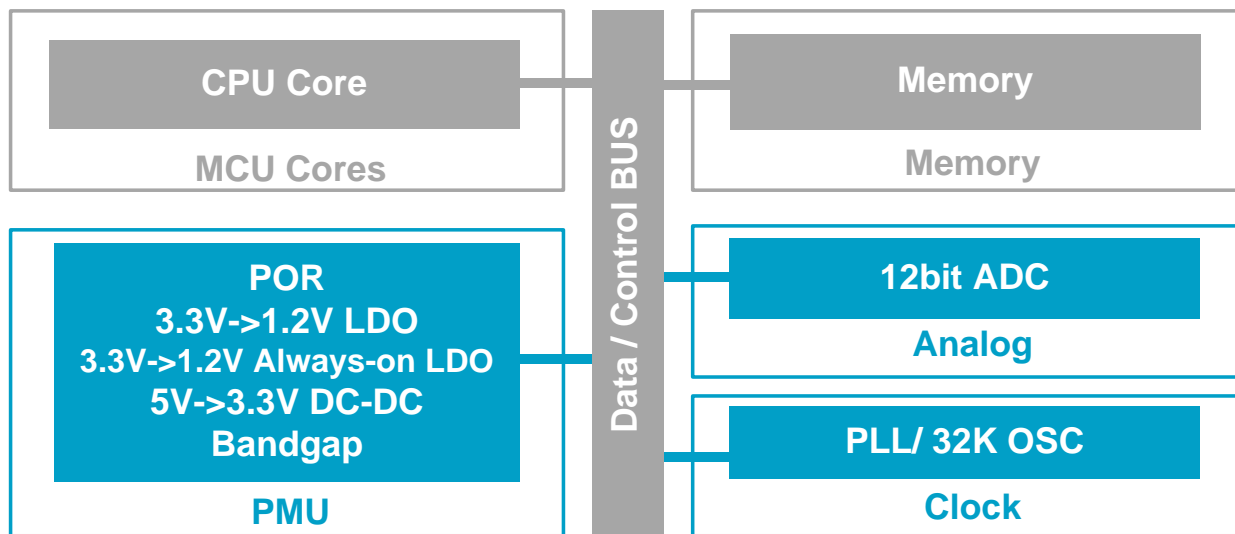
## 79uA

Power consumption of total 8 IPs

ACTT IP	Power consumption
100M PLL	60uA
32K RC OSC	1uA
POR	20nA
3.3V->1.2V LDO	1.5uA
3.3V->1.2V Always-on LDO	50nA
5V->3.3V DC-DC	15uA
12bit SAR-ADC	0.65uA @ 1Ksps
Bandgap	0.5uA

# High Cost Effective

**IP with high integration density design** from ACTT will help customer to obtain better cost effective!



**0.687mm<sup>2</sup>**  
Area of total 8 IPs

ACTT IP	Area
100M PLL	0.048mm <sup>2</sup>
32K RC OSC	0.0176mm <sup>2</sup>
POR	0.02mm <sup>2</sup>
3.3V->1.2V LDO	0.056mm <sup>2</sup>
3.3V->1.2V Always-on LDO	0.079mm <sup>2</sup>
5V->3.3V DC-DC	0.343mm <sup>2</sup>
12bit SAR-ADC	0.083mm <sup>2</sup>
Bandgap	0.04mm <sup>2</sup>

# Contents

## CONTENTS

**IoT Market & Application**

**ACTT ULP Analog IPs**

**ACTT eNVM Solution**

# eNVM Solutions

	MROM	EFuse	OTP	MTP	EEPROM	e-flash
cycles	0	1	1	1K	100K~1M	100K
Mechanism	Mask Define	poly or metal burn in	floating gate or gate oxide BV	floating gate	floating gate	floating gate or SONOS
Additional Mask	0	0	0	0-2	0-2	5~18
Logic Process Compatibility	High	High	High	High	High	Low
Cell size	<1	50	1~2	4	20	1
Density	Up to Mbyte	<4kbit	Up to 4Mbit	<1M bit	<4kbit	64Kb ~ 4Mb Mbyte

# ACTT' MTP LogicFlash® Key Features

## Low Cost

Additional Mask: 0  
Small bit cell with high density

## High Endurance

Normal Spec: 20K  
1KK capability for special requirement

## High Reliability

Data retention 150°C 10Year

## High Speed

Read access time : 25ns,  
Program speed: ~10us/byte

## Low Power

Read power consumption: ~70uA/MHz  
Write power consumption: ~10mA

# Actt LogicFlash® Flexibility

## eFlash

Density: up to 64KB

Operation:

--Byte PGM;

--Chip ERS + Sector ERS

Program Speed: **20us/Byte**

Read Speed: **40MHz**

Endurance: 10K



**LogicFlash®  
MTP**

## EEPROM

Density: up to 1KB

Endurance: **P/E up to 100K**

Operation:

--Byte PGM;

--Chip ERS + Sector ERS + **Byte ERS**

ERS Speed: **10ms/Chip**



# THANK YOU!



**Actt Will Be Your Best Partner to Achieve Success !!**



Follow us @ WeChat

