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STPMIC1x and STPMIC25x
Power management ICs

STPMIC

STPMICx comparison table and MPUs companions

STPMIC1x/25x are highly integrated PMIC aimed to support the complete STM32MP1x/2x MPUs family applications power management.
The STPMICs integrate advanced low power features controlled by a host processor via I²C and IO interface. The integrated regulators are designed to supply power to the application processor as well as to the external system peripherals such as: DDR, Flash memories and other system devices.
The buck SMPS are optimized to provide an excellent transient response and output voltage precision for a wide range of operating conditions. Very high efficiency in full output load range is achieved thanks to low power (LPM) and high power (HPM) mode selection.

ST MPUs	PMIC companion chip	#DC/DC	#LDOs & #SW	REFDDR	Package [QFN]
STM32MP1x	STPMIC1x	4 Buck + 1 Boost	6 LDOs + 2 power SW	yes	5x6mm - 44L
STM32MP2x	STPMIC25	7 Buck Up to 2.5A	8 LDOs	yes	6,5x6,5mm - 56L

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STPMIC1x overview

Highly integrated PMIC for microprocessor units

KEY APPLICATIONS

- Industrial [e.g. Controls, POS, M2M interfaces, predictive maintenance]
- Home Automation
- Networking
- Medical Monitoring

High level of integration – 14 power rails

- 4 Buck DC/DC converters
- 1 Boost DC/DC converter
- 6 LDOs
- 1 voltage reference
- 2 power switches
- Provides power to the microprocessor unit as well as to external peripherals such as USB, DDR , Flash memories and other external components

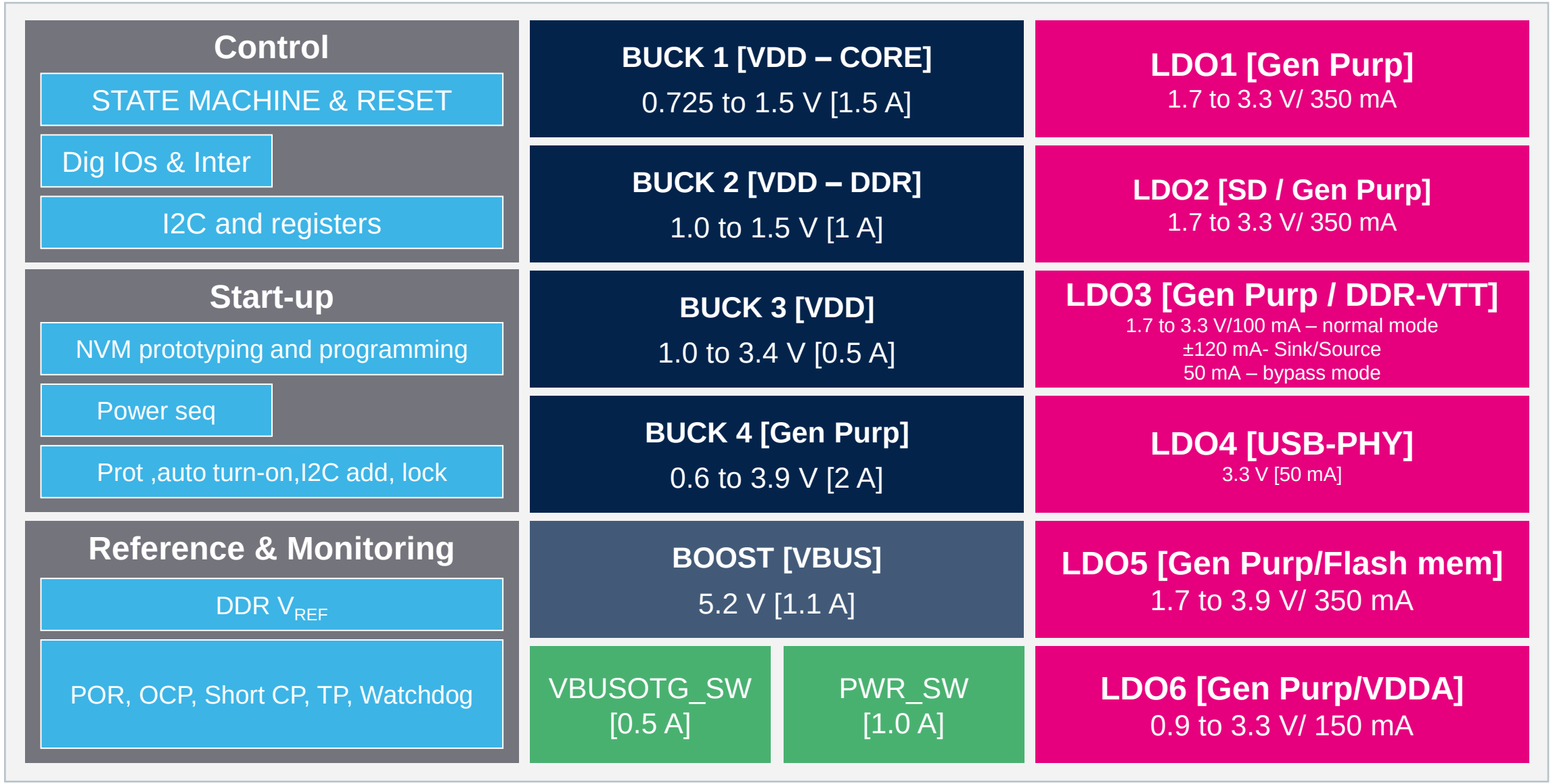
Application flexibility

- Large input voltage range: from 2.8 to 5.5 V.
- Compatible with 5 V wall adaptor, USB as well as Li-Ion/Li-Po batteries
- Full programmability via I2C

Package

- QFN 44L [5 x 6 x 0.8 mm]

STPMIC1x block diagram



STPMIC1x versions

	Pre-programmed [typ when V_{IN}=5 V]		Pre-programmed [typ when V_{IN}=battery]		Not pre-programmed [custom application]		Pre-programmed [typ when V_{IN}=5 V]		Pre-programmed [typ when V_{IN}=battery]	
	STPMIC1A		STPMIC1B		STPMIC1C		STPMIC1D		STPMIC1E	
	Default output Voltage [V]	**Rank**	**Default output Voltage [V]**	**Rank**	**Default output Voltage [V]**	**Rank**	**Default output Voltage [V]**	**Rank**	**Default output Voltage [V]**	**Rank**
LDO1	1.8	0	1.8	0	1.8	0	1.8	0	1.8	0
LDO2	1.8	0	2.9	2	1.8	0	1.8	0	1.8	0
LDO3	1.8	0	1.8	0	1.8	0	1.8	0	1.8	0
LDO4	3.3	3	3.3	3	3.3	0	3.3	3	3.3	3
LDO5	2.9	2	2.9	2	1.8	0	3.3	2	2.9	2
LDO6	1.0	0	1.0	0	1.0	0	1.0	0	1.0	0
REFDDR	0.55	0	0.55	0	0.55	0	0.55	0	0.55	0
BOOST	5.2	N/A	5.2	N/A	5.2	N/A	5.2	N/A	5.2	N/A
BUCK1	1.2	2	1.2	2	1.1	0	1.2	3	1.2	3
BUCK2	1.1	0	1.1	0	1.1	0	1.1	0	1.1	0
BUCK3	**3.3**	1	**1.8**	1	1.2	0	**3.3**	1	**1.8**	1
BUCK4	3.3	2	3.3	2	1.15	0	1.2	2	1.2	2

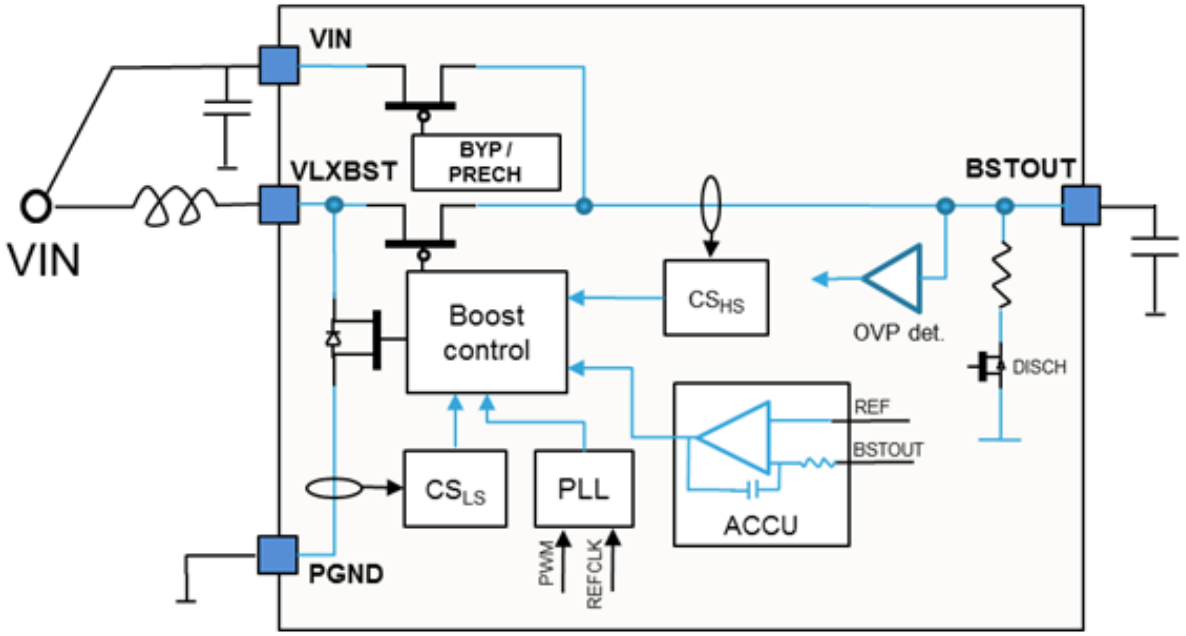
Rank= 0: rail not automatically turned ON
Rank= 1: rail automatically turned ON after 7 ms
Rank= 2: rail automatically turned ON after further 3 ms
Rank= 3: rail automatically turned ON after further 3 ms

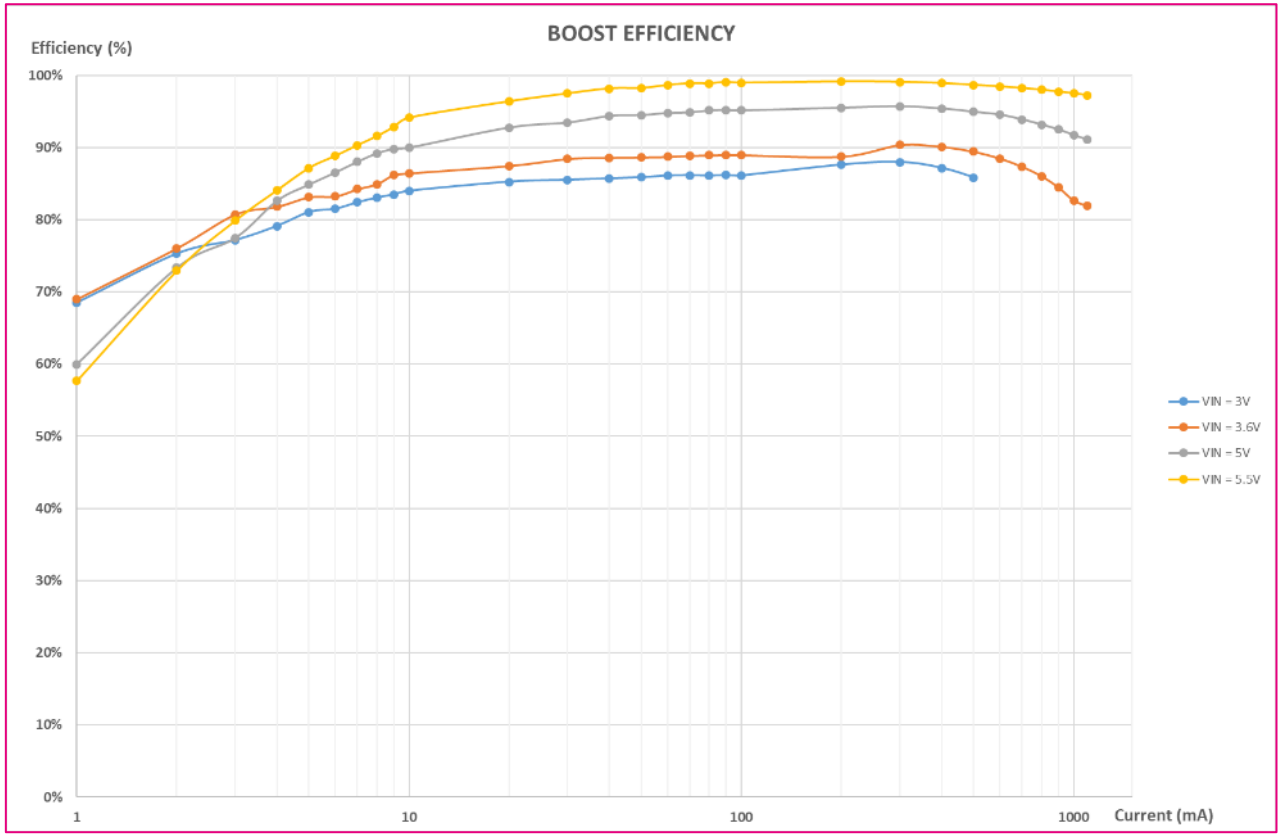
STPMIC1x | buck converters
Main electrical characteristics

	BUCK 1	BUCK 2	BUCK 3	BUCK 4
Output Voltage	**0.725 to 1.5 V**	**1 to 1.5 V**	**1 to 3.4 V**	**0.6 to 3.9 V**
Output Voltage Steps	**25 mV**	**50 mV**	**100 mV**	**25 mV** [V_{OUT} from 0.6 to 1.3V] **50 mV** [V_{OUT} from 1.3 to 1.5V] **100 mV** [V_{OUT} from 1.5 to 3.9V]
I_{OUT}	**1.5 A**	**1 A**	**0.5 A**	**2 A**
100% DC	**Y**	**Y**	**Y**	**Y**
Control Method	**Adaptive Constant ON-Time [in HP mode]** → 2 MHz in steady state, FSW during transient allowing excellent response , high accuracy [2 %] **Hysteretic [in LP mode]**: low Iq [5 - 20 uA], good transient response but lower accuracy [4 %]			

Boost converter for USB-VBUS
Main electrical characteristics

O/P Voltage	V_{OUT} acc	Rated I_{OUT}	Bypass	Disch V_{OUT}	OCP	OVP
5.2 V	± 3.5 %	1.1 A	Y	Y	Y	Y





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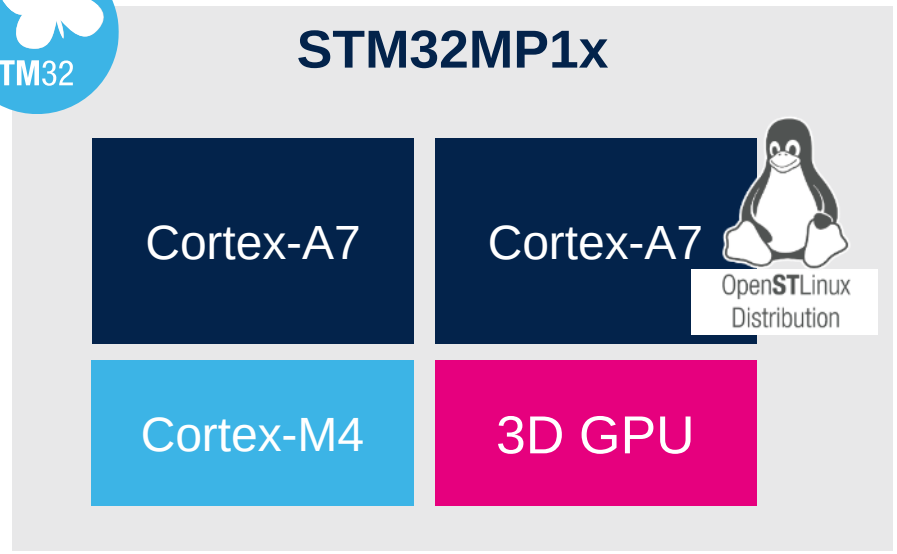
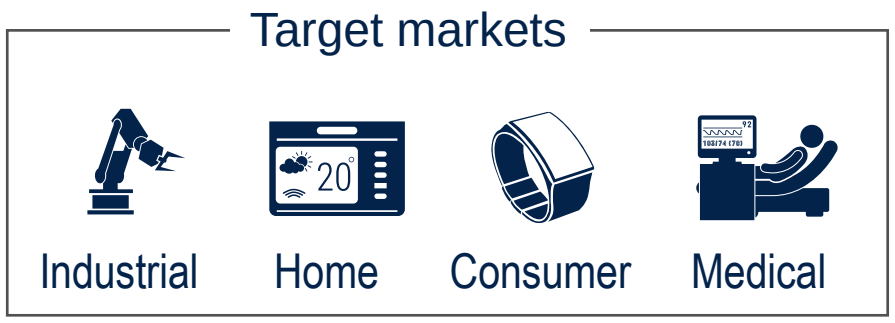
LDOs / VREF
Main electrical characteristics

- Input voltage: 2.8 V* to 5.5 V
- Output voltage / rated output current / default output voltage / usage:
  - LDO1: 1.7 to 3.3 V | 350 mA | OFF | General Purpose
  - LDO2: 1.7 to 3.3 V | 350 mA | OFF** or 2.9 V** | General Purpose [e.g. SD-card]
  - LDO3: 1.7 to 3.3 V | 120 mA | OFF | DDR3 VTT or lpDDR2's VDD1 or General Purpose
  - LDO4: 3.3 V | 50 mA | 3.3 V | Dedicated for MPU USB PHY
  - LDO5: 1.7 to 3.9 V | 350 mA | 2.9 V | General Purpose [e.g. Flash memory / SD-CARD]
  - LDO6: 0.9 to 3.3 V | 150 mA | OFF | General Purpose
  - VREF: VOUT2/2 | 5 mA | OFF | Dedicated for DDR reference voltage
- I²C programming step: 100 mV
- Output voltage accuracy: +/- 2 %
- Programmable passive discharge resistor: inactive / active
- OCP fault flag

* LDO3 V_{IN} min= 1.8V depending of operating mode
** STPMIC1**A** : **OFF** / STPMIC1**B** : **2.9 V**

STM32MP1x general purpose MPU
Accelerating IoT and smart industry innovation





- Multicore Microprocessor running RTOS & Linux in parallel
- Suitable for industrial applications with 10-year longevity commitment
- Heterogeneous architecture [2 x Cortex-A7 + Cortex-M4 + GPU Cores]
- STM32Cube full ecosystem reuse on Arm Cortex-M4 core
- Dual Cortex-A7 with free Linux Distribution: OpenSTLinux

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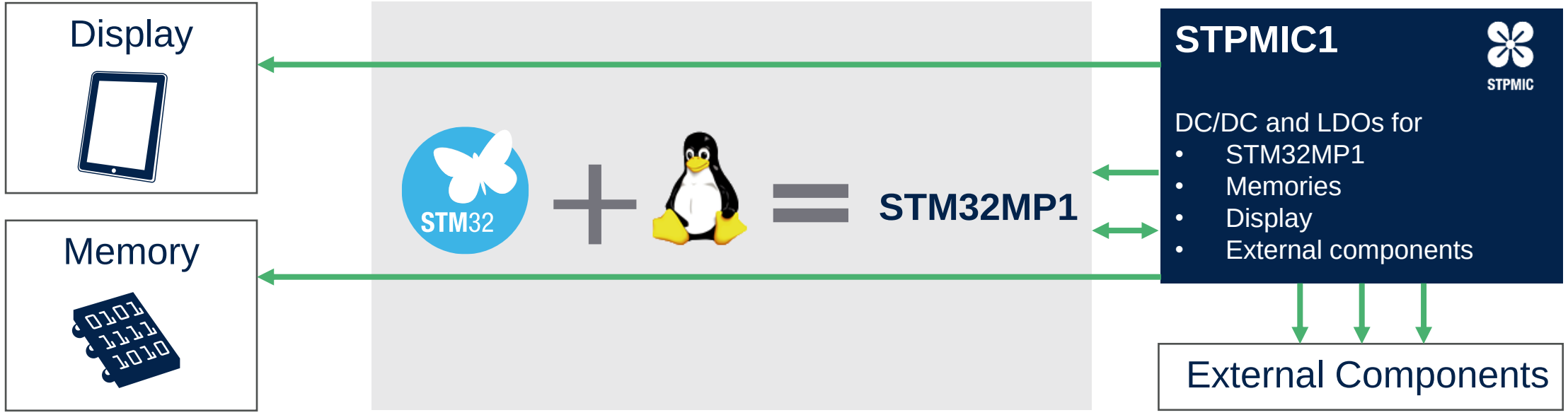
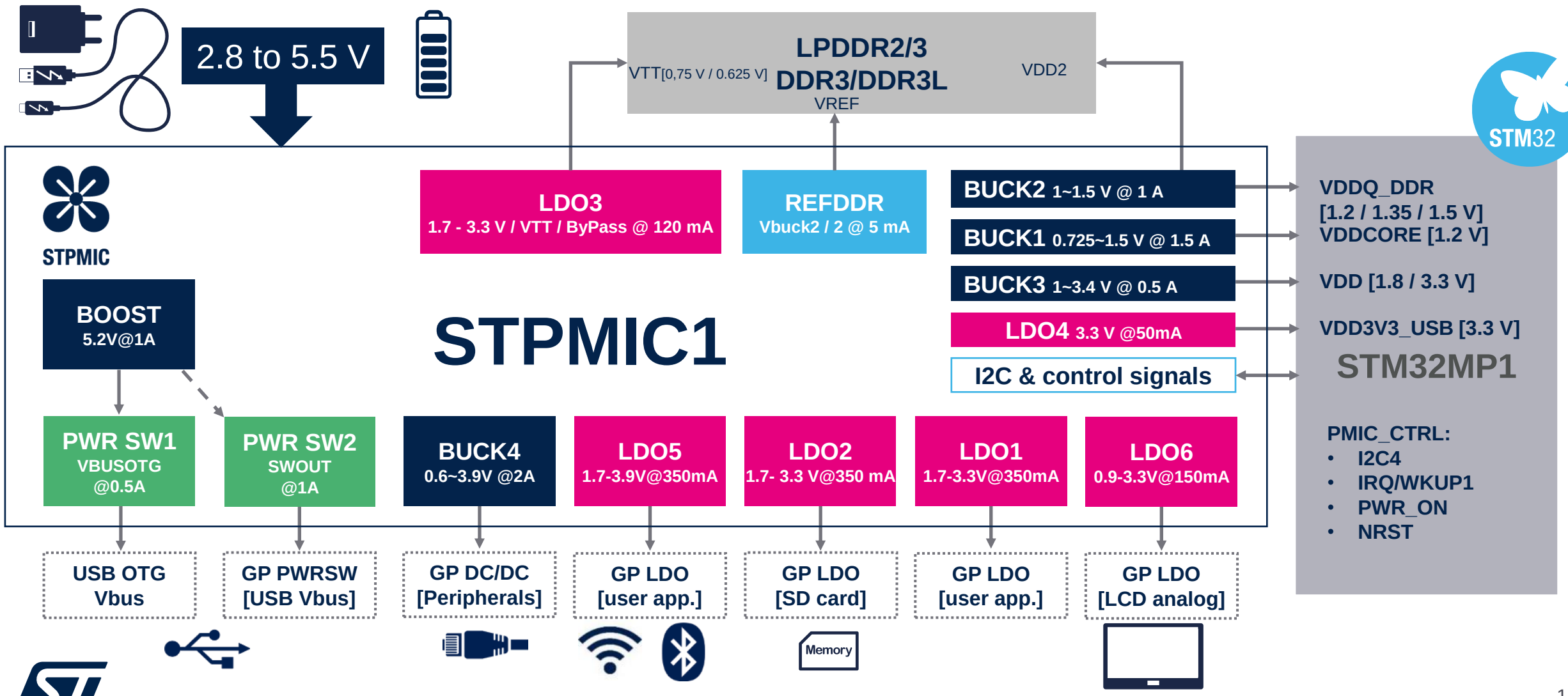
STPMIC1 and STM32MP1

The All-In-One power management solution for STM32MP1 microprocessors



- **Optimized power consumption**
- **BOM saving**
- **Smaller PCB footprint than discrete solution**

STPMIC1 and STM32MP1



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STPMIC1 IC vs. Discrete solutions
Optimized features

	STPMIC1	Discrete solution
Monitor all power rails and provide OCP, OVP, OTP features	✓	✗
Power-up / Power-down sequence	✓	✗
Voltage accuracy / settling time needed by STM32MP1 series	✓	**Need an accurate component selection**
Overall solution footprint (*)	✓	✗
BOM	✓	✗

* STPMIC1 PCB footprint ~**300mm^2**
Discrete solution ~ **750mm^2** | 5*DC/DC~600mm^2 | 6*LDO~150mm^2

STPMIC

End-markets

Home Automation

Industrial Control

POS Terminals

Networking

Medical Monitoring

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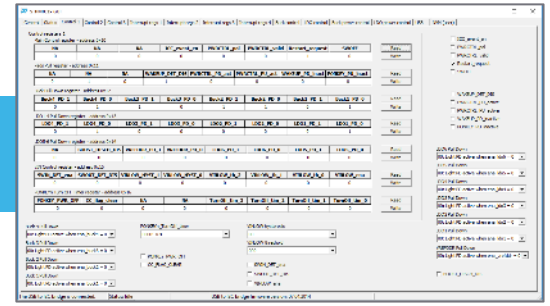
STPMIC1x for mass market

A comprehensive set of tool for validating the design on your own

STEVAL-PMIC1K1 | STPMIC1 Evaluation board



STSW-PMIC1GUI | GUI to monitor and configure STPMIC1

Technical Docs | Datasheet, Application Notes, Gerber files, …

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Minimum longevity commitment of 10 years

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STPMIC1x takeaways

STPMIC1x & STM32MP1x	Optimized companion PMIC for ST's STM32MP1 heterogeneous multicore microprocessors family
Best PMIC for MPU pick	Satisfies the complex power demands of highly-integrated application-processor based systems
Controls & protections beyond just delivering power	Provides power-rail monitoring and protection, handles power-up/down sequencing, and meets accuracy and settling-time specifications
Optimized application footprint	Saves board space and BOM cost vs discrete solution

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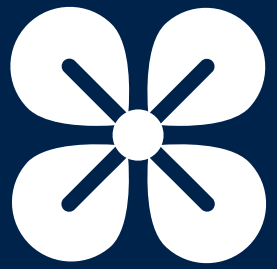
From STPMIC1x to STPMIC25



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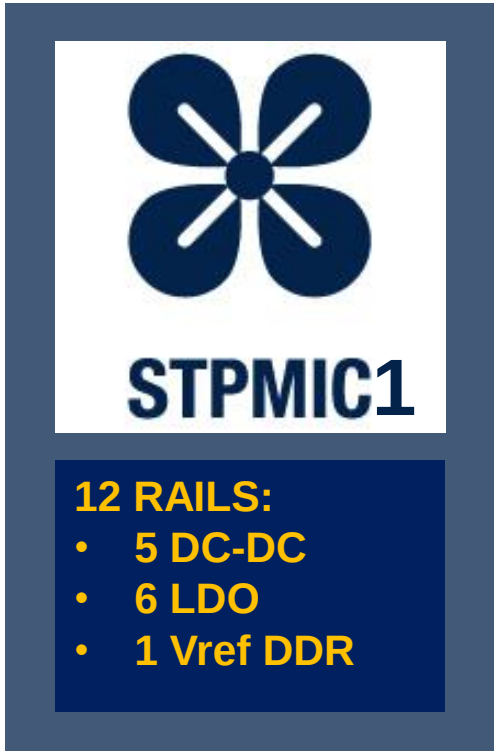
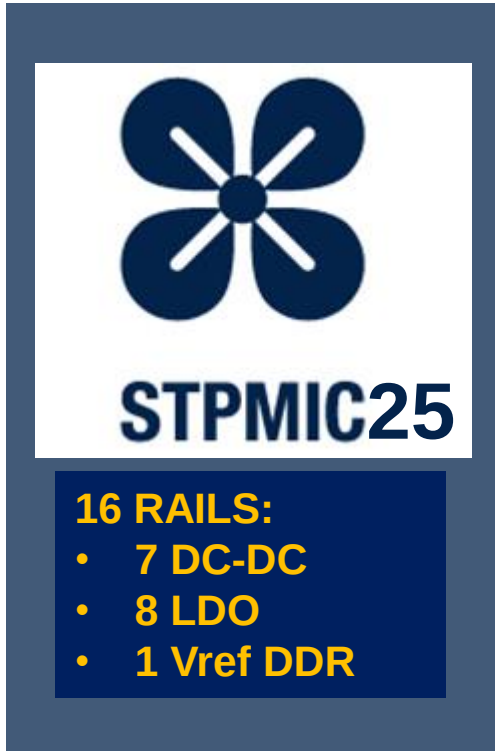
STPMIC1x → 25



- Higher **Output Power Capability**
- Improved o/p voltage **Ripple/Noise**
- Improved **Transient Performances**
- Increased DC/DC **Efficiency**
- Increased **Output Rails** number
- Increased **Safety Management**



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STPMIC25: highly integrated PMIC for STM32MP2x

Easy-to-use perfect companion to facilitate complex application design

KEY APPLICATIONS

- Industrial [e.g. Controls, POS, M2M interfaces, predictive maintenance]
- Factory Automation / Home Automation
- Networking
- Healthcare Monitoring

High Integration enabling cost effective solutions

- 7 Buck DC/DC converters
- 7 LDOs fixed and adjustable
- 1 LDO for DDR memory
- 1 voltage reference
- 3 power control pins for Power control management
- Provides power to the microprocessor unit as well as to external peripherals such as DDR, Flash memories and others

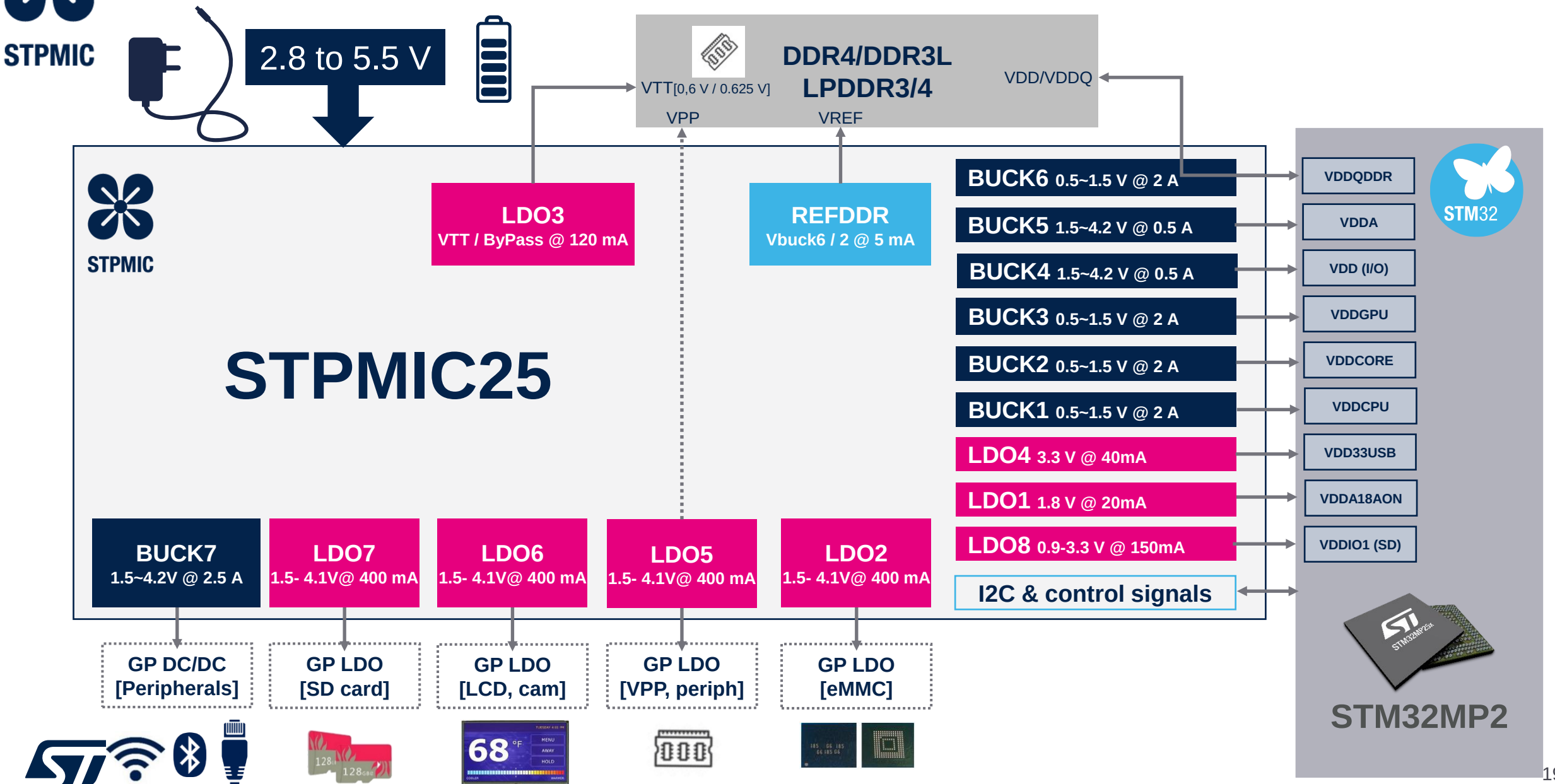
Application flexibility thanks to the scalable electrical characteristics

- Large input voltage range: from 2.8 to 5.5 V
- Compatible with 5 V wall adaptor, USB as well as Li-Ion/Li-Po batteries
- Full programmability via I^2C

Small package for space constraint applications

- QFN 56L, 6.5x6.5 mm

STPMIC25 and STM32MP2



STPMIC25: IPs Overview

7 adjustable step-down (Buck) converters

- 2 MHz with adaptive COT
- LP and HP Mode
- Dynamic Voltage Scaling
- Output discharge programmable (slow and fast)
- Programmable OCP protection with advanced safety management

5 adjustable LDOs

- Softstart circuit
- Output discharge programmable (slow and fast)
- Programmable OCP protection with advanced safety management

2 fixed LDOs

- 3.3V for USB PHY
- 1.8V fixed for VDDA

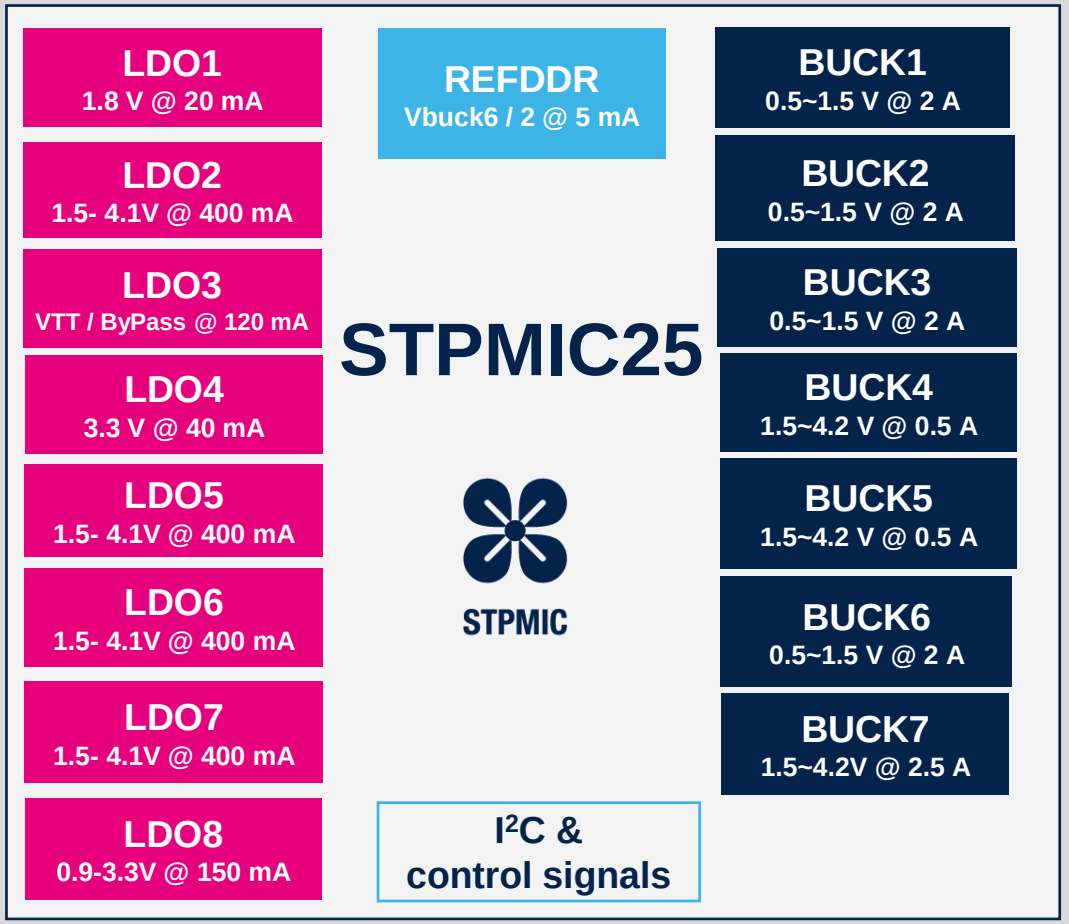
1 LDO for DDR memory

- DDR3/DDR4 termination with sink/source capability
- Bypass mode for lpDDR

1 Reference voltage for DDR memory

NVM

- STPMIC25A/B versions with different voltages & rank
- Output voltage rails fully customizable according to specific ranks
- Customizable safety management



Thank you

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