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STPMIC1
Power management IC

STPMIC

April 2023

STPMIC

STPMIC1 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

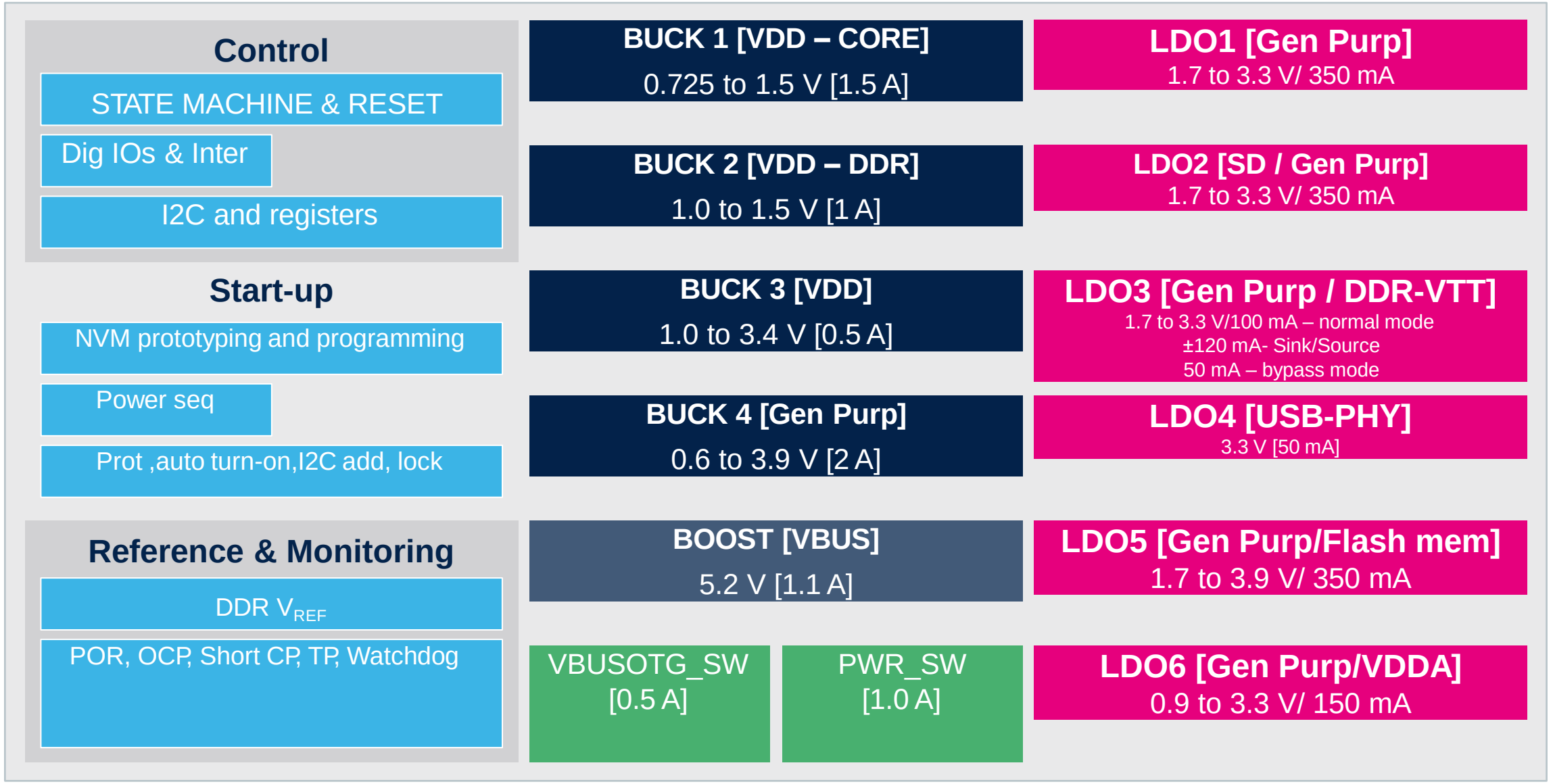
Application flexibility

- 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]

STPMIC1 block diagram



STPMIC1 versions

Pre-programmed [typ when V_{IN}=5 V]

Pre-programmed [typ when

Not pre-programmed [custom application]

Pre-programmed [typ when V_{IN}=5 V]

Pre-programmed [typ when

	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

STPMIC1 | 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%]			

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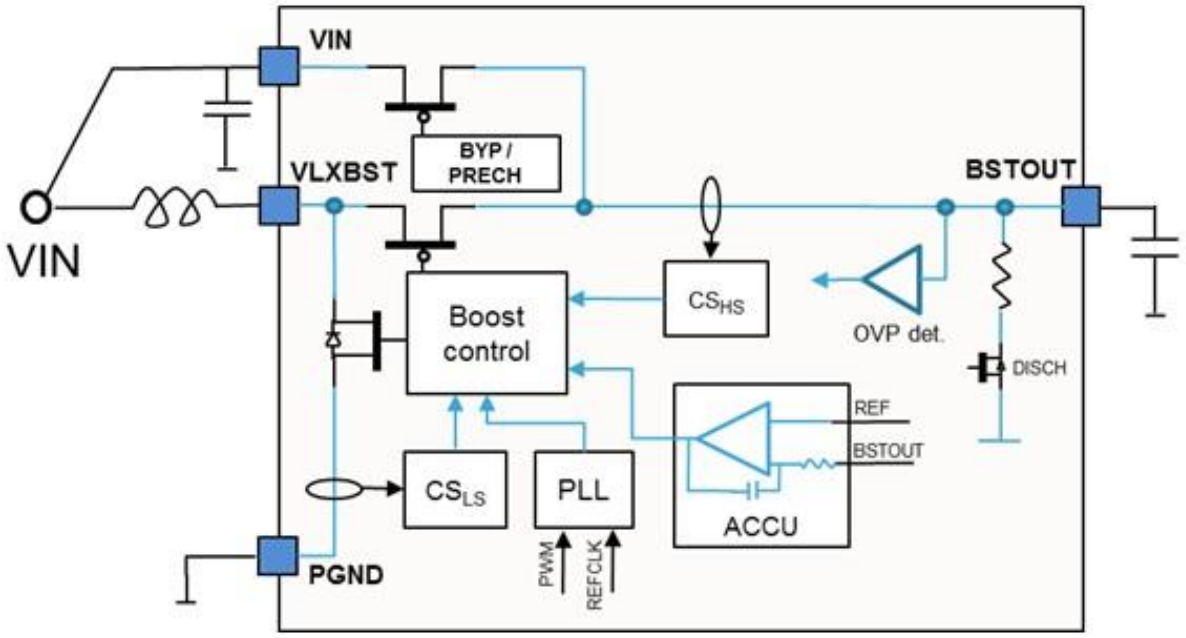
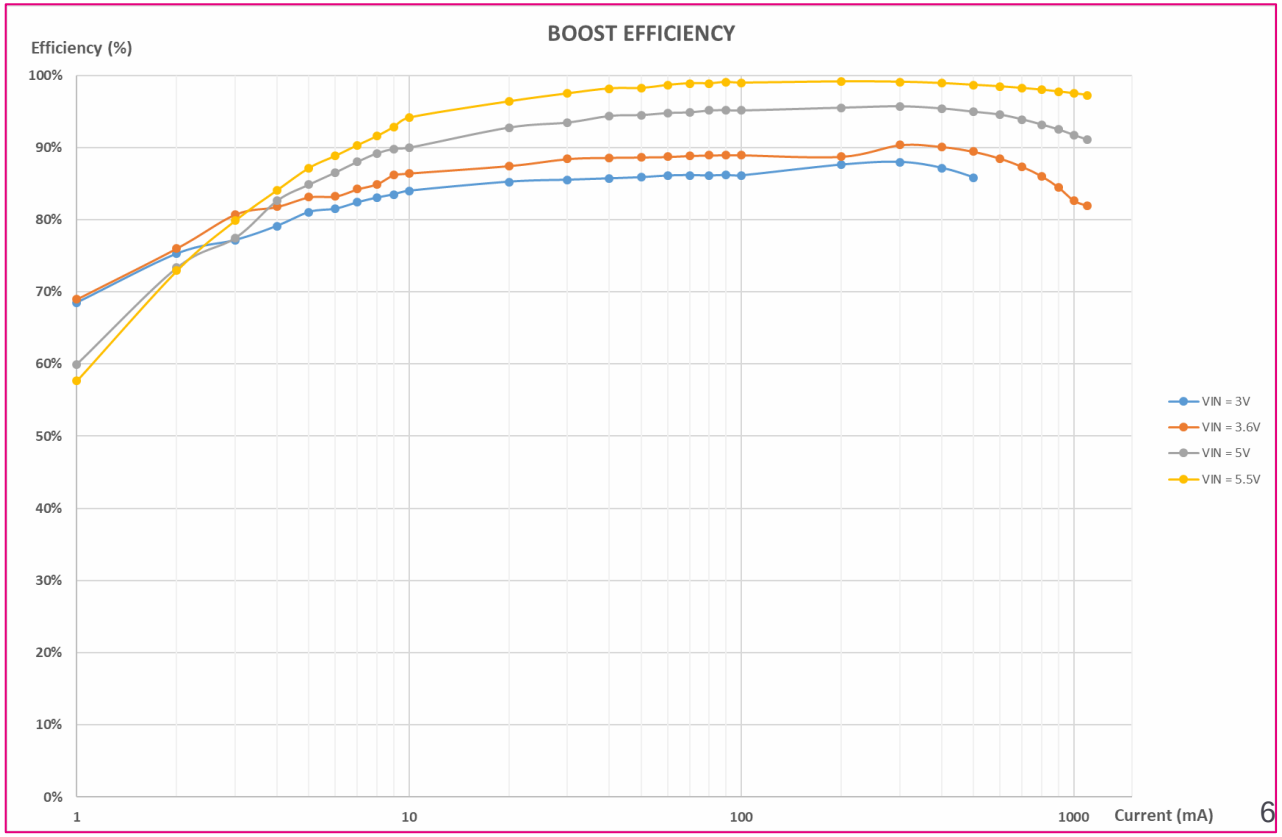
Boost converter for USB-VBUS
Main electrical characteristics

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



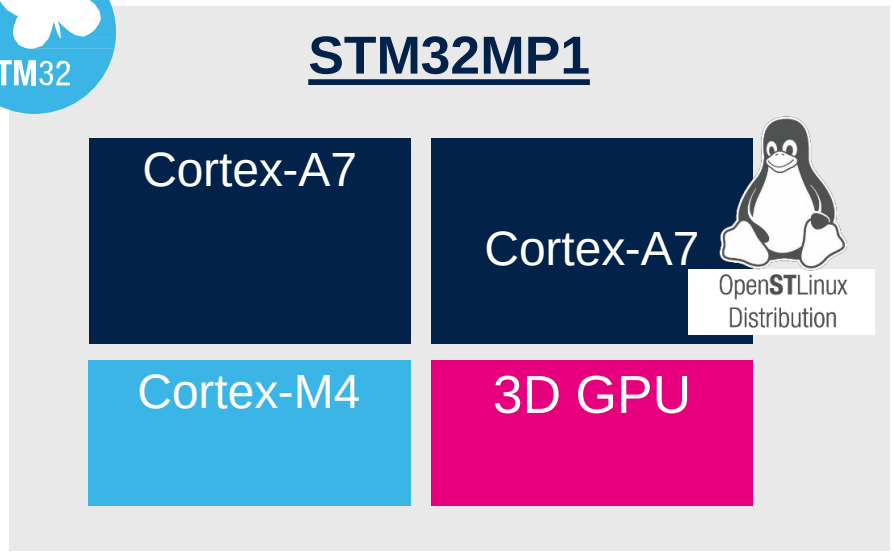


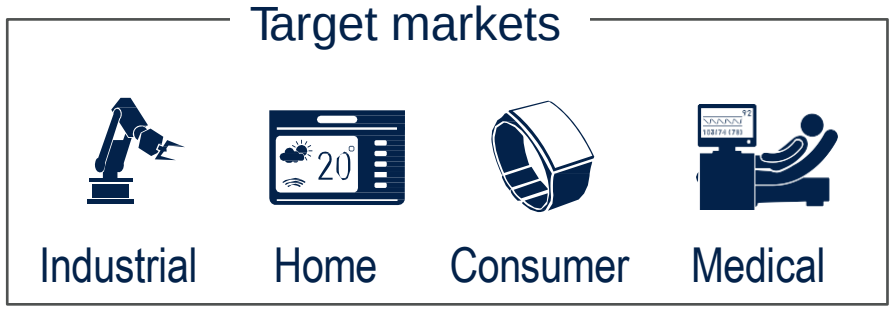
LDOs / VREF
Main electrical characteristics

- 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**

STM32MP1 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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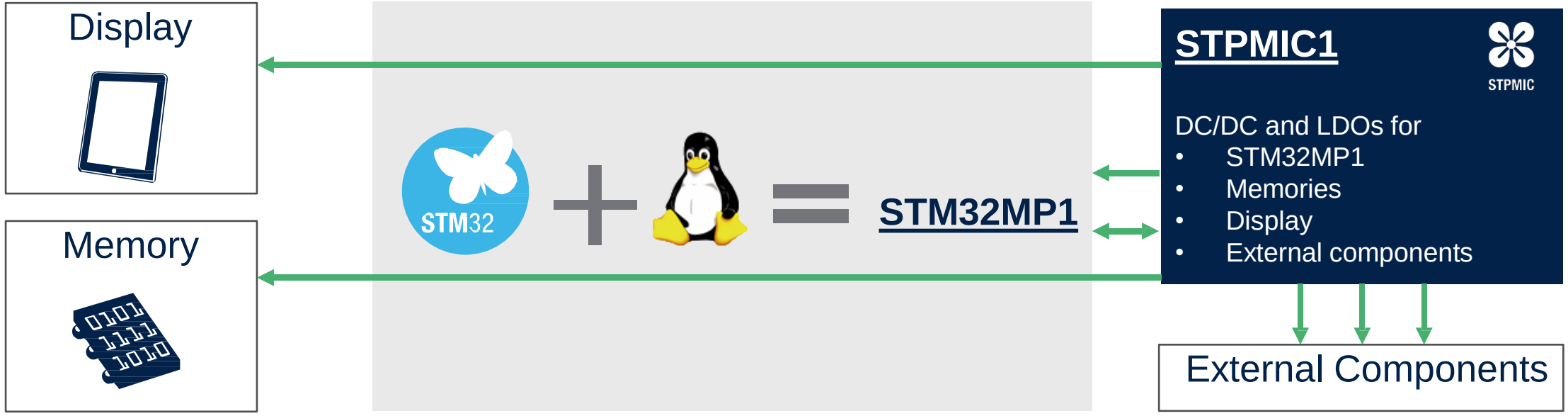
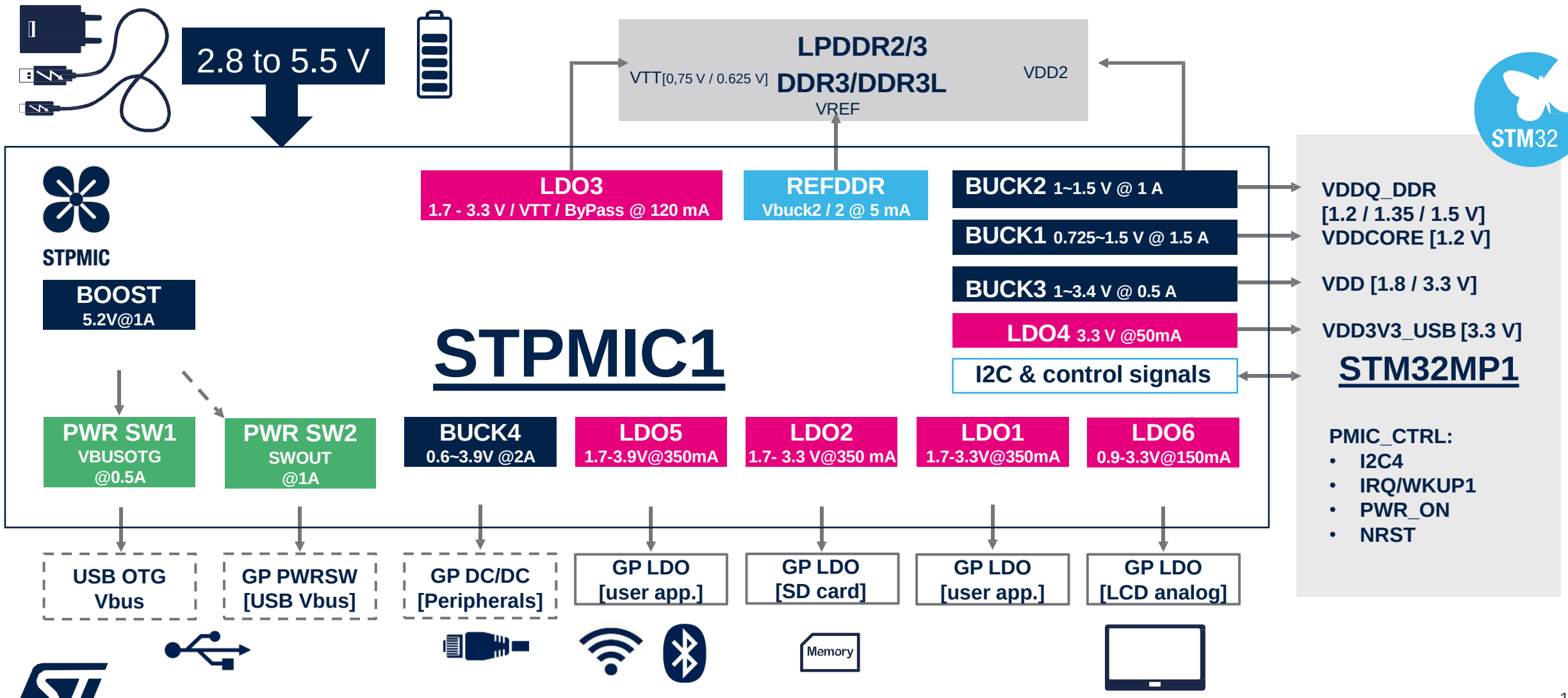
STPMIC1 and STM32MP1

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



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

STPMIC1 and STM32MP1



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

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End-markets

Home automation

Industrial control

POS terminals

Networking

Medical monitoring

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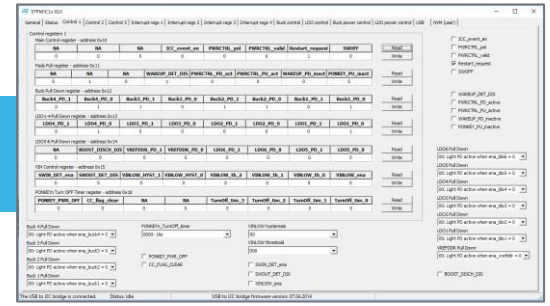
STPMIC1 for mass market

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, …

Minimum longevity commitment of 10 years

STPMIC1 takeaways

STPMIC1 & STM32MP1	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

Thank you

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