

1 Features

Programmable step down switch mode DC-DC converters

Five DCDC step-down voltage regulators with the following features:

- Wide Input Supply Range – 2.7V to 5.5V
- Power Save Mode at Light Load Current
- 100% Duty Cycle for Lowest Dropout
- 3 MHz switching frequency operation to reduce the external component form factor.
- DCDC 1:
 - DVS enabled output voltage range of 0.4V – 1.5V with step size of 12.5mV
 - Max load current of 1.5A in PWM mode and max load current of 200mA in PFM mode.
 - Output voltage accuracy of $\pm 2\%$ across V_{IN} and I_{LOAD} .
 - Transient Regulation within $\pm 50\text{mV}$ for a load current step of 1mA to 500mA or 700mA to 1200mA in $5\mu\text{s}$.
 - High efficiency– 82% efficiency in PWM mode at I_{LOAD} of 1A and 85% efficiency in PFM mode at I_{LOAD} of 50 mA.
- DCDC 2:
 - DVS enabled output voltage range of 1.0V – 2.0V with step size of 25mV.
 - Max load current of 2.0A in PWM mode and max load current of 200mA in PFM mode.
 - Output voltage accuracy of $\pm 3\%$ across V_{IN} and I_{LOAD} .
 - Transient Regulation within 5% for a load current step of 1mA to 500mA in $10\mu\text{s}$.
 - High efficiency– 87% efficiency in PWM mode at I_{LOAD} of 500 mA and 87% efficiency in PFM mode at I_{LOAD} of 50 mA.
- DCDC 3:
 - DVS enabled output voltage range of 1.0V – 2.0V with step size of 25mV.
 - Max load current of 750mA in PWM mode and max load current of 200mA in PFM mode.
 - Output voltage accuracy of $\pm 3\%$ across V_{IN} and I_{LOAD} .
 - Transient Regulation within 5% for a load current step of 1mA to 500mA in $10\mu\text{s}$.
 - High efficiency– 89% efficiency in PWM mode at I_{LOAD} of 500 mA and 90% efficiency in PFM mode at I_{LOAD} of 50 mA.
- DCDC 4:
 - DVS enabled output voltage range of 1.0V – 3.8V with step size of 25mV.
 - Max load current of 1A in PWM mode and max load current of 100mA in PFM mode.
 - Output voltage accuracy of $\pm 3\%$ in PWM mode

- Transient Regulation within 5% for a load current step of 1mA to 500mA in $10\mu\text{s}$.
- High efficiency– 91% efficiency in PWM mode at I_{LOAD} of 750 mA and 87% efficiency in PFM mode at I_{LOAD} of 50 mA.

- DCDC 5:
 - Register programmable output voltage range of 2.5V – 3.8V with step size of 25mV.
 - Max load current of 750mA in PWM mode and max load current of 100mA in PFM mode.
 - Output voltage accuracy of $\pm 3\%$ in PWM mode
 - Transient Regulation within 5% for a load current step of 1mA to 500mA in $10\mu\text{s}$.
 - High efficiency – 91% efficiency in PWM mode at I_{LOAD} of 750 mA and 87% efficiency in PFM mode at I_{LOAD} of 50 mA.

Programmable LDOs

Thirteen LDOs - 7 Core LDOs and 6 Normal LDOs

Core LDOs features:

- Input Voltage range from 1.4V to 2.0V – designed to operate off a step down converter output supply
- Output Voltage Range 0.8V to 1.3V. Output voltage accuracy of $\pm 2.5\%$
- Max load current of 10mA in Sleep Mode and 250mA in Normal Mode.
- Transient Regulation of $\pm 30\text{mV}$ for a load current step of 0mA to 100mA in $1\mu\text{s}$.
- High Frequency PSRR of 30dB at 3 MHz with a load current of 100mA.

Normal LDOs features:

- Input Voltage range from 2.5V to 5.5V – designed to operate directly off the input supply.
- LDO1 and LDO6: Programmable Output Voltage Range of 1.0V to 3.3V with step size of 50mV.
- LDO7: Fixed Output Voltage of 1.8V or 3.0V
- LDO8: Fixed Output Voltage of 1.8V or 2.5V
- LDO13: Fixed Output Voltage of 1.5V.
- Output voltage accuracy of $\pm 2\%$
- Max load current of 10mA in Sleep Mode and 250mA in Normal Mode.
- Transient Regulation of $\pm 30\text{mV}$ for a load current step of 0mA to 200mA in $1\mu\text{s}$.
- PSRR of 45dB at 100 kHz with a load current of 100mA.

Safety Functions

- Thermal Monitoring
- High Temperature Warning
- Thermal Shutdown

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Interface Functions

- I2C protocol for bus interface

System support Functions

- Interrupt controller
- All supply rails' power good monitoring
- All supply rails support software on/off functions
- External power button controlled on/off with Long Button-Press Detection
- Programmable Power-up and Power-Down Sequencing

Packaging

- 3.60mm x 3.60mm, 81 Pin WCSP Package with 0.4mm pitch

2 Applications

- IOT devices
- Wearable devices
- Data Communication devices/dongles

3 Pin Diagram

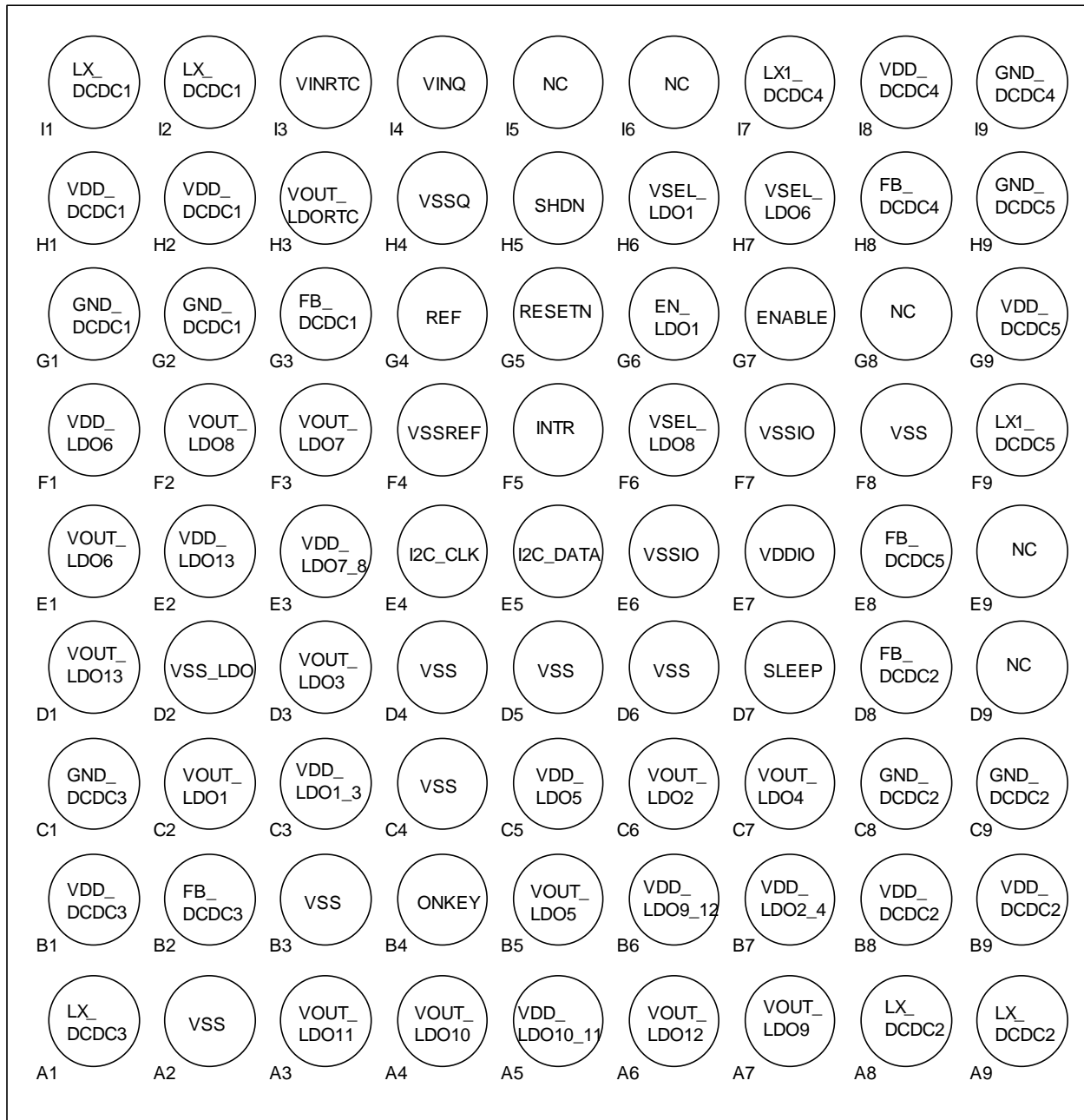


Figure 3-1: CSPM1305- 81 pin WLCSP Diagram

4 Block Diagram

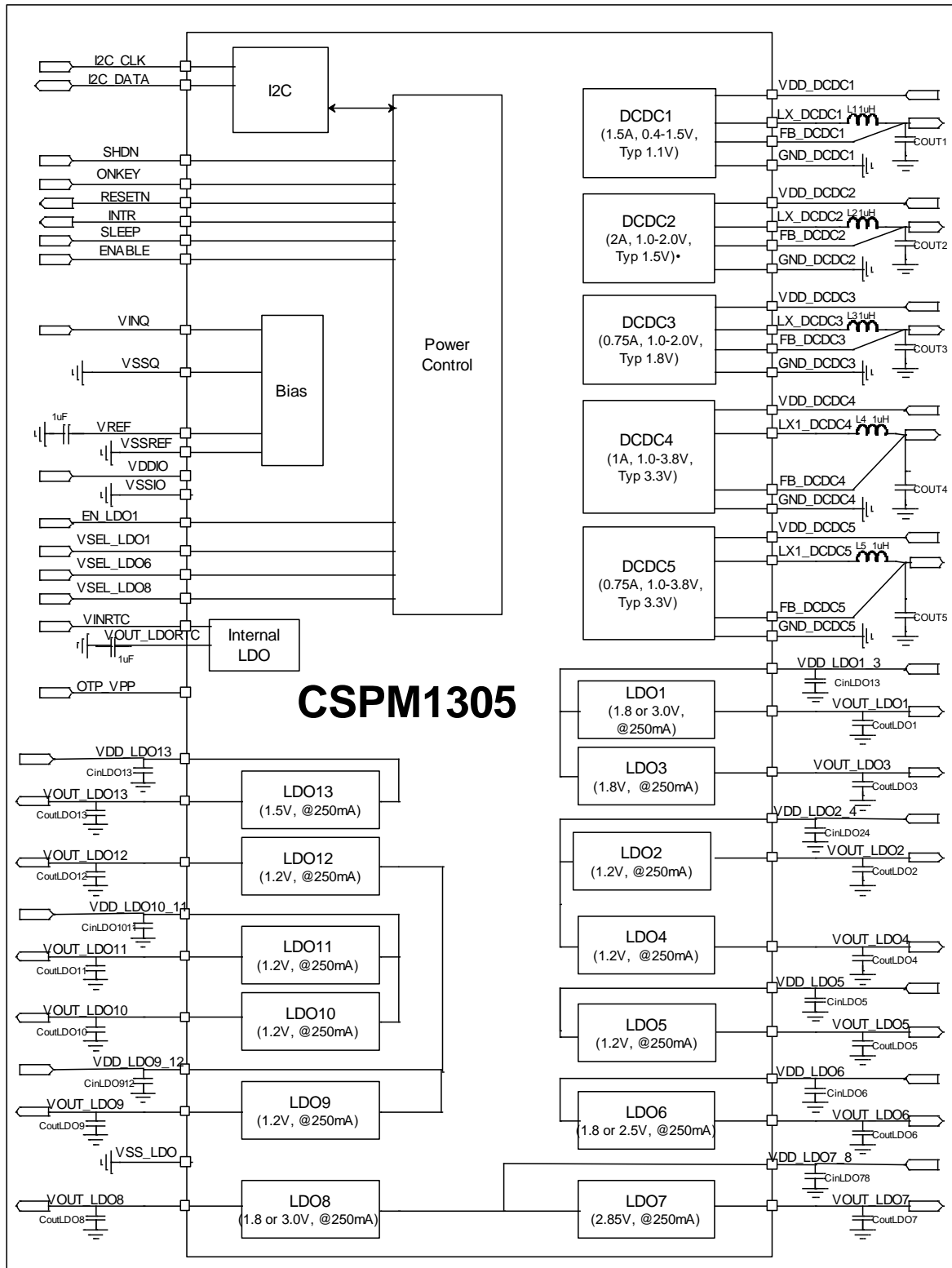


Figure 4-1 : PMU Block Diagram

5 Pin List

PIN NAME	I/O	DESCRIPTION	PINS	PIN
LX_DCDC1	O	Inductor node for DCDC1	I1, I2	2
FB_DCDC1	I	Feedback input DCDC1	G3	1
VDD_DCDC1	I	Power supply for DCDC1	H1, H2	2
GND_DCDC1		Power ground for DCDC1	G1, G2	2
LX_DCDC2	O	Inductor node for DCDC2	A8, A9	2
FB_DCDC2	I	Feedback input DCDC2	D8	1
VDD_DCDC2	I	Power supply for DCDC2	B8, B9	2
GND_DCDC2		Power ground for DCDC2	C8, C9	2
LX_DCDC3	O	Inductor node for DCDC3	A1	1
FB_DCDC3	I	Feedback input DCDC3	B2	1
VDD_DCDC3	I	Power supply for DCDC3	B1	1
GND_DCDC3		Power ground for DCDC3	C1	1
LX1_DCDC4	I	Inductor node1 for DCDC4	I7	1
NC		No Connect. Leave this pin floating. Do not connect to ground.	I6	1
NC		No Connect. Leave this pin floating. Do not connect to ground.	I5	1
FB_DCDC4	I	Feedback input DCDC4	H8	1
VDD_DCDC4	I	Power supply for DCDC4	I8	1
GND_DCDC4		Power ground for DCDC4	I9	1
LX1_DCDC5	I	Inductor node1 for DCDC5	F9	1
NC		No Connect. Leave this pin floating. Do not connect to ground.	E9	1
NC		No Connect. Leave this pin floating. Do not connect to ground.	D9	1
FB_DCDC5	I	Feedback input DCDC5	E8	1
VDD_DCDC5	I	Power supply for DCDC5	G9	1
GND_DCDC5		Power ground for DCDC5	H9	1
VINQ	I	Quite supply for DCDC converters	I4	1
VSSQ		Quite ground for DCDC converters	H4	1
VOUT_LDO1	O	Output of LDO1	C2	1
VOUT_LDO2	O	Output of LDO2	C6	1
VDD_LDO1_3	I	Power supply for LDO1 and LDO3	C3	1
VOUT_LDO3	O	Output of LDO3	D3	1
VDD_LDO2_4	I	Power supply for, LDO2 and LDO4	B7	1
VOUT_LDO4	O	Output of LDO4	C7	1
VOUT_LDO5	O	Output of LDO5	B5	1
VDD_LDO5	I	Power supply for LDO5	C5	1
VOUT_LDO6	O	Output of LDO6	E1	1
VDD_LDO6	I	Power supply for LDO6	F1	1
VOUT_LDO7	O	Output of LDO7	F3	1
VDD_LDO7_8	I	Power supply for LDO7 and LDO8	E3	1
VOUT_LDO8	O	Output of LDO8	F2	1
VOUT_LDO9	O	Output of LDO9	A7	1
VDD_LDO9_12	I	Power supply for LDO9 and LDO12	B6	1
VOUT_LDO10	O	Output of LDO10	A4	1

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PIN NAME	I/O	DESCRIPTION	PINS	PIN
VOUT_LDO11	O	Output of LDO11	A3	1
VDD_LDO10_11	I	Power supply for LDO10 and LDO11	A5	1
VSSLDO		Ground for LDOs	D2	1
VOUT_LDO12	O	Output of LDO12	A6	1
VOUT_LDO13	O	Output of LDO13	D1	1
VDD_LDO13	I	Power supply for LDO13	E2	1
VOUT_LDORTC	I	RTC LDO output	H3	1
VINRTC	I	Power supply for RTC LDO	I3	1
REF	O	Reference voltage	G4	1
VSSREF		Ground for reference voltage	F4	1
ENABLE	I	Enable signal. This pin has a 500kΩ internal pull up resistor to VDDIO.	G7	1
SLEEP	I	Sleep mode signal. Logic High=Active Mode, Logic Low=Sleep Mode	D7	1
SHDN	I	Shutdown signal. This pin has a 2500kΩ internal pull up resistor to VINRTC. Logic High= PMIC Active, Logic Low=PMIC in OFF state.	H5	1
ONKEY	I	ONKEY function input signal that is active low. This pin has a 500kΩ internal pull up to VINRTC. A logic high can be anywhere between 0.9 x VOUT_LDORTC to VINRTC.	B4	1
RESETN	O	RESETN signal. It is an active low signal and an open drain output. A pull up resistor to VDDIO is required.	G5	1
I2C_CLK	I	I2C clock	E4	1
I2C_DATA	I/O	I2C data	E5	1
VDDIO	I	Supply for IO	E7	1
VSSIO		Ground for IO	F7	1
INTR	O	Interrupt signal. It is active low signal and open drain. A pull up resistor to VDDIO is required.	F5	1
EN_LDO1	I	Enable signal of LDO1. This pin will have pull down resistance of 30K	G6	1
VSEL_LDO1	I	Default output voltage select pin for LDO1 (It will have pull up/down resistance on board)	H6	1
VSEL_LDO6	I	Default output voltage select pin for LDO6 (It will have pull up/down resistance on board)	H7	1
VSEL_LDO8	I	Default output voltage select pin for LDO8 (It will have pull up/down resistance on board)	F6	1
NC		No Connect. Leave this pin floating. Do not connect to ground.	G8	1
VSS		VSS	A2, B3, C4, D4, D5, D6, E6, F8	7

6 Packaging Information

CSPM1305 is available in 81 pin WLCSP package.

