

Features

- PWM, voltage mode, point-of-load (POL) regulator
- Up to 12A output current using resource-efficient design
- Maximum output current: Defined by selected device
2A=AmP8D1, 6A=AmP8D3, 12A=AmP8D6
- Vin: 3.0 to 13.2 V, Vout: 0.6V to 5.5V
- Adjustable output voltage with down to 1.2 mV resolution
- Integrated MOSFETs, $R_{DS(on)}$: 40m Ω
- 1% typical load regulation
- Efficiency up to 95%
- Internal single pole compensator minimizes external part count
- Additional capabilities – see I210, P210
- Adaptable stability, bandwidth, gain & phase margin
- Frequency synchronization: adjustable up to 2000 kHz
- Adjustable protection: Under-Voltage Lockout (UVLO), Overcurrent (OCP), Overvoltage (OVP), and Over Temperature (OTP)
- Short-circuit protection (SCP)
- Power-good flag output and Enable input
- Soft start/stop, sequencing, pre-bias startup
- 74-pin VQFN package
- -40°C to +125°C operating junction temperature
- Three SIM elements; integrate up to four C210 Power Components in one AmP platform

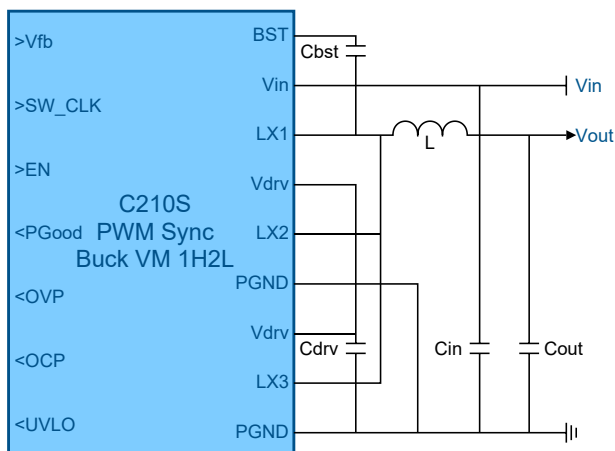
Applications

- On-demand power management, multi-rail power integration
- Powering server, processor, memory, storage, network switcher and router platforms
- FPGA, processor, SSD, subsystem power control & sequencing

Typical Application Circuit

Figure 1 provides a typical schematic for the C210S Power Component when integrated with other power rails in an AmP application.

Figure 1: C210S application schematic



Description

The C210S Power Component is a customizable PWM Synchronous Buck Switching Regulator capable of supplying up to 12A of current using a resource-efficient design. Combine the C210S component with other Power Components to create a custom-defined, AnDAPT AmP on-demand power management device.

To provide high current, the C210S Power Component uses one high-side integrated, low-resistance switching Scalable Integrated MOSFET (SIM) and two low-side, parallel SIMs to provide up to 12A output current. The maximum current is defined by the AmP device selected.

Output voltage feedback is compared against an internal reference using a high-performance, voltage-error amplifier that provides tight voltage regulation accuracy under transient conditions. Pulse-width modulated (PWM), voltage-mode regulation is implemented with PID compensation. The switching frequency is either generated internally via an oscillator with selectable frequencies or provided via an external pin. The C210S component has a customizable current switchover point between pulse-width modulation (PWM) for higher-current loads and pulse-skipping modulation (PSM) for low-current loads.

The customizable output voltage is specified by the power engineer during customization using AnDAPT's cloud-based WebAmP development software. The C210S has customizable control and status pins including an optional enable input, an optional power-good output, and optional output flags to signal when the system triggers an overvoltage (OVP), overcurrent (OCP), or undervoltage lockout (UVLO) condition. The threshold values are specified by the power engineer using the WebAmP tool.

The customizable soft-start and soft-stop slew rates plus ramp timing are also specified by the power engineer using the WebAmP tool.

Customizable Options

[Table 1](#) lists the various customizable options available for the C210S Power Component. These options are set graphically in the WebAmp development software.

Table 1: C210S Customizable Options

Option	Units
Switching frequency	kHz
Input voltage	V
Output voltage	V
Ripple, % of output voltage*	%
Ripple, % of maximum output current*	%
Use optional En input to enable supply	On/Off
Delay time from enable to soft-start	ms
Use optional UVLO output to signal that output voltage is in under-voltage lockout condition	On/Off
Input voltage threshold for under-voltage lockout	V
Use optional OVP output to signal when over-voltage protection is triggered	On/Off
Over-voltage protection threshold	V
Use optional OCP output to signal when over-current protection is triggered	On/Off
Over-current protection threshold	A
Soft start rise time after enable	ms
Soft stop delay after disable	ms
Soft stop fall time after initial delay after disable	ms
Use optional PGood output to signal “power good”	On/Off
“Power good” threshold, percentage of output	%
Delay from “power good” until PGood asserted	ms
PID regulation coefficients (K_P , K_I , K_D)	
Threshold to switch between pulse-skipping mode (PSM) and pulse-width modulation (PWM)	A

* to generate passive component recommendations

Package Options

[Table 2](#) lists the package options available for the C210S Power Component. Typically, multiple AnDAPT power components are integrated into a single package.

Table 2: Package Options for C210S

Pins	Dimension	SIM Bonding	Part Number
74	8 x 8 mm	Single	C210S

Advanced Capabilities and Options

[Table 3](#) lists derivatives of the C210S component with additional capabilities plus other similar components potentially suitable for this application.

Table 3: C210S Advanced Capabilities Options

Description	Part Number
Standard version (this component)	C210
Add external control via I ² C bus interface	I210
Add telemetry and dynamic voltage scaling via DVS interface	P210
Single-phase buck regulator, synchronous, PWM, current mode regulation	C100
Single-phase buck regulator, asynchronous, PWM, voltage mode regulation	C250
Multi-phase buck regulator, synchronous, PWM, current mode regulation	C510

System Characteristics

[Table 4](#) lists the system characteristics for the C210S Power Component when implemented in an AnDAPT AmP device.

Table 4: C210S System Characteristics

Parameters	Min	Typ	Max	Units
Power				
Bias Supply Voltage (V_{BIAS})	6		13.2	V
Input Drain Voltage (V_{IN})	3		13.2	V
Output Voltage (V_{OUT})	0.6		5.5	V
Output Current (I_{OUT})	D6		12	A
	D3		6	
	D1		2	
Switching frequency (F_{SW})			2000	kHz
Output MOSFET switch ($R_{DS(on)}$)		40		mΩ
Load regulation ($\Delta V_{OUT}/\Delta I_{OUT}$)		1		%/A
Line regulation ($\Delta V_{OUT}/\Delta V_{IN}$)		1		%/V
Peak efficiency ($V_{IN}=5V$, $V_{OUT}=3.3V$, $F_{SW}=500kHz$)		95		%
Control				
Time to load change		5		μs
Over-/under-shoot		±5		%
Dynamic MOSFET current per segment		0.37		A
Soft start/stop delay	2		10	ms
Current Limit – OCP	0.2		12	A
Overvoltage protection trip point range (OVP)	0		5.5	V
Undervoltage lockout start threshold range (UVLO)	0		5.5	V

For other device specifications, see the AnDAPT AmP Platform datasheet.

Additional Resources

- AnDAPT AmP Platform datasheet