

Product Description

The C150_B Power Component is a customizable, PWM Asynchronous Buck, Current Mode Switching Regulator. Combine the C150_B component with other Power Components to create a custom-defined, AnDAPT AmP on-demand power management integrated circuit (PMIC).

Features

- PWM, Current Mode, point-of-load (POL) regulator
- Maximum output current: 6A
- PV_{IN} : 3 to 14V, V_{OUT} : 0.7V to 5.5V
- Adjustable output voltage with down to 2.5 mV resolution
- Integrated MOSFETs, $R_{DS(on)}$: 30m Ω
- 1% load regulation
- Efficiency up to 95%
- Internal compensator minimizes external part count
- Adjustable switching frequency from 500 kHz to 1 MHz
- Adaptable compensation, bandwidth, gain & phase margin
- Adjustable protection: Input Undervoltage Lockout, (ViUVLO), Output Undervoltage Lockout, (VoUVLO), Overcurrent (OCP), Overvoltage (OVP)
- Over Temperature Protection (OTP) (part of platform)
- Short-circuit protection (SCP)
- Power-good flag output and Enable input
- Soft start/stop, sequencing, pre-bias startup
- -40°C to +125°C operating junction temperature
- One SIM element; integrate up to eight C150_B 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

Product Detail

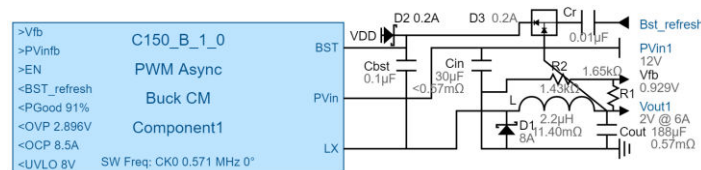
The C150_B Asynchronous Buck Regulator includes an integrated MOSFET, customizable PWM controller and various protection circuits.

The integrated, low-resistance switching Scalable Integrated MOSFET-(SIM) provides up to 6A output current. Output voltage feedback is compared against an internal reference using a high-performance, voltage-error digitizer that provides tight voltage regulation accuracy under transient conditions. MOSFET current is sensed through an internal current mirror and compared with a current reference using digital compensation. The switching frequency is either generated internally via an oscillator with selectable frequencies or provided via an external pin.

The customizable output voltage is specified by the power engineer during customization using AnDAPT's cloud-based WebAmp development software. The C150_B component has customizable control and status pins including enable input, an optional power-good output, and optional output flags to signal when the system triggers an overvoltage (OVP), overcurrent (OCP), or input undervoltage lockout (ViUVLO) condition. The threshold values are specified by the power engineer using the WebAmp tool.

The customizable soft-start and soft-stop slew rates are also specified by the power engineer using the WebAmp tool. Additional sequencing options are available when used in conjunction with the C420 customizable Sequencer, by interconnecting signals EN and PGood to provide customizable dependencies and customizable delays between each sequence step.

Figure 1: C150_B_1_0 application schematic



Recommended Operating Conditions

over operating free-air temperature range

Symbol	Parameter	Min	Typ	Max	Unit
PV_{IN}	Power Input Voltage	3		14	V
I_{OUT}	I_{OUT} Output Current Maximum†			6	A

Electrical Characteristics

$PV_{IN}=V_{IN}=12V$, $T_A=25^{\circ}C$, $C_{vdd}=10\mu F$, $C_{vcc}=1\mu F$, unless otherwise specified

Parameters	Test Conditions	Min	Typ	Max	Units
Output Voltage (V_{OUT})		0.7		5.5	V
Voltage Regulation	Including load line and temperature variation V_{IN} range: 6V to 14V	-1		+1	%
Switching frequency (F_{SW})		500		1000	kHz
Switching frequency accuracy		-5		+5	%
MOSFET switch on-resistance ($R_{DS(on)}$)			30		m Ω
Peak efficiency	$V_{IN}=9V$, $V_{OUT}=5V$, $F_{SW}=800kHz$ $I_{OUT}=2.2A$		94		%
Full Load Efficiency	$V_{IN}=12V$, $V_{OUT}=5V$, $F_{SW}=800kHz$, $I_{OUT}=6.0A$		91		%
Input Shutdown current (V_{IN})	EN = Low		3.1		mA
Input Shutdown current (PV_{IN})			0.1		mA
Input Quiescent current (V_{IN})	EN = High, $I_{OUT} = 0A$, $F_{SW} = 571 kHz$ $V_{OUT} = 5V$		3.8		mA
Input Quiescent current (PV_{IN})			3.3		mA
PROTECTION					
V_{iUVLO} , input Undervoltage Lockout		2.5		10	V
OCP, Over Current Protection (% I_{OUT})			140		%
OTP, Over Temperature Protection	Shutdown (Power Good goes low) Hysteresis	125			$^{\circ}C$
OVP, Overvoltage Protection trip point range (relative to V_{fb} Setting)**		+100		+432	mV
V_{oUVLO} , output Undervoltage Lockout threshold range (relative to V_{fb} Setting)**		-100		-432	mV
Power Good threshold (relative to V_{fb} Setting)**		-100		-432	mV

† max current also depends on V_{in} , V_{out} and F_{sw} as outlined in Figure 4 Maximum Output Current, I_{OUT}

* Parameters shaded in green are user customizable as set in WebAmP development software

** V_{fb} is equal to V_{out} multiplied by the feedback resistor divider ratio