PWM Single-Phase DrMOS Controller

Power Component: C860_B, I860_B

Product Description

The C860_B Power Component is a customizable, single-phase, voltage-mode DrMOS controller designed for point-of-load (POL) applications. Combine the C860_B with other Power Components to create a custom-defined, AnDAPT AmP on-demand PMIC. The I860_B Power Component includes the C860_B Synchronous Buck and extends it with I2C communication for dynamic voltage scaling and current measurement.

Power components are software components, accessible through WebAmP™, allowing users to create their own PMIC. The C860_B has been developed to interface with industry-standard DrMOS devices such as the 3.3 V compatible Vishay SiC645A or the Intersil/Renesas ISL99227 with 3.3V compatible tri-state PWM input. The DrMOS is a fully integrated power stage that integrates a high side and low side MOSFET and a high-performance driver with integrated bootstrap FET. Maximum output current will be based on the selected external DrMOS and on the thermal design of the specific application.

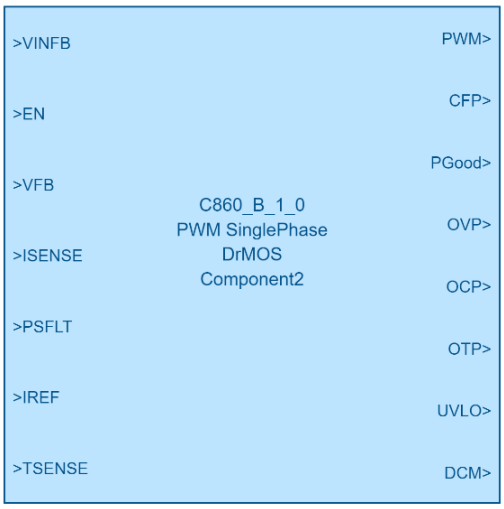
Features

- PWM, voltage mode, DrMOS controller
- Adjustable output voltage with down to 2.5 mV resolution
- 1% voltage accuracy
- Efficiency up to 94%
- Adjustable switching frequency 533 to 1000 kHz
- Adaptable bandwidth, gain & phase margin
- Adjustable protections:
  Input Undervoltage Lockout (ViUVLO), Output Undervoltage Lockout (VoUVLO), Overcurrent Protection (OCP), Overvoltage Protection (OVP), Over temperature Protection (OTP), Short-circuit Protection (SCP)
- Power-good flag output and Enable input
- Controller junction temperature range –40°C to +125°C
- Component included in the WebAmP™ development tool

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

Figure 1. C860_B Power Component



Product Detail

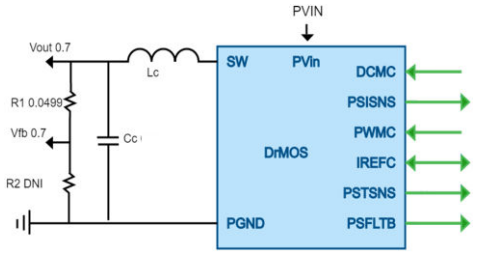
The C860_B Synchronous Buck controller power component symbol is shown in Figure 1. The controller drives a DrMOS integrated power stage with connections as shown in Figure 2 and described in the Pin Function and Description Table. A typical application diagram is shown in Figure 3.

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. 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 customizable output voltage is specified by the power engineer during customization using AnDAPT's cloud-based WebAmp development software. The C860_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), undervoltage lockout (UVLO), catastrophic DrMOS failure (CFP) or over temperature (OTP) condition. The threshold values are specified by the power engineer using the WebAmp tool.

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 Sequencer, by interconnecting signals EN and PGood to provide customizable dependencies and customizable delays between each sequence step.

Figure 2: DrMOS Interface



Pin Function and Description Table

Port Name	GPIO Name	SiC645 Name	I/O	Description
OVP			O	Over Voltage Protection fault flag for internal connection to AmP fault manager
OCP			O	Over Current Protection fault flag for internal connection to AmP fault manager
OTP			O	Over Temperature Protection fault flag for internal connection to AmP fault manager
UVLO			O	Input Under Voltage Lock Out fault flag for internal connection to AmP fault manager
PGood			O	Controller Power Good signal
CFP			O	Catastrophic Fault Protection fault flag for internal connection to AmP fault manager.
VINFB			I	Internal - Input voltage measurement for ViUVLO protection
TSENSE	PSTSNS	TMON	I	Temperature monitor input from DrMOS Power Stage to C860_B controller
PSFLT	PSFLTB	FAULT#	I	Open drain fault input pin from DrMOS Power Stage to C860_B controller.
ISENSE	PSISNS	IMON	I	Current monitor input from DrMOS Power Stage to C860_B controller.
IREF	IREFC	REFIN	I	Reference voltage connected to DrMOS power stage REFIN signal and to C860_B controller. Recommend using AmP auxiliary 1.2V LDO to drive the signal.
DCM	DCMC	LGCTRL	O	DrMOS power stage lower gate control signal output from DrMOS controller. Used for Discontinuous current mode operation for light load efficiency when available on the DrMOS.
EN			I	Enable DrMOS controller
PWM	PWMC	PWM	O	DrMOS power stage gate driver control signal output from DrMOS controller
VFB	Vfb		I	VOUT feedback for DrMOS controller

Figure 3: Typical Application Diagram