Application Report
SNVA737–August 2015

LP8758 Flexible Four Core Buck Regulator

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ABSTRACT

The LP8758 device is a flexible DC-DC regulator which consists of four configurable regulator cores. This application note can be used as a reference for different LP8758 device configuration options (Quad, Triple, Dual, Single Outputs).

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1 LP8758 Regulator Configurations

The LP8758 device supports the following regulator configurations:

- Single output 4-phase regulator with maximum 16-A load current (LP8758-B0).
- One 3-phase and one single-phase regulator with maximum 12-A and 4-A load currents (LP8758-C0).
- Two 2-phase regulators with maximum 8-A load currents (LP8758-D0).
- One 2-phase and two single-phase regulators with maximum 8-A and 4-A load currents (LP8758-E0).
- Four single-phase regulators with maximum 4-A load current at each output (LP8758-F0).

Parametrics for the different configurations are summarized in Table 1.

Table 1. Parametrics

PARAMETER	LP8758-B0	LP8758-C0	LP8758-D0	LP8758-E0	LP8758-F0
Configuration	4-phase	3+1-phase	2+1+1-phase	1+1+1+1-phase	2+2-phase
Input voltage range	2.5 V to 5.5 V				
Minimum dropout voltage	0.7 V				
Switching frequency	3 MHz				
Output voltage slew-rate	Programmable 0.47 mV/µs to 30 mV/µs, default 10 mV/µs				
Converter operating mode	Programmable PFM-PWM / Forced PWM / Forced multi-phase, default PFM-PWM				
Output voltage range	Programmable 0.5 V to 3.36 V				
Default output voltage	Buck0/1/2/3: 1.1 V	Buck0/1/2: 0.9 V	Buck0/1: 0.9 V	Buck0: 1 V	Buck0/1: 0.9 V
				Buck1: 2.5 V	
			Buck2: 1.5 V	Buck2: 1.2 V	Buck2/3: 0.9 V
		Buck3: 1.2 V	Buck3: 1.8 V	Buck3: 1.8 V	
Maximum load current	4 A / phase				
Inductor current limit / phase	Programmable 1.5 A to 5 A				
Default Inductor current limit / phase	5 A	5 A	5 A	Buck0: 2.5 A	4.5 A
				Buck1: 4.5 A	
				Buck2: 3.5 A	
				Buck3: 4.5 A	
Default control pin	EN1	EN1	EN1	EN1	EN1, EN2
Start-up and shutdown delays	Programmable 0 ms to 15 ms				
Default start-up / shutdown delay	Buck0/1/2/3: 0 ms /0 ms	Buck0/1/2: 0 ms / 0 ms	Buck0/1: 0 ms / 0 ms	Buck0: 0 ms / 5 ms	Buck0/1: 2 ms / 4 ms
				Buck1: 0 ms / 5 ms	
			Buck2: 0 ms / 0 ms	Buck2: 5 ms / 0 ms	Buck2/3: 4 ms / 2 ms
		Buck3: 0 ms / 0 ms	Buck3: 0 ms / 0 ms	Buck3: 0 ms / 5 ms	
Interrupts unmasked by default	- Thermal warning - Load current measurement - Powergood - Current Limit	- Thermal warning - Load current measurement			

2 Typical Applications

The following sections show the typical functional block diagrams for the different configurations.

2.1 LP8758-B0: 4-Phase Regulator Configuration

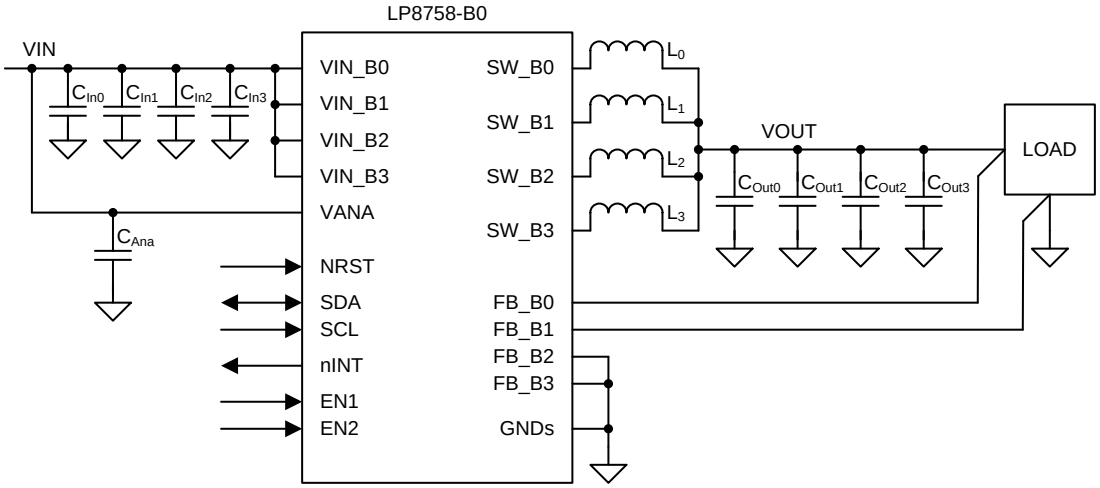

Figure 1. 4-Phase Configuration

The output voltage is sensed with differential feedback, VOUT sense, and Ground sense.

The LP8758-B0 device is described in the data sheet (SNVSA06).

2.2 LP8758-C0: 3-Phase and 1-Phase Regulators Configuration

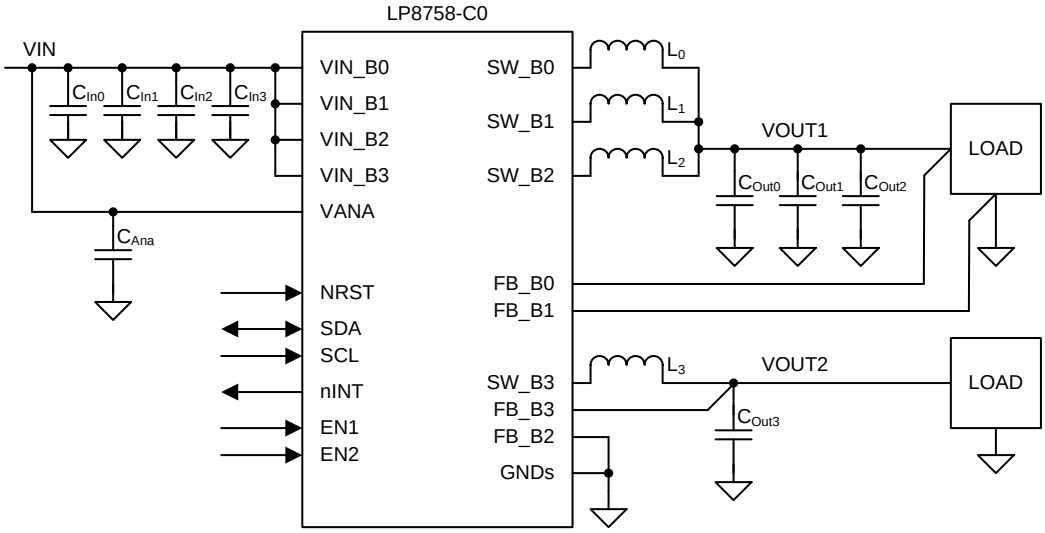

Figure 2. 3-Phase and 1-Phase Configuration

The output voltage of 3-phase output is sensed with differential feedback, VOUT1 sense, and Ground sense.

The output voltage of 1-phase output is sensed with single-ended feedback and VOUT2 sense.

2.3 LP8758-D0: 2-Phase and Two 1-Phase Regulators Configuration

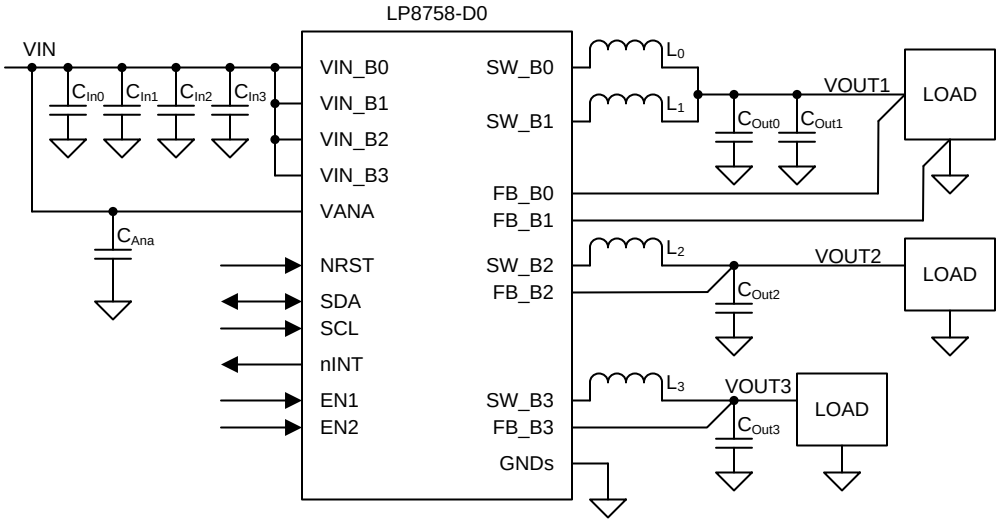

Figure 3. 2-Phase and Two 1-Phase Configuration

The output voltage of 2-phase output is sensed with differential feedback, VOUT1 sense, and Ground sense.

The output voltages of 1-phase outputs are sensed with single-ended feedbacks, VOUT2 sense, and VOUT3 sense.

2.4 LP8758-E0: Four 1-Phase Regulators Configuration

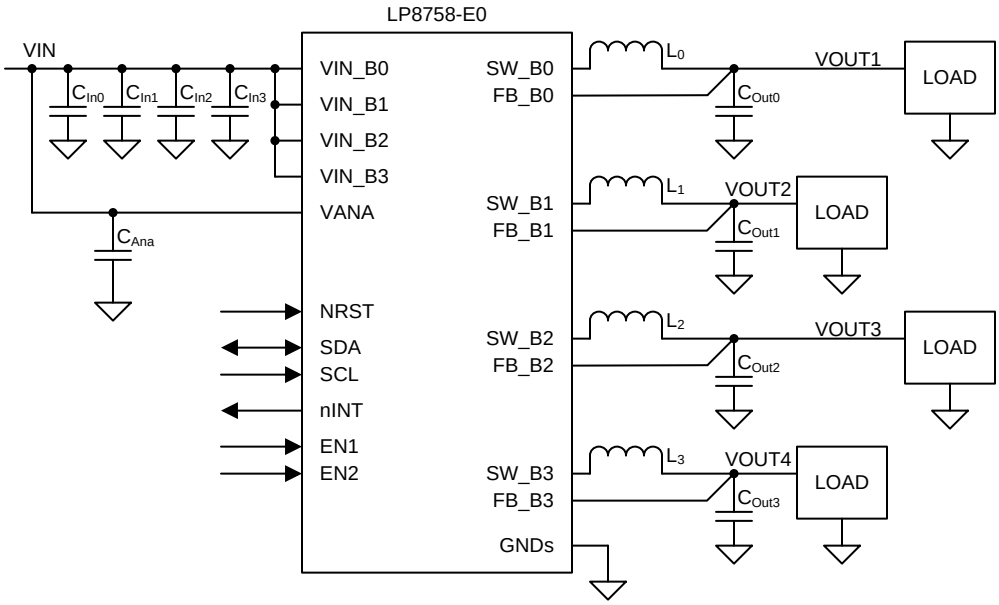

Figure 4. Four 1-Phase Configuration

The output voltages are sensed with single-ended feedbacks.

2.5 LP8758-F0: Two 2-Phase Regulators Configuration

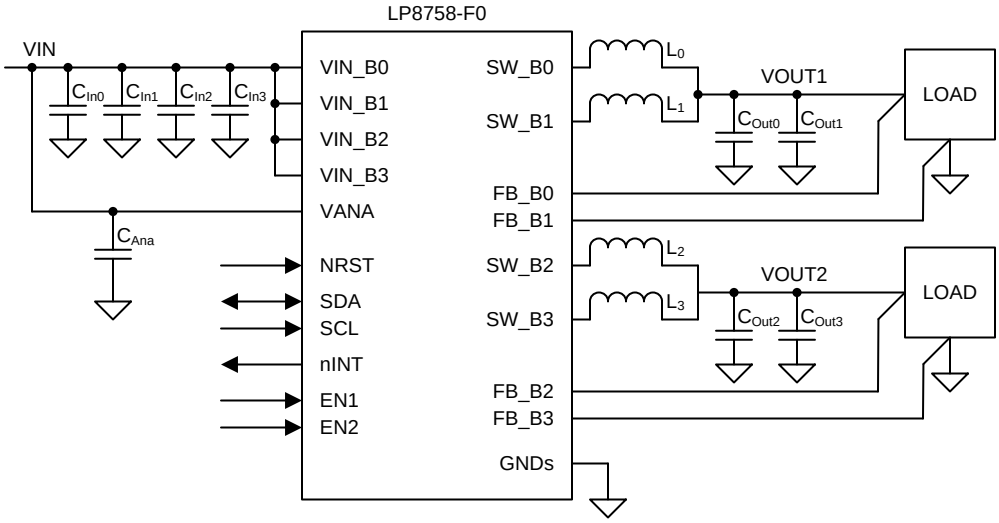

Figure 5. Two 2-Phase Configuration

The output voltages are sensed with differential feedbacks, VOUT sense, and Ground sense.

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