ARC1C0608/ARC1C0605

Document Category: Product Brief

High-efficiency LED Backlight Driver

General Description

The ARC1C0608/ARC1C0605 is an ultra-high efficiency DC-DC converter solution with integrated programmable current sinks that drive up to six strings of LEDs. The ARC1C0608/ARC1C0605 integrates all MOSFETs and their control and driver circuitry. With a proprietary architecture, the ARC1C0608 provides the highest efficiency (>93%) possible in a compact WLCSP-35 package. The 0.4 mm pitch and high switching frequency enables a small solution size aligned to the needs of the newest mobile products.

Features

- Synchronous DC-DC converter with integrated FETs
- Single-cell Li-Ion battery input voltage: 2.7V to 5.5V
- Patented architecture for ultra-high LED efficiency, above 90% over most of the operating range
- Integrated output disconnect switch
- Up to 30V output for maximum flexibility in assignment of LEDs to strings and selection of LED forward voltage
- 12 bits hybrid (mixed) linear dimming mode and 10 bits logarithmic mapping
- Up to 12 bits resolution with DC or PWM dimming
- LED brightness ramp up/down control with programmable ramp rate and linear/logarithmic ramp profiles
- Phase-shifted PWM dimming among active strings to minimize audible noise
- 1 MHz I²C 6.0-compatible serial interface to program the brightness, or an external resistor on ISET to set the maximum brightness
- External PWM input for fine dimming resolution
- Six independently enabled current sinks, up to 25 mA per current sink
- +/-0.8% max/min current sink matching accuracy at 25 mA
- Wide range of input and output voltages with 3x/2x charge pump ratio
- Selectable boost switching frequency from 320 KHz to 3.4 MHz
- Extensive fault protection including boost over-current protection, output short circuit protection, output over-voltage protection, LED open and short protection, and thermal shutdown

Typical Applications

- Low-profile point-of-load (POL) regulators
- Optical modules
- Core supplies
- ASICs
- FPGA

Efficiency

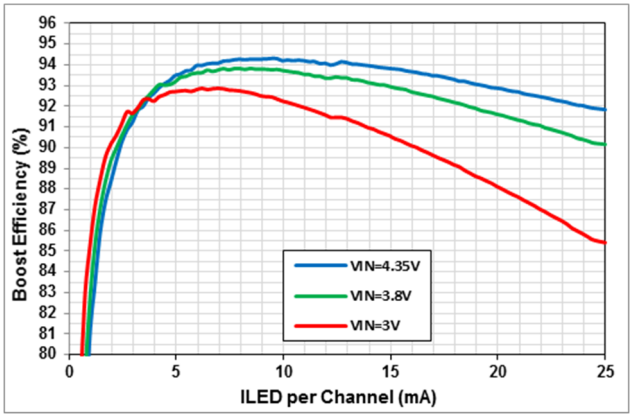

Figure 1. Efficiency Plot of Single Device

Simplified Application

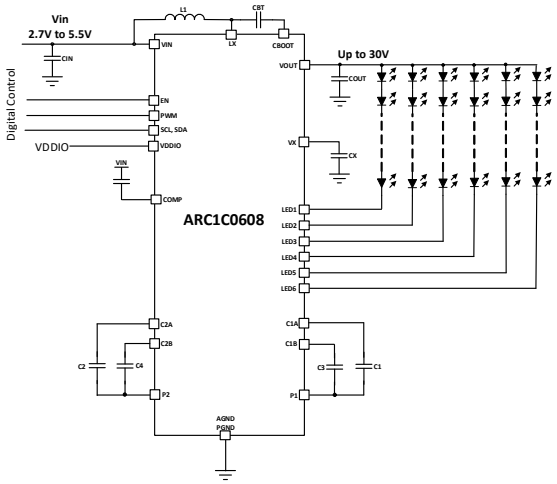

Figure 2. Typical Applications Circuit

Application Schematics

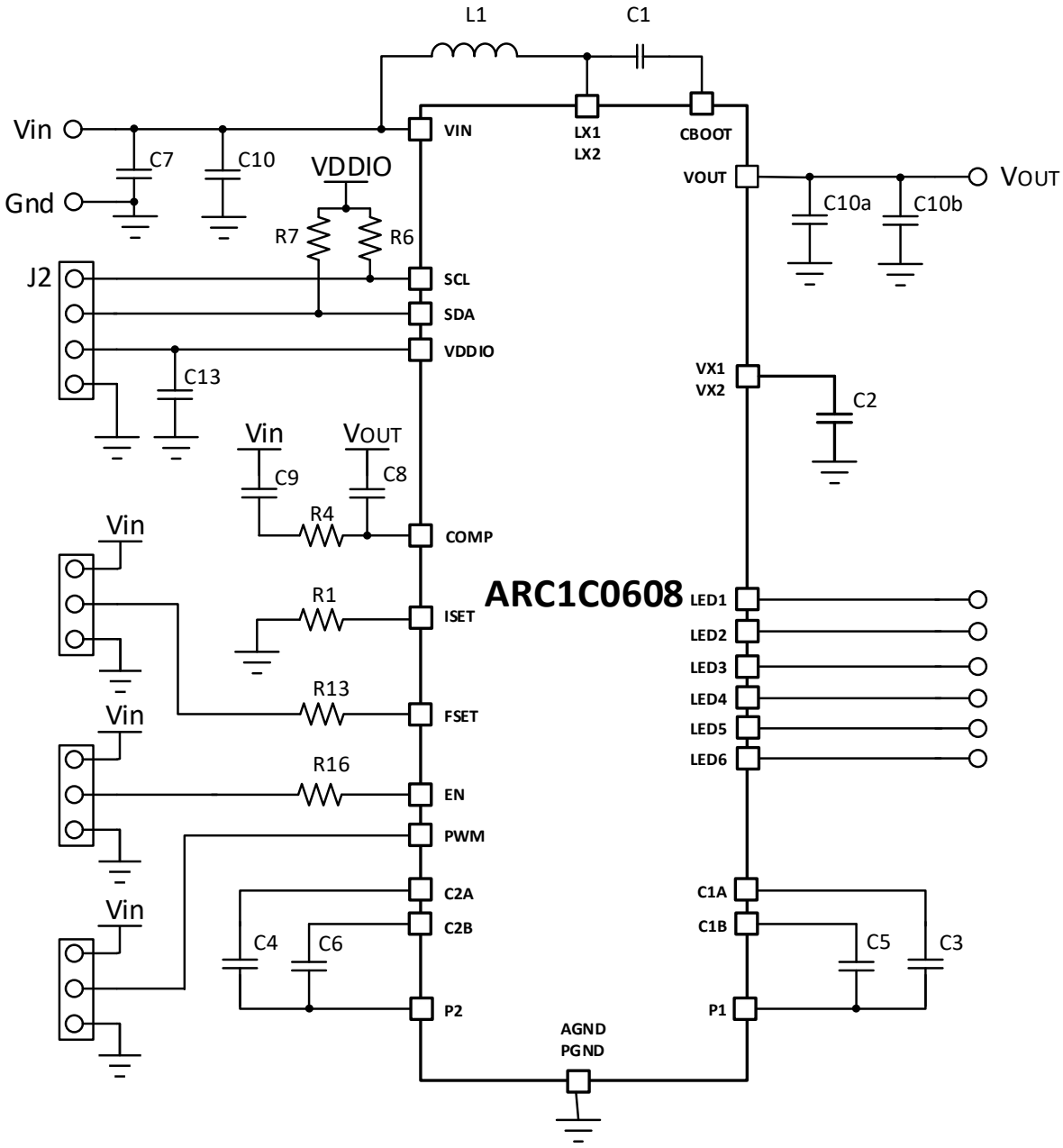

Figure 3. Detailed Application Schematic for 3x Charge Pump Ratio

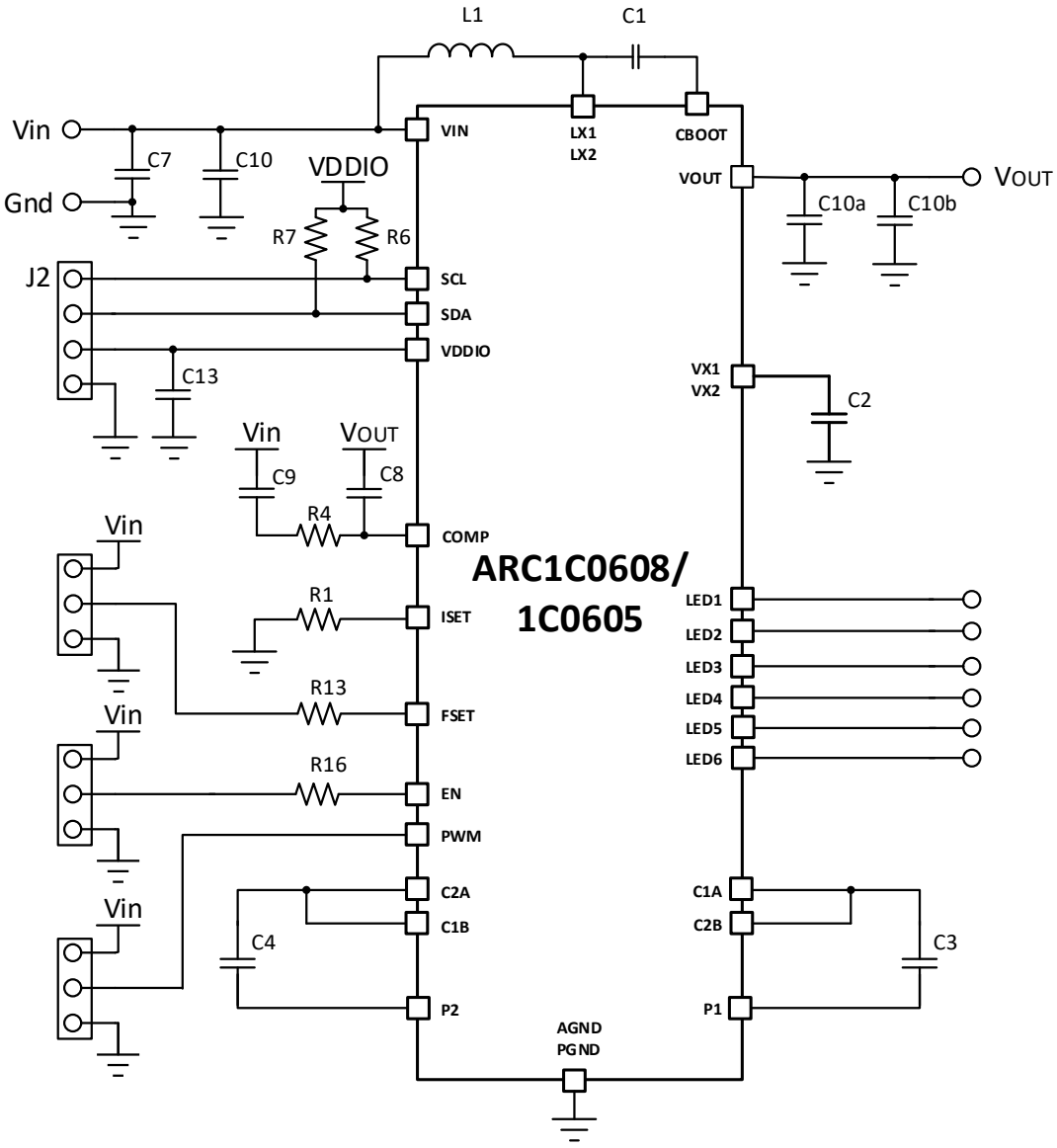

Figure 4. Detailed Application Schematic for 2x Charge Pump Ratio

Recommended BOM Lists

Table 1. Recommended BOM List for 3x Charge Pump Ratio (Figure 3)

Component Name	Value	Part Size (Imperial Unless Otherwise Specified)	Manufacturer's Part Number
C1	22 nF 50V X7R	0402	GRM155R71H223KA12D
C2	470 nF 25V X5R	0402	GRM155R61E474KE01
C3	2.2 µF 16V X5R	0603	GRM188R61C225KAAD
C4	2.2 µF 16V X5R	0603	GRM188R61C225KAAD
C5	4.7 µF 35V X5R	0603	GRM188R6YA475KE15
C6	4.7 µF 35V X5R	0603	GRM188R6YA475KE15
C7 (1)	1.0 µF 16V X5R	0603	GRM188R61C105KA12D
C8	47 pF 50V C0G	0201	GRM0335C1H470JA01
C9	15 nF X5R	0201	GRM033R61C153KE84D
C10a. C10b	4.7 µF 35V	0603	GRM188R6YA475KE15
L1	6.8 µH 1.2 mm max height	3.2 mm × 2.5 mm	DFE322512F-6R8M
R4	20k Ohms	0201	Generic
U1	ARC1C0608	WLCSP-35	ARC1C06081W

Table 2. Recommended BOM List for 2x Charge Pump Ratio (Figure 4)

Component Name	Value	Part Size (Imperial Unless Otherwise Specified)	Manufacturer's Part Number
C1	22 nF 50V X7R	0402	GRM155R71H223KA12D
C2	470 nF 25V X5R	0402	GRM155R61E474KE01
C3	4.7 µF 35V X5R	0603	GRM188R6YA475KE15
C4	4.7 µF 35V X5R	0603	GRM188R6YA475KE15
C7 (1)	1.0 µF 16V X5R	0603	GRM188R61C105KA12D
C8	47 pF 50V C0G	0201	GRM0335C1H470JA01
C9	15 nF X5R	0201	GRM033R61C153KE84D
C10a. C10b	4.7 µF 35V	0603	GRM188R6YA475KE15
L1	6.8 µH 1.2mm max height	3.2 mm x 2.5 mm	DFE322512F-6R8M
R4	20k Ohms	0201	Generic
U1	ARC1C0605	WLCSP-35	ARC1C06051W

Ordering Information

Information for ordering the ARC1C0608 and ARC1C0605 devices is available in the following table.

Table 3. Order Codes

Ta	Package	Non-I²C Mode Charge Pump Ratio Setting	Orderable Device Number	Pins	Transport Media	Minimum Order Quantity
-40....+85°C	WLCSP	3x	ARC1C06081W-R	35	Large tape-and-reel	5000
			ARC1C06081W-V		Small tape-and-reel	250
			ARC1C06081W-G		Sample waffle tray	10
		2x	ARC1C06051W-R[1]		Large tape-and-reel	5000
			ARC1C06051W-V[1]		Small tape-and-reel	250
			ARC1C06051W-G[1]		Sample waffle tray	10

Document Categories

Advance Information

The product is in a formative or design stage. The datasheet contains design target specifications for product development. Specifications and features may change in any manner without notice.

Preliminary Specification

The datasheet contains preliminary data. Additional data may be added at a later date. pSemi reserves the right to change specifications at any time without notice in order to supply the best possible product.

Product Specification

The datasheet contains final data. In the event pSemi decides to change the specifications, pSemi will notify customers of the intended changes by issuing a Customer Notification Form (CNF).

Product Brief

This document contains a shortened version of the datasheet. For the full datasheet, contact sales@psemi.com.

Sales Contact

For additional information, contact Sales at sales@psemi.com.