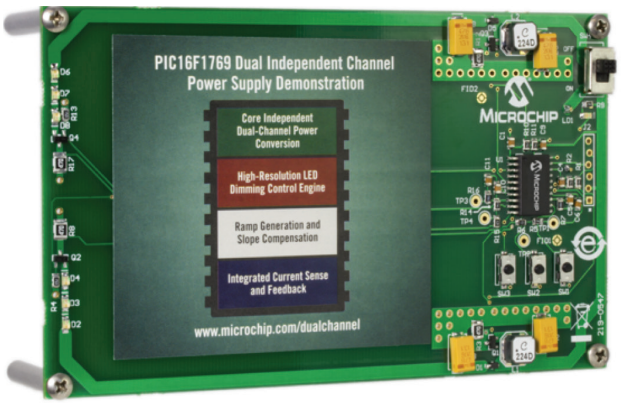
PIC16F1769 Dual Independent Channel Power Supply Demonstration

Summary

The PIC16F1769 Dual Independent Channel Power Supply Demonstration Board showcases the flexible intelligence of Microchip's newest family of PIC® MCUs. The on-chip peripherals can be used to create multiple independent, closed-loop power supply channels. In the demonstration, the PIC16F1769 implements two independent boost power supplies with independent dimming engines. The interconnection of these hardware-based solutions reduces latency, increases system performance, eliminates discrete components and frees the CPU to perform the task of driving the LED array.



Product Highlights

PIC16F1769

- Two op amps
- Programmable Ramp Generator (PRG)
  - Slope compensation
  - Ramp generation
- Four fast comparators
- Digital-to-Analog Converters (DAC)
  - Two 5-bit and two 10-bit DACs
- 10-bit Analog-to-Digital Converter (ADC)
  - Up to 12 channels
- Two Complementary Output Generators (COG)
- Two Data Signal Modules (DSM)
- Three Configurable Logic Cell (CLC)
- Pulse Width Modulations (PWMs): two 10-bit and two 16-bit
- Two high-current drive I/Os: 100 mA capacity
- Zero Cross Detect (ZCD)
- Fixed voltage reference

About the Demonstration

The demonstration utilizes the powerful 20-pin PIC16F1769 MCU to enable all required functions necessary to create two independent closed-loop boost SMPS channels to drive two different LED strings with minimal-to-zero interaction with the CPU. The three modes of operation showcase this capability, highlighting cost-effective solution and a flexible platform for creating a variety of power supply and LED lighting applications.

The MCU drives two independent channels of LED strings, which are controlled by three push buttons.

Buttons

- **Right (SW1):** Up scroll, increases LED intensity
- **Center (SW2):** Press/hold for two seconds to change the mode
- **Left (SW3):** Down scroll, decreases LED intensity

Modes

- **Mode 0: Off** (center button) – Press button to turn on/off. Hold for two seconds to change to Mode 1.
- **Mode 1: Auto Cycle** – Automatically ramps the dimming of the independent channels of LED strings
  - Right Button – Press to change to Mode 2
  - Center Button – Press/hold for two seconds to turn off
  - Left Button – Press to change to Mode 3
- **Mode 2: Control/Adjust Channel 1** – Adjust dimming of channel 1of LED strings
  - Right Button – Press to increase intensity
  - Center Button – Press to change to Mode 3; hold for two seconds to change to Mode 1
  - Left Button – Press to decrease intensity
- **Mode 3: Control/Adjust Channel 2** – Adjust dimming of channel 2 of LED strings
  - Right Button – Press to increase intensity
  - Center Button – Press to change to Mode 2; hold for two seconds to change to Mode 1
  - Left Button – Press to decrease intensity

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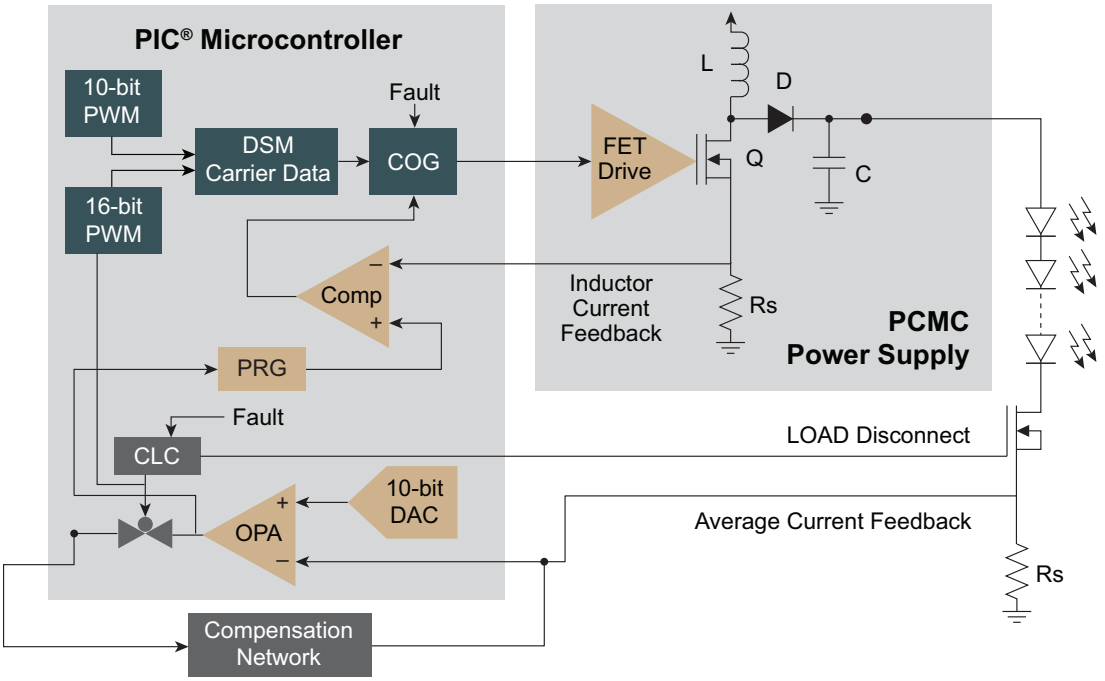
Major Components of the Demonstration

- PIC16F1769 MCU with the following peripherals:
  - Programmable Ramp Generator (PRG)
  - Intelligent Analog: DACs, ADCs, op amps and comparators
  - High-current I/Os: 100 mA
  - Digital peripherals: 10-bit PWM, Complementary Output Generator (COG)
  - Data signal modulator
  - Fixed voltage reference (±4%)
- Discrete boost converter
- Independent Channel #1
  - Three white LEDs (3.3 V, 20 mA)
- Independent Channel #2
  - Three blue LEDs (3.3 V, 20 mA)
- Powered by three AA batteries (4.5V)

Function Enablement: Precision LED Dimming Engine Block Diagram



PIC16(L)F176X Product Family																					
Device	Program Memory Flash (KB)	Program Flash Memory (KW)	High-Endurance Flash (B)	Data SRAM (Bytes)	I/O Pins	8-bit with HLT Timer	16-bit Timer	Comparator	10-bit ADC (ch)	5-/10-bit DAC	Capture/ Compare/PWM	10-/16-bit PWM	COG	CLC	Op Amp	ZCD	PRG	High-Current I/O (100 mA)	Peripheral Pin Select	EUSART	I²C™/SPI	Fixed Voltage Reference
PIC16(L)F1764 XLP	7	4096	128	512	12	1/3	3	2	8	1/1	1	1/1	1	3	1	1	1	2	✓	1	1	1
PIC16(L)F1765 XLP	14	8192	128	1024	12	1/3	3	2	8	1/1	1	1/1	1	3	1	1	1	2	✓	1	1	1
PIC16(L)F1768 XLP	7	4096	128	512	18	1/3	3	4	12	2/2	2	2/2	2	3	2	1	2	2	✓	1	1	1
PIC16(L)F1769 XLP	14	8192	128	1024	18	1/3	3	4	12	2/2	2	2/2	2	3	2	1	2	2	✓	1	1	1

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