AP63205WU-EVM

32V, 2A, Synchronous DC-DC Buck Converter With Enhanced EMI Reduction

DESCRIPTION

The AP63205 is a 2A, synchronous buck converter with a wide input voltage range of 3.8V to 32V and fully integrates a 125mΩ high-side power MOSFET and a 68mΩ low-side power MOSFET to provide high-efficiency step-down DC-DC conversion.

The AP63205 device is used by minimizing the external component count due to its adoption of peak current mode control along with its integrated compensation network.

The AP63205 is a fixed output buck converter with Electromagnetic Interference (EMI) reduction. The converter features Frequency Spread Spectrum (FSS) with a switching frequency jitter of ±6%, which reduces EMI by not allowing emitted energy to stay in any one frequency for a significant period of time. It also has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which further reduces high-frequency radiated EMI noise caused by MOSFET switching.

The device is available in a low-profile, TSOT26 package.

FEATURES

- VIN 3.8V to 32V
- 2A Continuous Output Current
- 0.8V ± 1% Reference Voltage
- 22μA Ultralow Quiescent Current (Pulse Frequency Modulation)
- 1.1MHz Switching Frequency
- Supports Pulse Frequency Modulation (PFM) and Pulse Width Modulation (PWM)
- Proprietary Gate Driver Design for Best EMI Reduction
- Frequency Spread Spectrum (FSS) to Reduce EMI
- Low-Dropout (LDO) Mode
- Precision Enable Threshold to adjust UVLO
- Protection Circuitry
  - Undervoltage Lockout (UVLO)
  - Cycle-by-Cycle Peak Current Limit
  - Thermal Shutdown

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FUNCTIONAL BLOCK

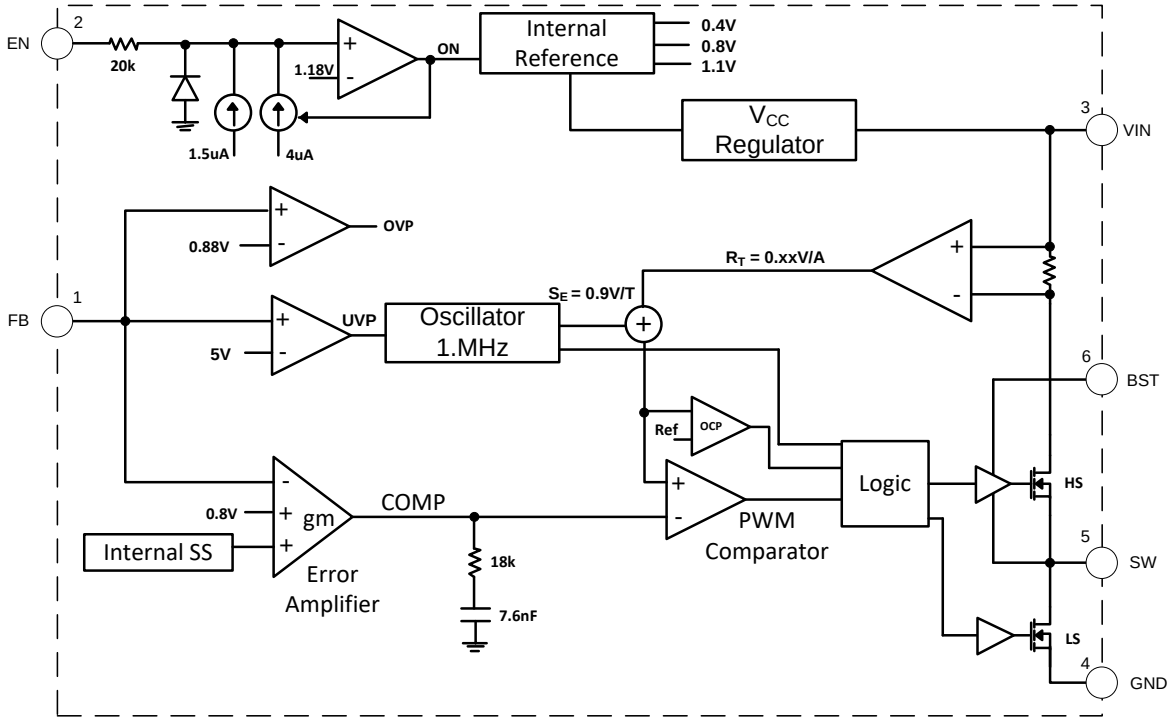

Figure 1. Functional Block Diagram

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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VIN	Supply Voltage	-0.3 to +35.0 (DC)	V
		-0.3 to +40.0 (400ms)	
V_{SW}	Switch Node Voltage	-1.0 to VIN + 0.3 (DC)	V
		-2.5 to VIN + 2.0 (20ns)	
V_{BST}	Bootstrap Voltage	V_{SW} - 0.3 to V_{SW} + 6.0	V
V_{FB}	Feedback Voltage	-0.3 to +6.0	V
V_{EN}	Enable/UVLO Voltage	-0.3 to +35.0	V
T_{ST}	Storage Temperature	-65 to +150	°C
T_J	Junction Temperature	+150	°C
T_L	Lead Temperature	+260	°C
ESD Susceptibility			
HBM	Human Body Mode	2000	V
CDM	Charge Device Model	1000	V

RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Min	Max	Unit
VIN	Supply Voltage	3.8	32	V
T_A	Operating Ambient Temperature Range	-40	+85	°C
T_J	Operating Junction Temperature Range	-40	+125	°C

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EVALUATION BOARD

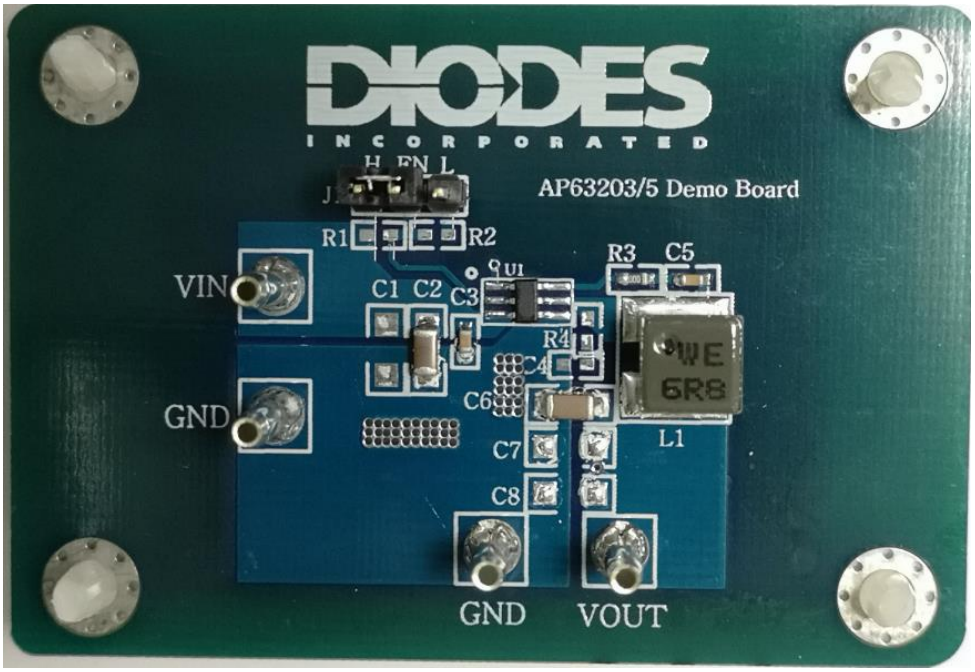

Figure 2. AP63205WU-EVM

QUICK START GUIDE

The AP63205WU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP63205WU, follow the procedure below:

1. For evaluation board configured at V_{OUT}=5.0V, connect a power supply to the input terminals V_{IN} and GND. Set V_{IN} to 12V.
2. Connect the positive terminal of the electronic load to V_{OUT} and negative terminal to GND.
3. For Enable, place a jumper to “H” position to enable IC. Jump to “L” position to disable IC.
4. The evaluation board should now power up with a 5.0V output voltage.
5. Check for the proper output voltage of 5.0V (±1%) at the output terminals V_{OUT} and GND. Measurement can also be done with a multimeter with the positive and negative leads between V_{OUT} and GND.
6. Set the load to 2A through the electronic load. Check for the stable operation of the SW signal on the oscilloscope. Measure the switching frequency.

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MEASUREMENT/PERFORMANCE GUIDELINES:

1) When measuring the output voltage ripple, maintain the shortest possible ground lengths on the oscilloscope probe. Long ground leads can erroneously inject high frequency noise into the measured ripple.

2) For efficiency measurements, connect an ammeter in series with the input supply to measure the input current. Connect an electronic load to the output for output current.

SETTING OUTPUT VOLTAGE:

Setting the output voltage

The AP63205 is a fixed output buck converter with an output voltage of 5V. The VFB pin is connected directly to the output as illustrated in the below schematic:

EVALUATION BOARD SCHEMATIC

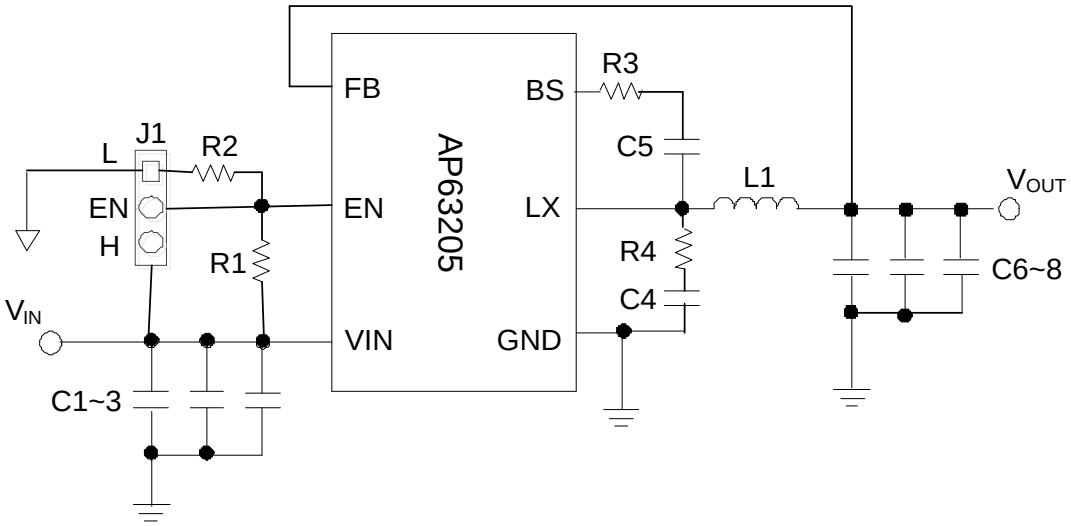

Figure 3. AP63205WU-EVM Schematic

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BILL OF MATERIALS for AP63205WU-EVM (V_{OUT}=5.0V)

Item	Value	Type	Rating	Description	Description
C2	10µF	X5R/X7R, Ceramic/1206	35V	Input CAP	
C3	0.1µF	X5R/X7R, Ceramic/0603	50V	Input CAP	Würth PART 885 012 206 095
C4	100pF	0603	100V	Feedback CAP	Würth PART 885 012 206 102
C5	0.1µF	X5R/X7R, Ceramic/0603	50V	Bootstrap CAP	Würth PART 885 012 206 095
C6 & C7	22µF	X5R/X7R, Ceramic/1206	25V	Output CAP	
L1	6.8µH	6060	5.0A	Inductor	Würth PART 744 393 460 68
R3	0	0603	1%	Bootstrap RES	
U1		AP63205WU		TSOT26	Diodes Incorporated

TYPICAL PERFORMANCE CHARACTERISTICS

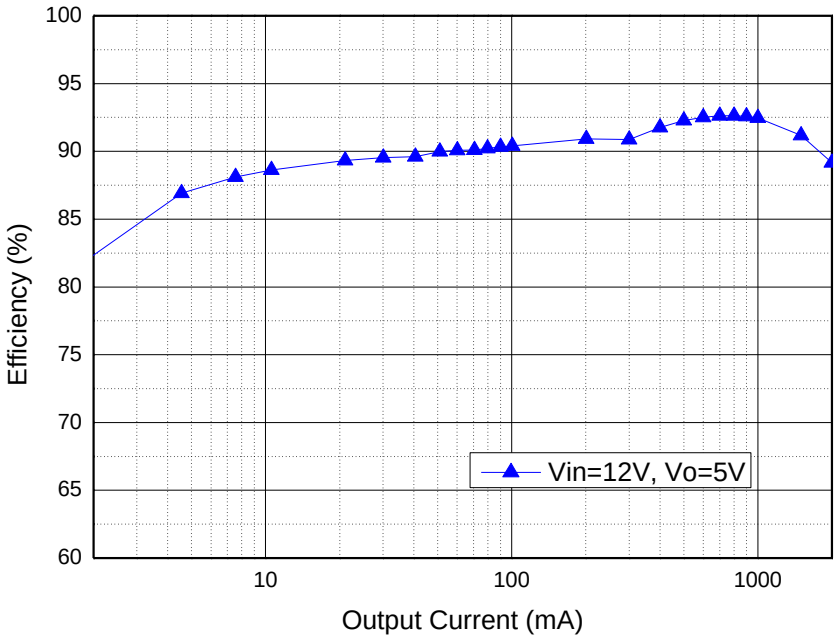

Figure 4. Efficiency for VIN=12V, VOUT= 5.0V

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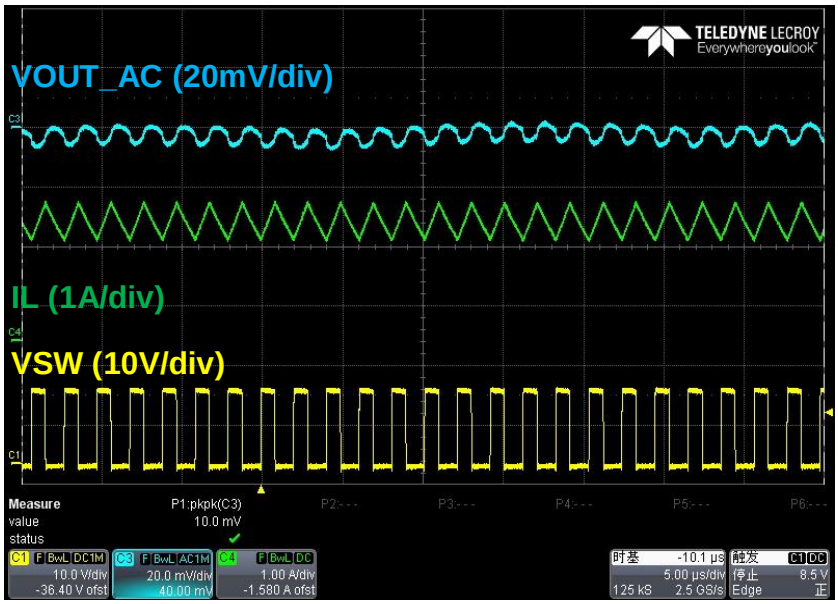

5µS/div

Figure 5. Output Ripple for VIN=12V, VOUT=5.0V, IOUT=2A

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