

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 $\pm 6\%$, 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 \pm 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

FUNCTIONAL BLOCK

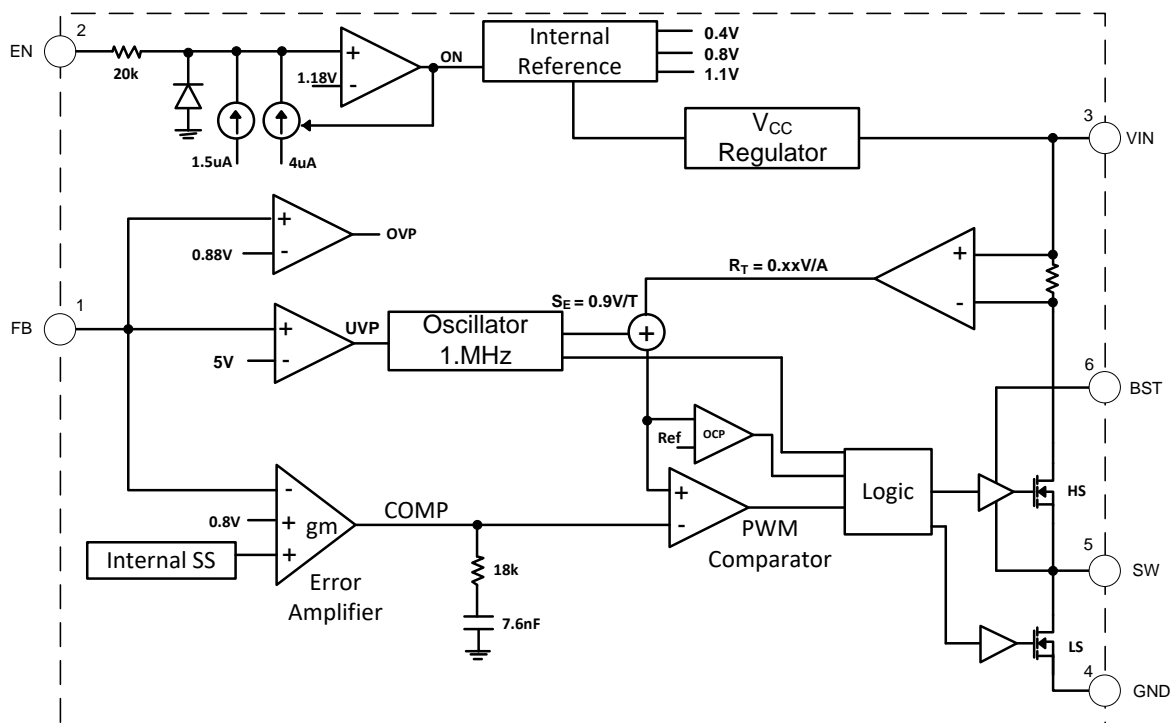


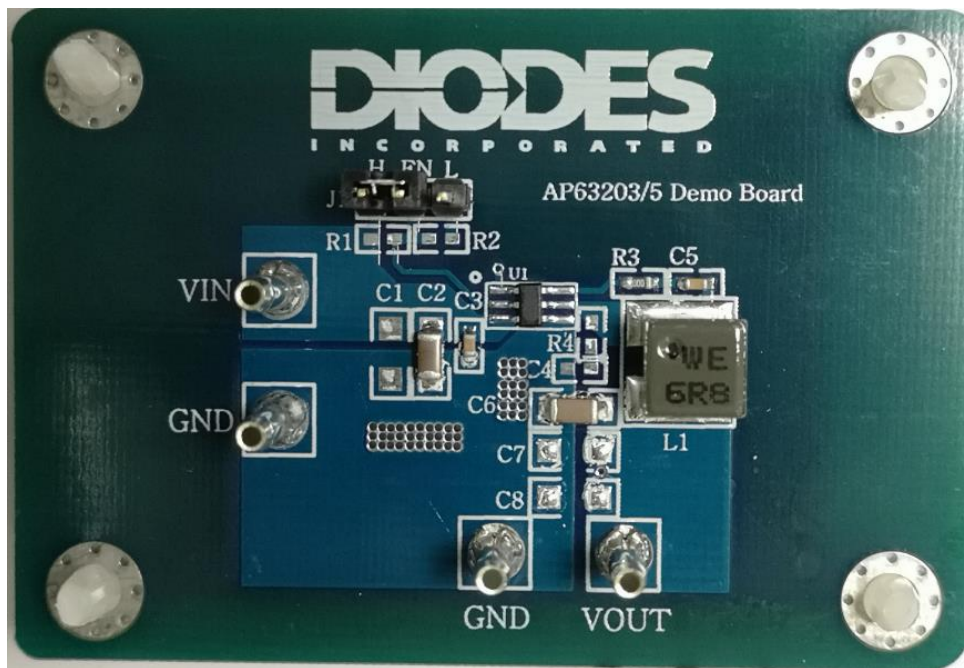
Figure 1. Functional Block Diagram

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

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 ($\pm 1\%$) 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.

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:

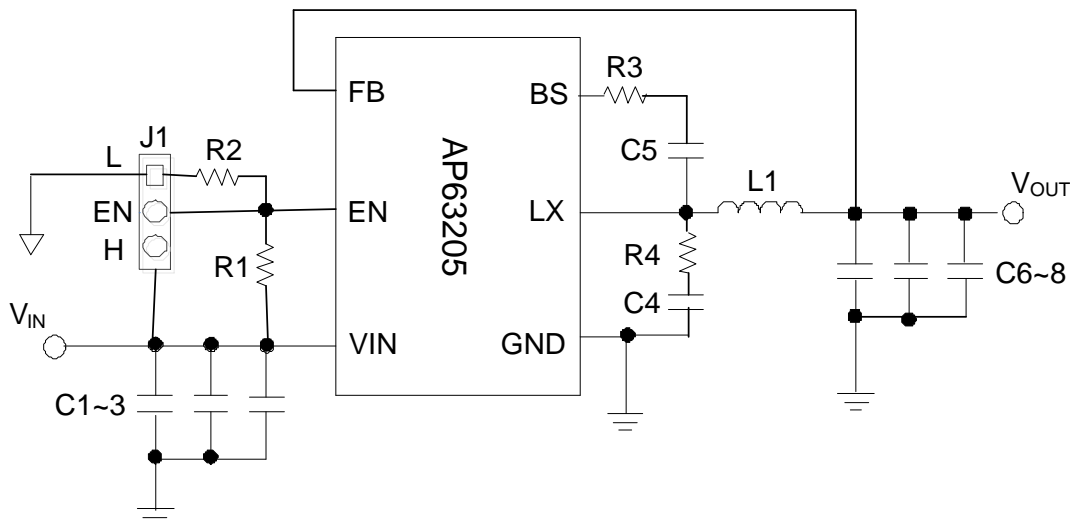
EVALUATION BOARD SCHEMATIC


Figure 3. AP63205WU-EVM Schematic

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

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

TYPICAL PERFORMANCE CHARACTERISTICS

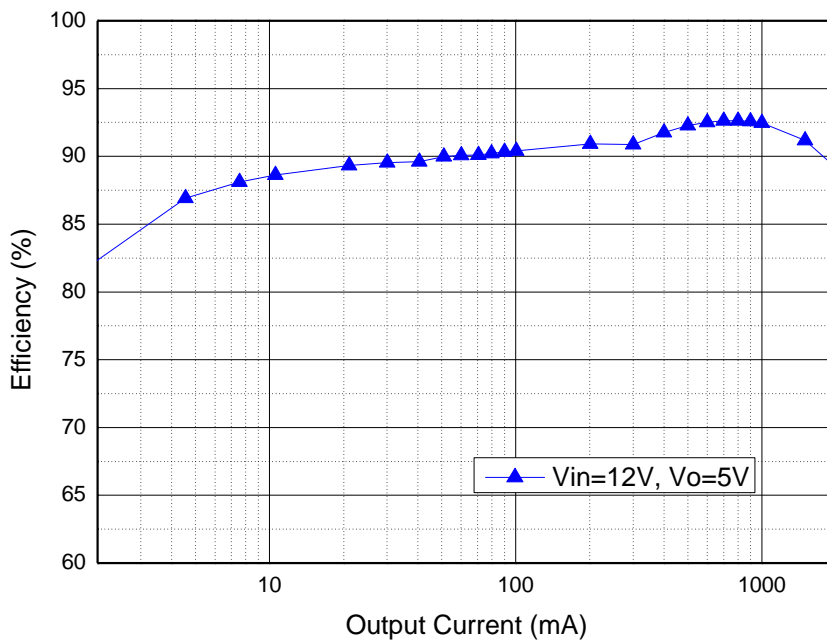


Figure 4. Efficiency for $V_{IN}=12V$, $V_{OUT}= 5.0V$

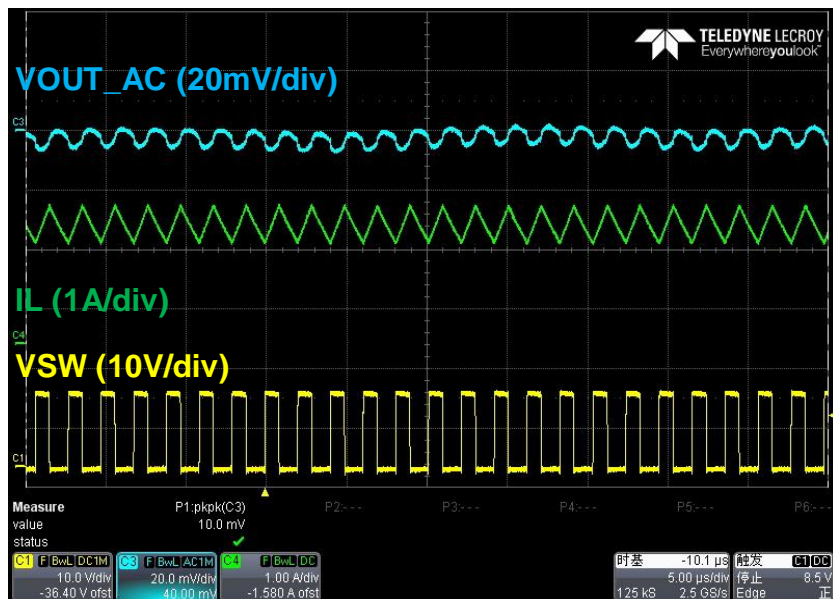


Figure 5. Output Ripple for VIN=12V, VOUT=5.0V, IOUT=2A

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

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