

**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 easily 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 fixed output buck converters 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
- 22 $\mu$ A 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

### APPLICATIONS

- 12V and 24V Distributed Power Bus Supplies
- Flat Screen TV Sets and Monitors
- Power Tools and Laser Printers
- White Goods and Small Home Appliances
- FPGA, DSP, and ASIC Supplies
- Home Audio
- Network Systems
- Set Top Boxes
- Gaming Consoles
- Consumer Electronics

### FUNCTIONAL BLOCK

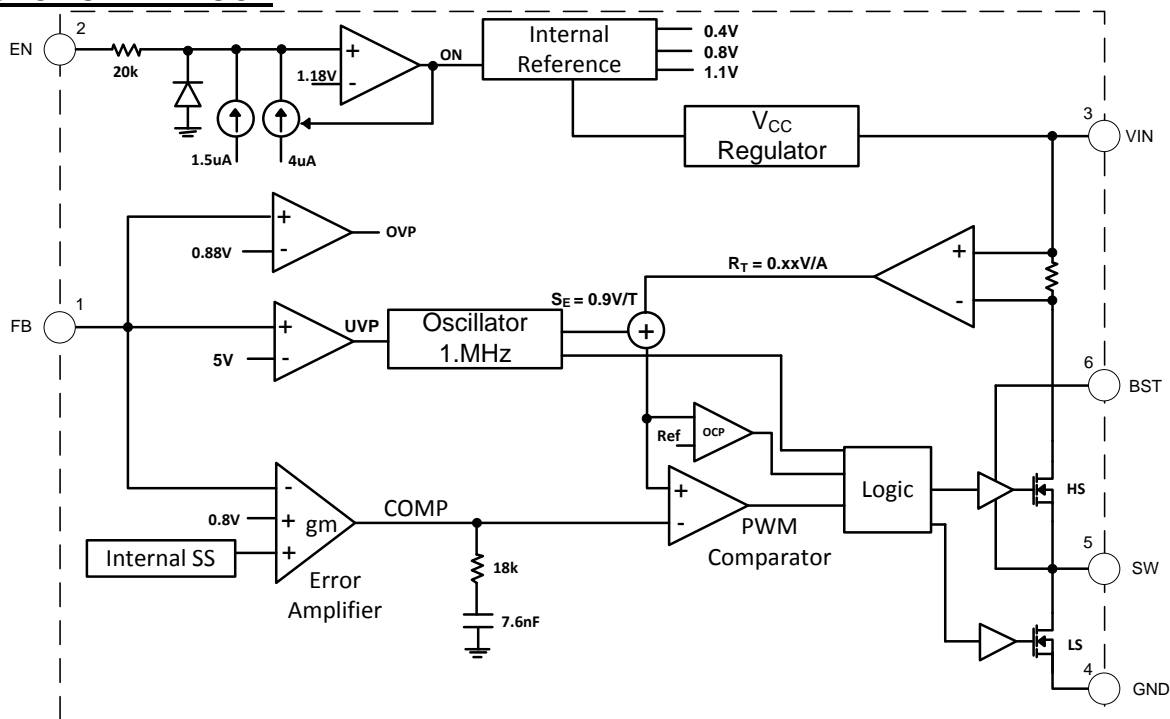


Figure 1. Functional Block Diagram

### ABSOLUTE MAXIMUM RATINGS

| Symbol          | Parameter           | Rating                 | Unit |
|-----------------|---------------------|------------------------|------|
| VIN             | Supply Voltage      | -0.3 to +35.0 (DC)     | V    |
|                 |                     | -0.3 to +40.0 (400ms)  |      |
| V <sub>SW</sub> | Switch Node Voltage | -1.0 to VIN + 0.3 (DC) | V    |

|                           |                      |  |    |
|---------------------------|----------------------|--|----|
|                           |                      | -2.5 to VIN + 2.0 (20ns)                       |    |
| V <sub>BST</sub>          | Bootstrap Voltage    | V <sub>SW</sub> - 0.3 to V <sub>SW</sub> + 6.0 | V  |
| V <sub>FB</sub>           | Feedback Voltage     | -0.3 to +6.0                                   | V  |
| V <sub>EN</sub>           | Enable/UVLO Voltage  | -0.3 to +35.0                                  | V  |
| T <sub>ST</sub>           | Storage Temperature  | -65 to +150                                    | °C |
| T <sub>J</sub>            | Junction Temperature | +150   | °C |
| T <sub>L</sub>            | Lead Temperature     | +260   | °C |
| <b>ESD Susceptibility</b> |                      |  |    |
| HBM                       | Human Body Mode      | 2000   | V  |
| CDM                       | Charge Device Model  | 1000   | V  |

### RECOMMENDED OPERATING CONDITIONS

| Symbol          | Parameter                            | Min | Max  | Unit |
|-----------------|--------------------------------------|-----|------|------|
| V <sub>IN</sub> | Supply Voltage                       | 3.8 | 32   | V    |
| T <sub>A</sub>  | Operating Ambient Temperature Range  | -40 | +85  | °C   |
| T <sub>J</sub>  | Operating Junction Temperature Range | -40 | +125 | °C   |

### EVALUATION BOARD

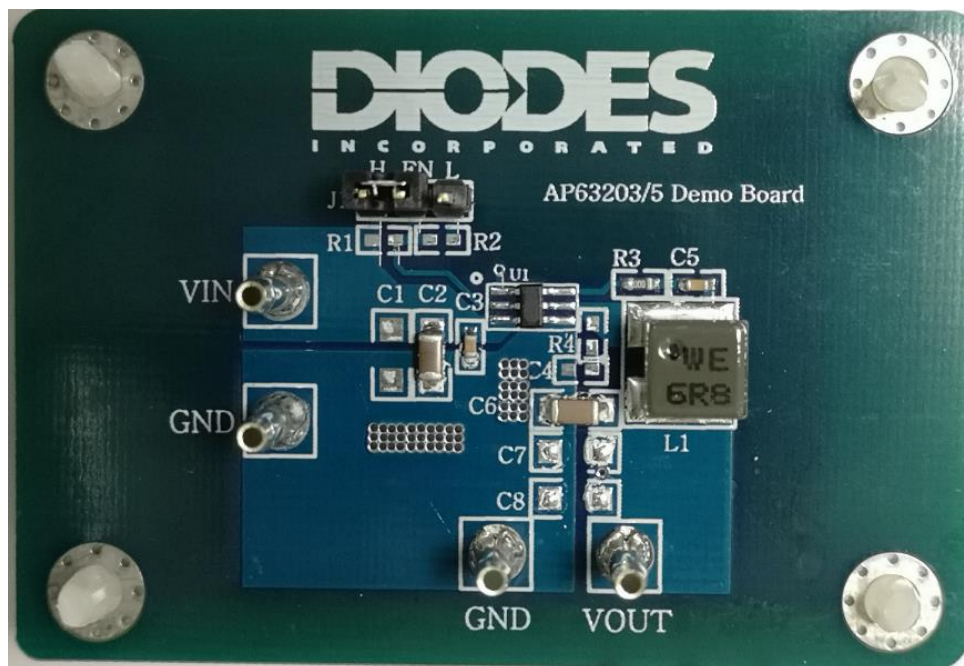


Figure 2. AP63205WU-EVM

**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 fixed output buck converters; the output voltage is 5V. connect VFB pin to output directly as schematic shown,

### EVALUATION BOARD SCHEMATIC

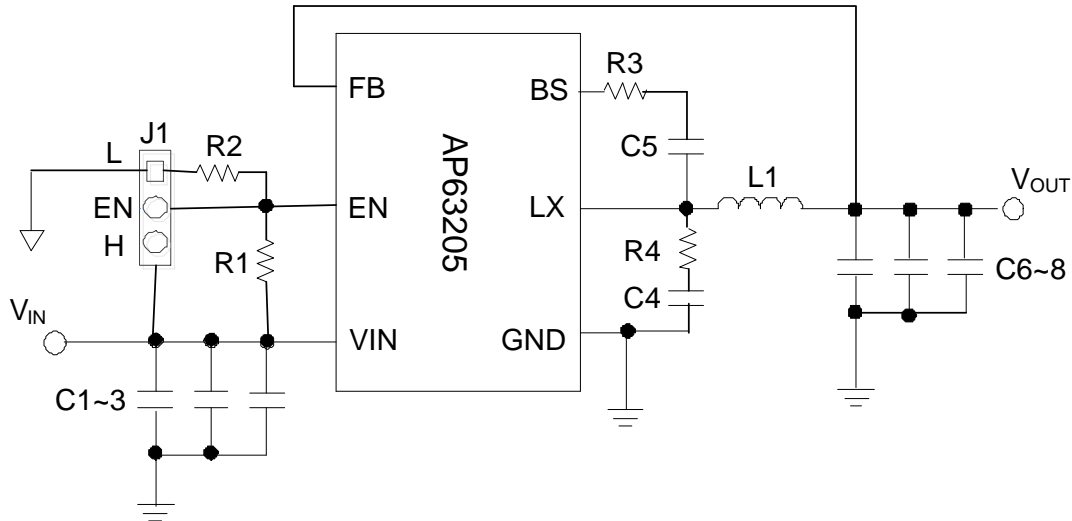


Figure 3. AP63205WU-EVM Schematic

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

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

**TYPICAL PERFORMANCE CHARACTERISTICS**

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

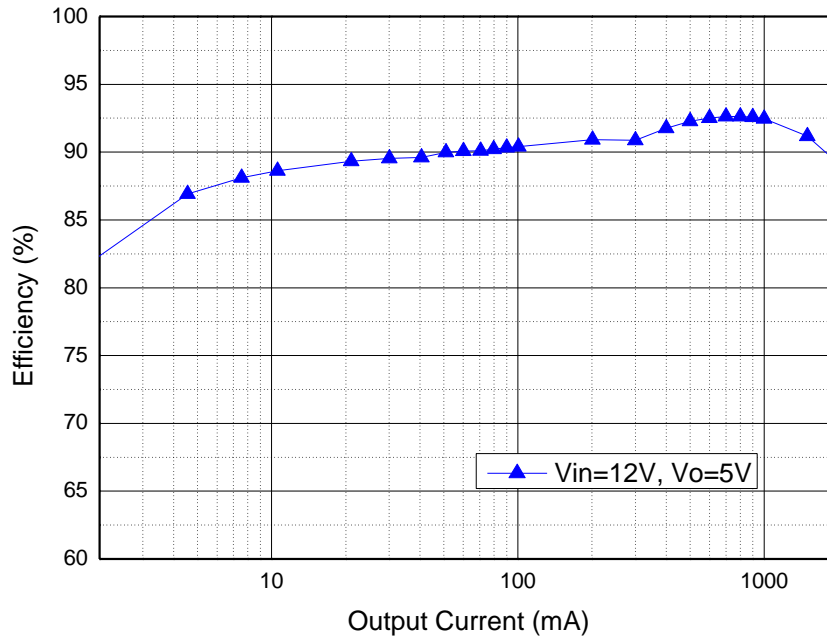
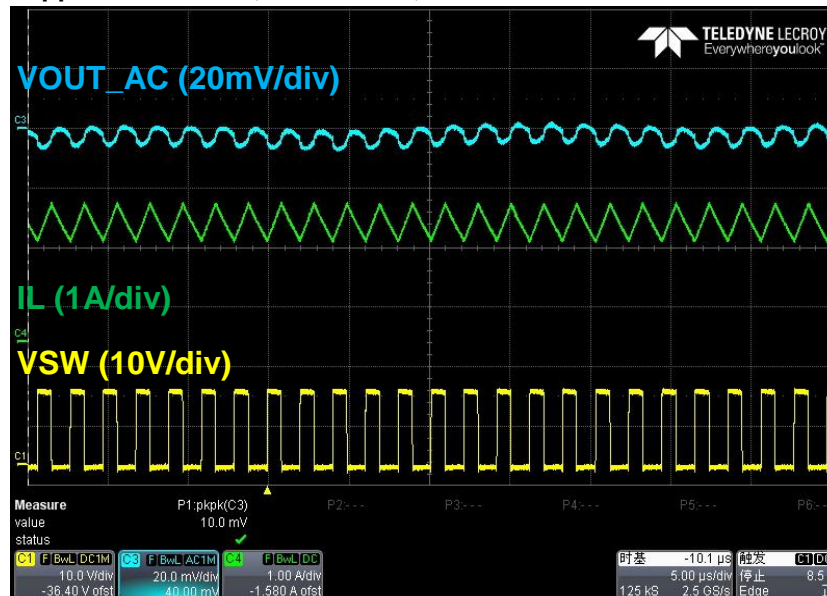


Figure 5. Output Ripple for VIN=12V, VOUT=5.0V, IOUT=2A



5µS/div