

## **DESCRIPTION**

The AP63203Q 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 AP63203Q 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 AP63203Q 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, further reducing high-frequency radiated EMI noise caused by MOSFET switching.

The device is available in the low-profile TSOT26 package.

## **FEATURES**

- VIN 3.8V to 32V
- 2A Continuous Output Current
- 0.8V  $\pm$  1% Reference Voltage
- 22 $\mu$ A Low 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

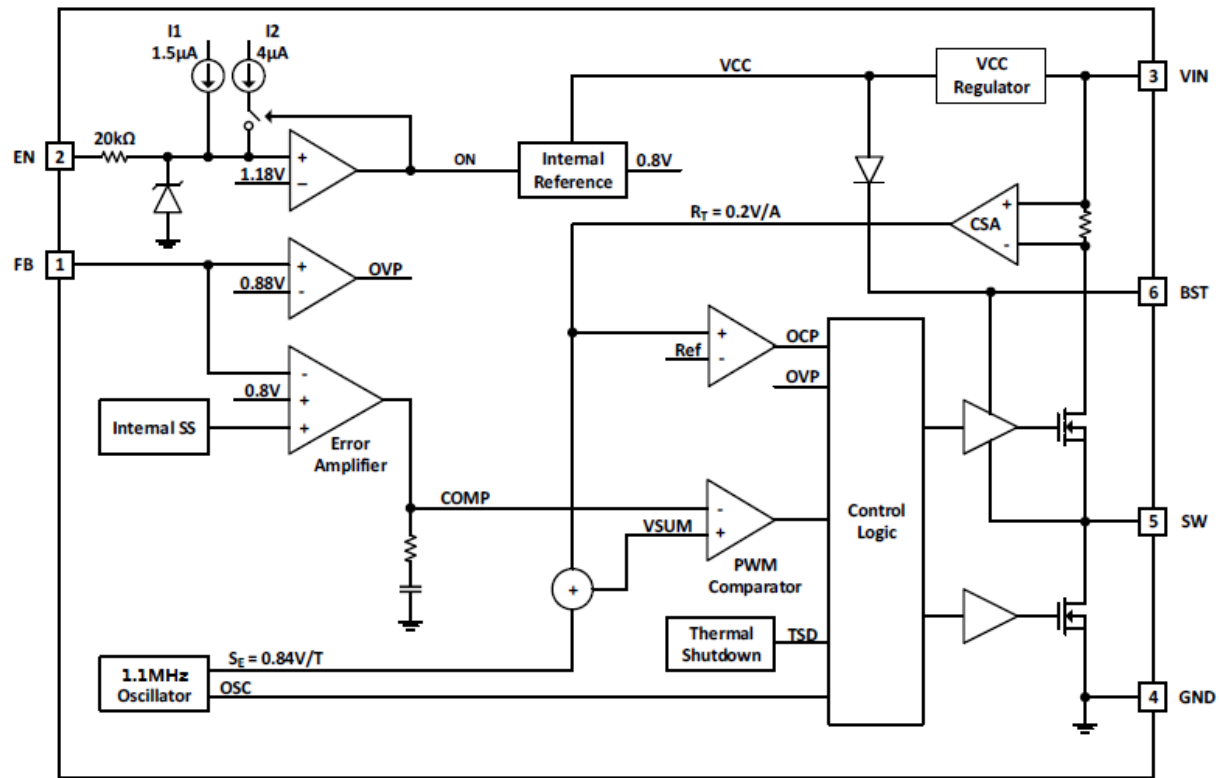


Figure 1. Functional Block Diagram

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VIN	Supply Voltage	-0.3 to +35.0 (DC)	V
		-0.3 to +40.0 (400ms)	
VSW	Switch Node Voltage	-1.0 to VIN + 0.3 (DC)	V
		-2.5 to VIN + 2.0 (20ns)	
VBST	Bootstrap Voltage	VSW - 0.3 to VSW + 6.0	V
VFB	Feedback Voltage	-0.3 to +6.0	V
VEN	Enable/UVLO Voltage	-0.3 to +35.0	V
TST	Storage Temperature	-65 to +150	°C
TJ	Junction Temperature	+150	°C
TL	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 <sub>A</sub>	Operating Ambient Temperature Range	-40	+125	°C
T <sub>J</sub>	Operating Junction Temperature Range	-40	+150	°C

### EVALUATION BOARD

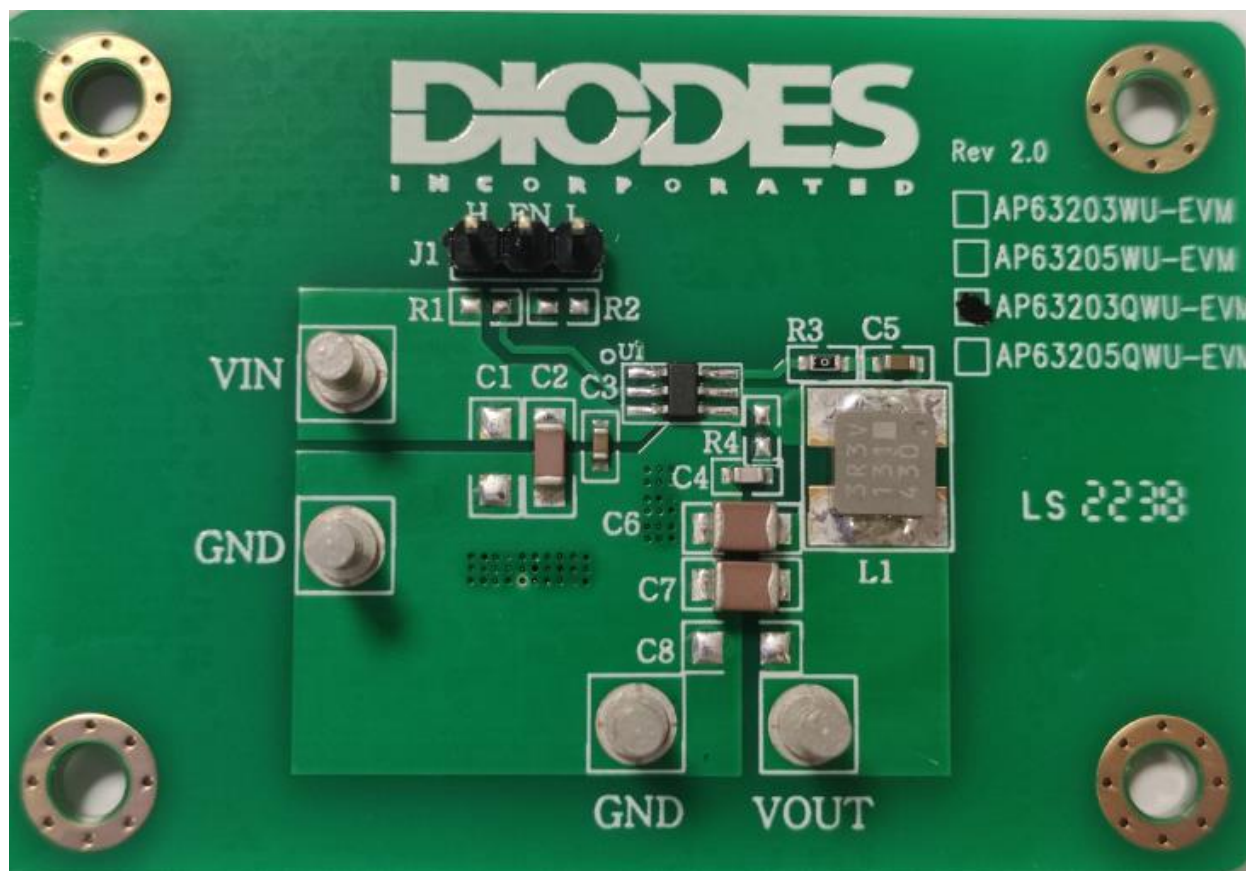


Figure 2. AP63203QWU-EVM

### **QUICK START GUIDE**

The AP63203QWU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP63203QWU, follow the procedure below:

1. For an evaluation board configured at  $V_{OUT}=3.3V$ , 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 3.3V output voltage.
5. Check for the proper output voltage of 3.3V ( $\pm 1\%$ ) 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 AP63203Q is a fixed output buck converter. The output voltage is 3.3V. Connect VFB pin to output directly as schematic shown.

## EVALUATION BOARD SCHEMATIC

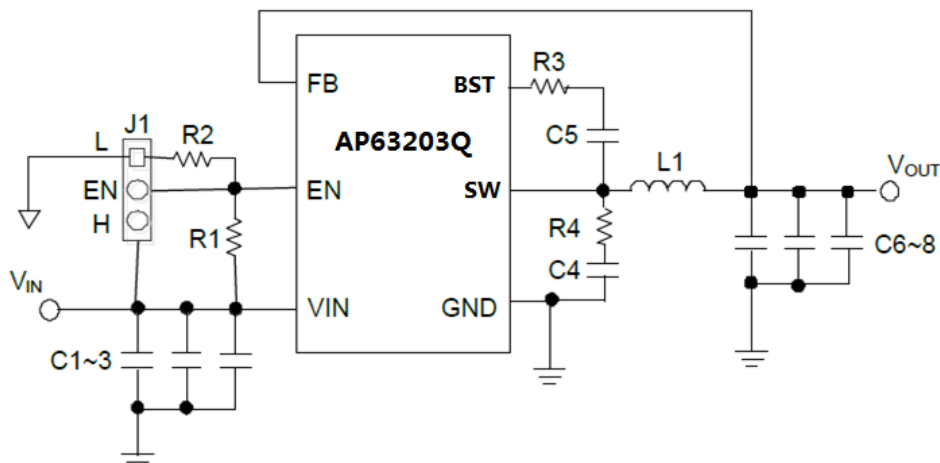


Figure 3. AP63203QWU-EVM Schematic

## BILL OF MATERIALS for AP63203QWU-EVM (VOUT=3.3V)

Item	Value	Type	Rating	Description	Description
C1				Input CAP	open
C2	10Uf	X7R, Ceramic/1206	50V	Input CAP	CGA5L1X7R1H106K160AC
C3	0.1Uf	Ceramic/0603	50V	Input CAP	GCM188L81H104KA57
C4	100pF	Ceramic/0603	100V	Feedback CAP	GCM1885G2A101JA16
C5	0.1Uf	Ceramic/0603	50V	Bootstrap CAP	GCM188L81H104KA57
C6	22Uf	X8L, Ceramic/1206	16V	Output CAP	CGA6P1X8L1C226M250AC
C7	22Uf	X8L, Ceramic/1206	16V	Output CAP	CGA6P1X8L1C226M250AC
C8				Output CAP	open
L1	3.3μH			Inductor	Panasonic ETQP3M3R3KVP
R1					open
R2					open
R3	0	0603	1%	Bootstrap RES	ERJ-3GEY0R00V
R4					open
H EN L				Würth Electronics	61304011121
U1		AP63203QWU		TSOT23-6	Diodes BCD

**TYPICAL PERFORMANCE CHARACTERISTICS**

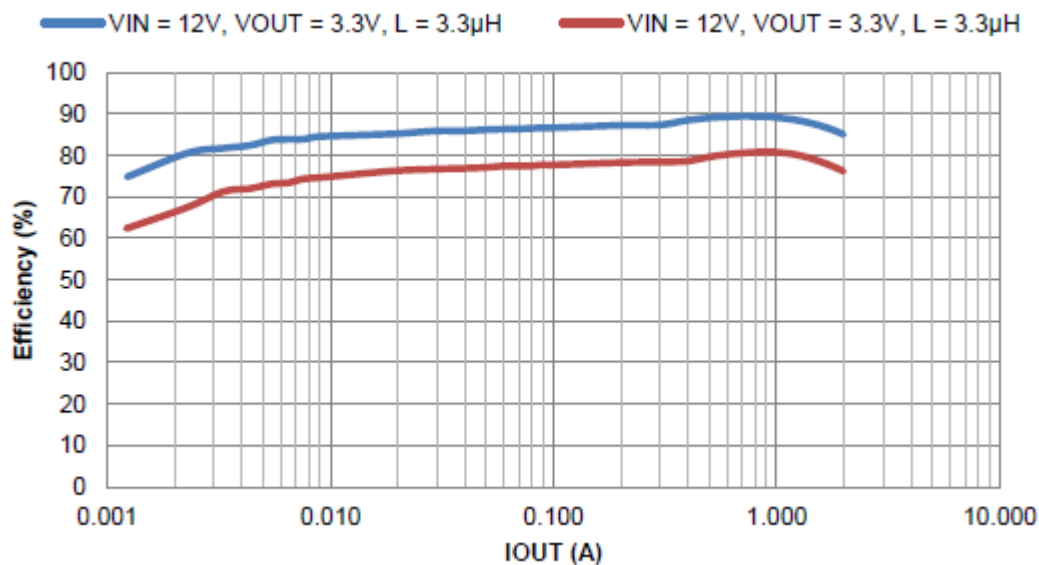


Figure 4. Efficiency vs Output Current

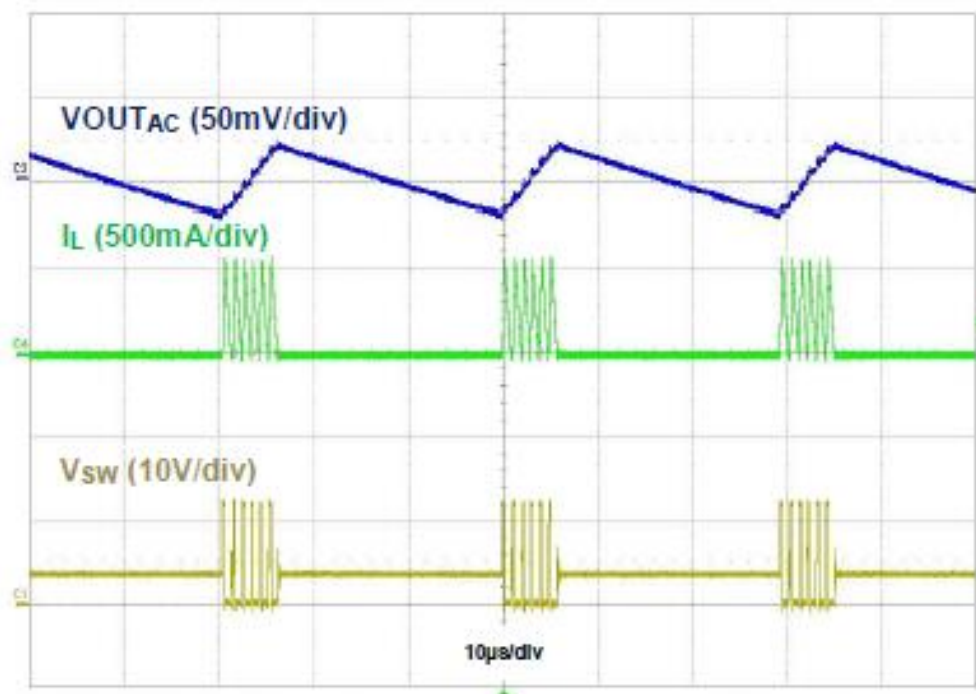


Figure 5. Output Ripple for  $V_{IN} = 12V$ ,  $V_{OUT} = 5.0V$ ,  $I_{OUT} = 50mA$

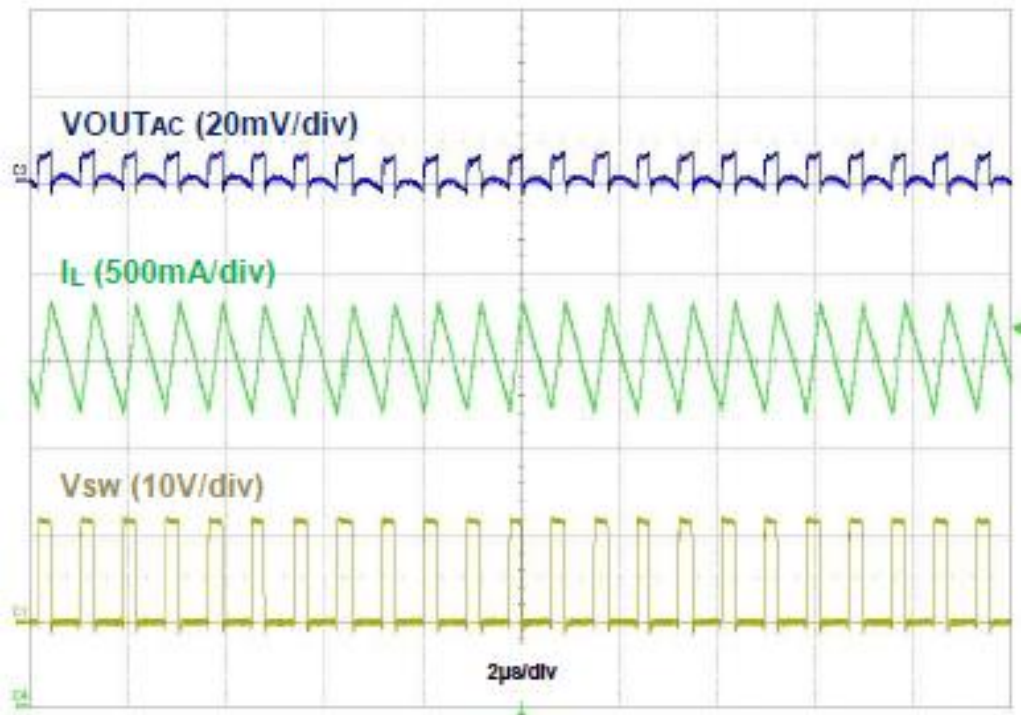


Figure 6. Output Ripple for  $V_{IN}=12V$ ,  $V_{OUT}=5.0V$ ,  $I_{OUT}=2A$



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

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