# AP63203QWU-EVM



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

#### **DESCRIPTION**

The AP63203Q is a 2A, synchronous buck converter with a wide input voltage range of 3.8V to 32V and fully integrates a  $125m\Omega$  high-side power MOSFET and a  $68m\Omega$  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 ±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 ± 1% Reference Voltage
- 22µA 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



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### **FUNCTIONAL BLOCK**

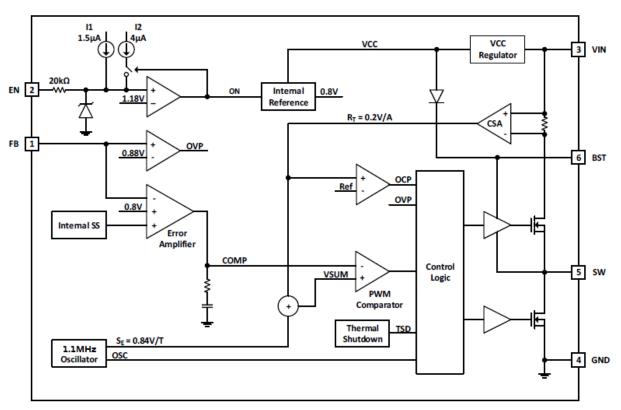


Figure 1. Functional Block Diagram

### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Rating	Unit	
VIN	Supply Voltage	-0.3 to +35.0 (DC)	V	
VIIN	Supply Voltage	-0.3 to +40.0 (400ms)		
$V_{\sf SW}$	Switch Node Voltage	-1.0 to VIN + 0.3 (DC)	V	
V SW	Switch Node Voltage	-2.5 to VIN + 2.0 (20ns)		
V <sub>BST</sub>	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 <sub>ST</sub>	Storage Temperature	-65 to +150	°C	
TJ	Junction Temperature	+150	°C	
T <sub>L</sub>	Lead Temperature	+260	°C	

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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		32	V
T <sub>A</sub>	Operating Ambient Temperature Range	-40	+125	°C
TJ	T <sub>J</sub> Operating Junction Temperature Range		+150	°C

### **EVALUATION BOARD**

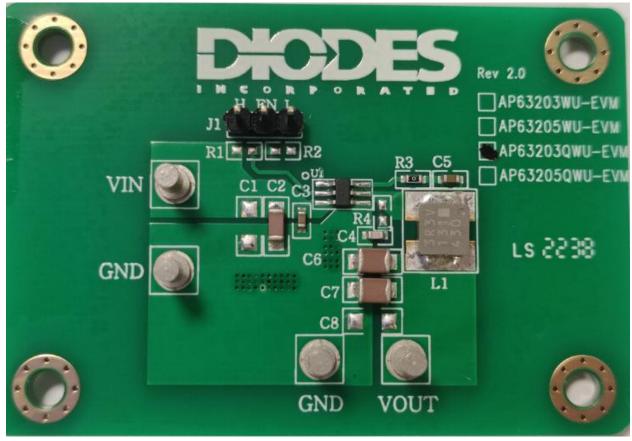


Figure 2. AP63203QWU-EVM

# AP63203QWU-EVM



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#### **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 Vout 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 (±1%) at the output terminals Vou⊤ and GND. Measurement can also be done with a multimeter with the positive and negative leads between Vou⊤ 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.
- 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.



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#### **EVALUATION BOARD SCHEMATIC**

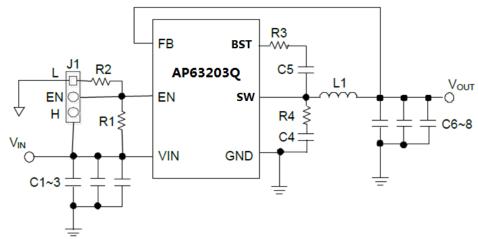


Figure 3. AP63203QWU-EVM Schematic

### 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
СЗ	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
LI	3.5μπ		Inductor		ETQP3M3R3KVP
R1					open
R2					open
R3	0	0603	1%	Bootstrap RES	ERJ-3GEY0R00V
R4					open
HENL				Wurth Electronics	61304011121
U1		AP63203QWU		TSOT23-6	Diodes BCD



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#### **TYPICAL PERFORMANCE CHARACTERISTICS**

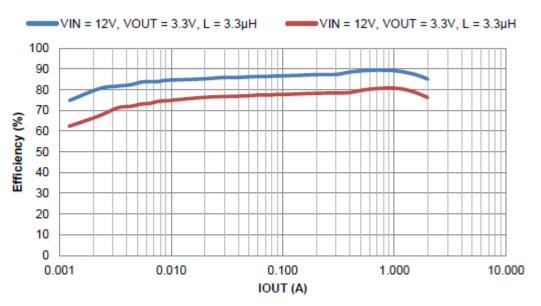


Figure 4. Efficiency vs Output Current

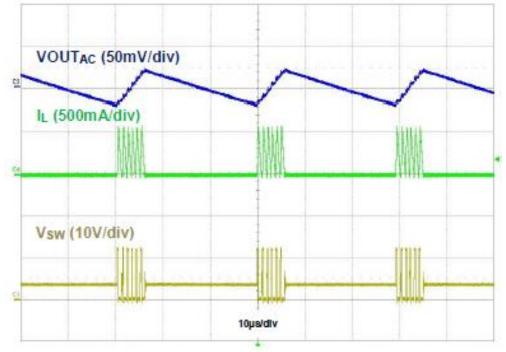


Figure 5. Output Ripple for VIN=12V, VOUT=5.0V, IOUT=50mA



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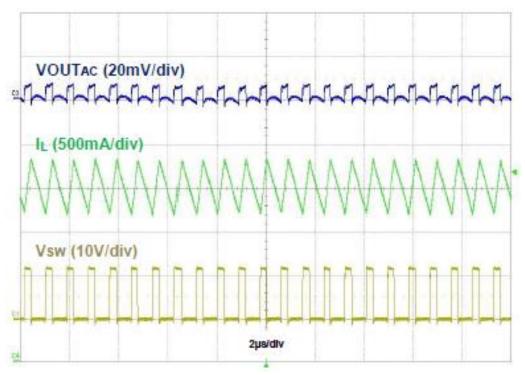


Figure 6. Output Ripple for VIN=12V, VOUT=5.0V, IOUT=2A

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