

DESCRIPTION

The AP72200 is a high current synchronous buck-boost converter providing high efficiency, excellent transient response and high DC output accuracy. The targeted applications are smartphones, tablets, and other handheld devices. The AP72200 utilizes a four switches H-bridge configuration to support buck and boost operation. The buck-boost provides at least 2A output current.

The current control scheme handles wide input/output voltage ratios and provides low external component count with outstanding performance in line/load transient response

and seamless transition between buck and boost modes.

The AP72200 features I²C compatible, 2-wires serial interface consisting of a bidirectional serial-data line, SDA, and a serial-clock line, SCL. It supports SCL clock rates up to 3.4MHz.

The AP72200 also features UVLO, OTP, and OCP to protect the circuit.

This IC is available in a small 2.125x1.750mm, 20 balls WLCSP package

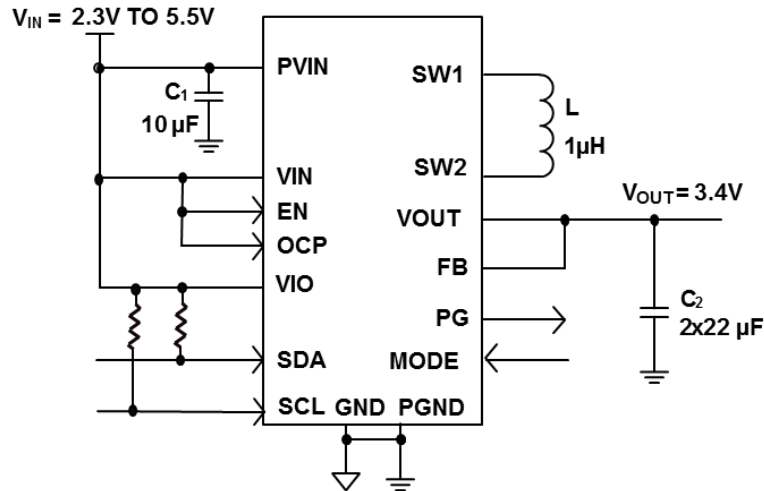
FEATURES

- V_{IN} 2.3V to 5.5V
- Output Voltage range: 2.6V to 5.14V
- 2A Continuous Output Current for V_{OUT}=3.4V and V_{IN}>2.9V
- Efficiency Up to 97%
- 2.5MHz Switching Frequency
- I²C Interface
- Selectable MODE PFM/PWM
- Ultrasonic Operation Programmable through I²C
- Halogen and Antimony Free. "Green" Device
- Power Good Indicator with 5MΩ Internal Pull-up
- Adjustable Overcurrent Limit
- Full Protected for Overcurrent, Short Circuit, Reverse Current Protection, Over Temperature, and UVLO
- Totally Lead-Free & Fully RoHS Compliant

APPLICATIONS

- Smartphones
- Tablets
- Portable Consumer Devices

TYPICAL APPLICATIONS CIRCUIT



RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}, V_{IO}, PV_{IN}	Supply Voltage	-0.3 to +7.0	V
V _{OUT}	Output Voltage	-0.3 to +6.0	V
V_{SW1}, V_{SW2}	Switch Node Voltage	-1.0 to $V_{IN} + 0.3$	V
V _{IO}	I ² C Voltage	-1.0 to $V_{IN} + 0.3$	V
All other pins		-0.3V to +7.0	V
T _J	Junction Temperature	+150	°C
T _L	Lead Temperature	+260	°C
ESD Susceptibility			
HBM	Human Body Mode	3000	V
CDM	Device Charged Model	1000	V

ORDERING INFORMATION

Part Number	Package Code	Package	Identification Code	Tape and Reel	
				Quantity	Part Number Suffix
AP72200CT20-7	W-WLB2118-20	WLCSFP-20	D7	3000	-7

EVALUATION BOARD

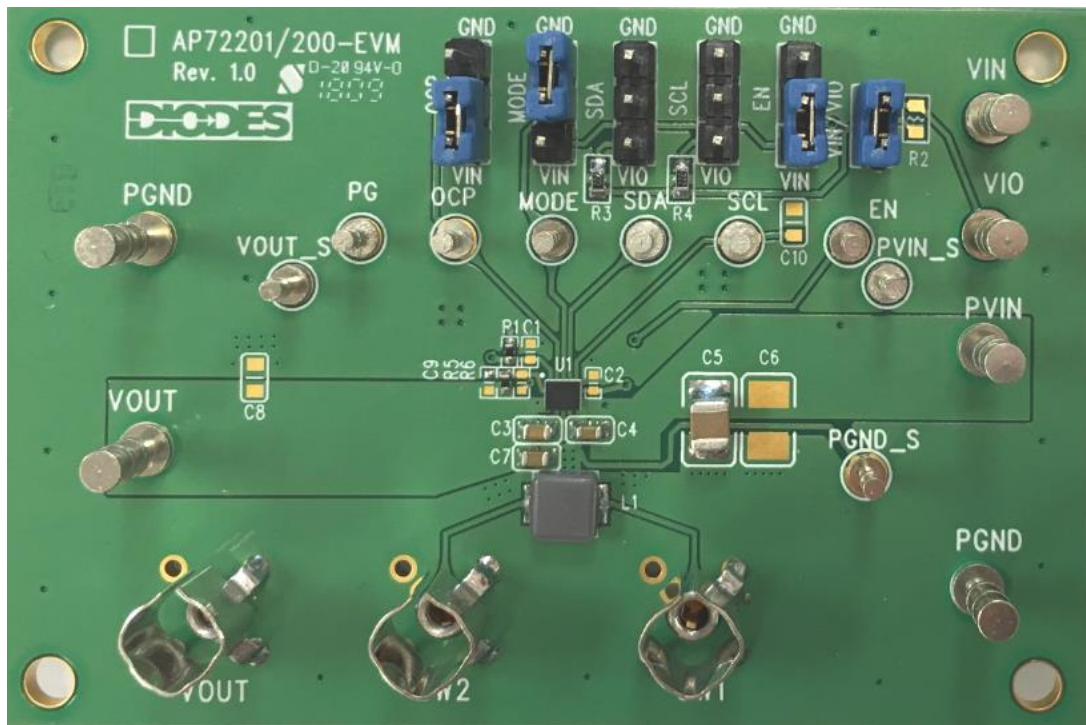


Figure 1. AP72200-EVM

QUICK START GUIDE

The AP72200 EVM board has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP72200, follow the procedure below:

1. Insert jumpers to configure the EVM board setting as described in the Application Information sections of the device datasheet.
2. Use MODE switch to set PWM mode (VIN) or SKIP/PFM mode (GND).
3. Use OCP switch to set to 1.8A (GND) or 4.3A (VIN) Peak Overcurrent Threshold.
4. Use EN switch to set device enabled (VIN) or disabled (GND).
5. Use the VIN/VIO switch to connect VIN to VIO.
6. Use the SDA and SCL switch to connect SDA high (VIO) or Low (GND).
7. Connect a 3.8V power supply between the PVIN and PGND terminals. Make sure the power supply is turned off.

8. Connect an adjustable current or resistive load to the VOUT and PGND terminals.
9. Turn on the power supply. Do not turn on the power supply until all connections are completed and fully checked.
10. The EVM board should now power up with a 3.4V output voltage.
11. Increase the load current and observe the output voltage change.
12. Check for the stable operation of the SW1 and SW2 signal on the oscilloscope. Measure the switching frequency on SW1 and SW2 probe jack in the EVM board.
13. Measure the output ripple on the VOUT probe jack in the EVM board.
14. Use the I2C to read and write to registers. (as described in the device datasheet)

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. When measure the efficiency and load regulation, connect the voltage meter between VOUT_S and PGND_S for accurate Kelvin output voltage measurement and between PVIN_S and PGND_S for accurate input Kelvin voltage measurement.

EVALUATION BOARD SCHEMATIC

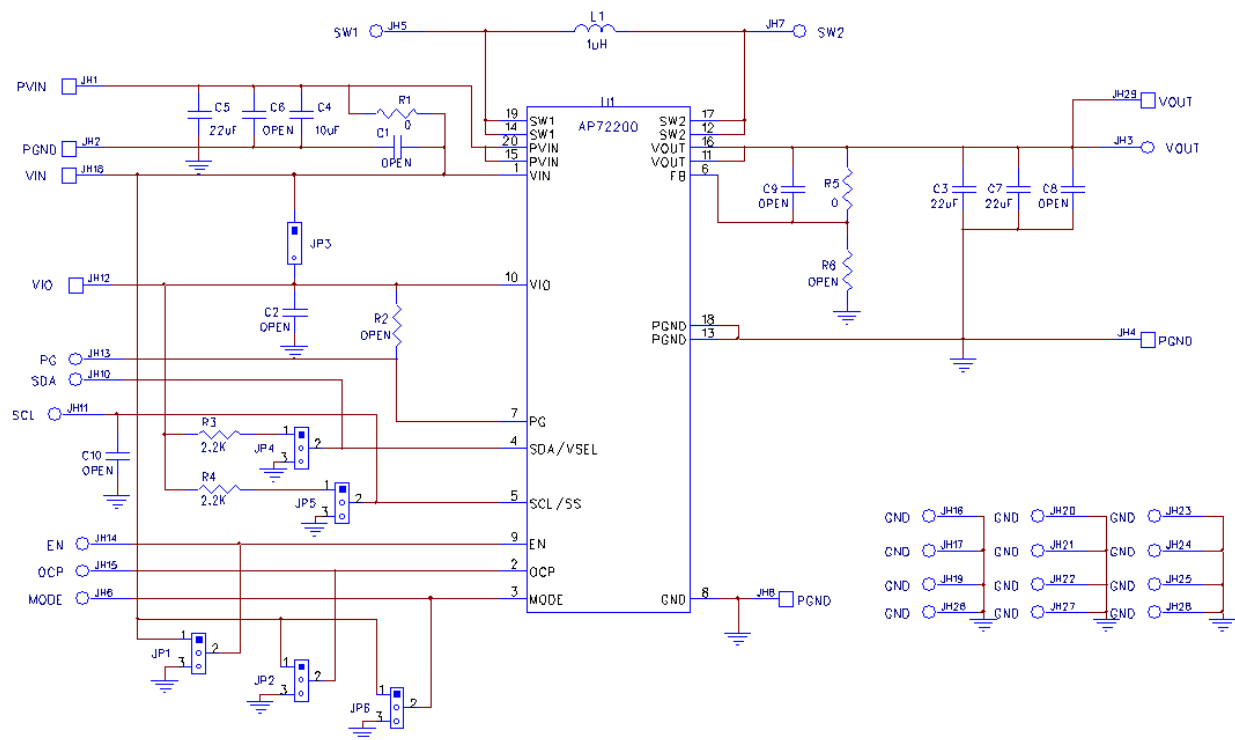


Figure 2. AP72200-EVM Schematics

PCB LAYOUT

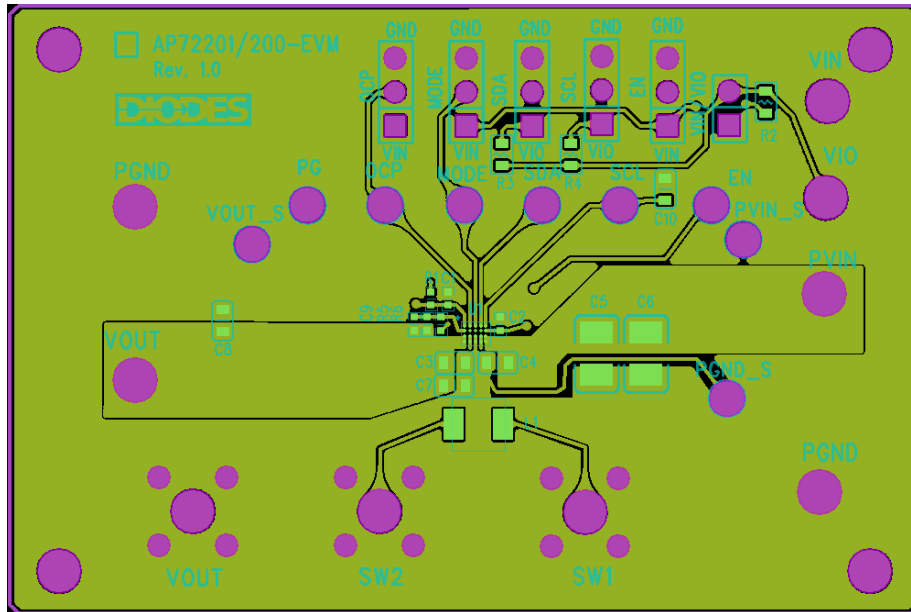


Figure 3. AP72200-EVM – Top Layer

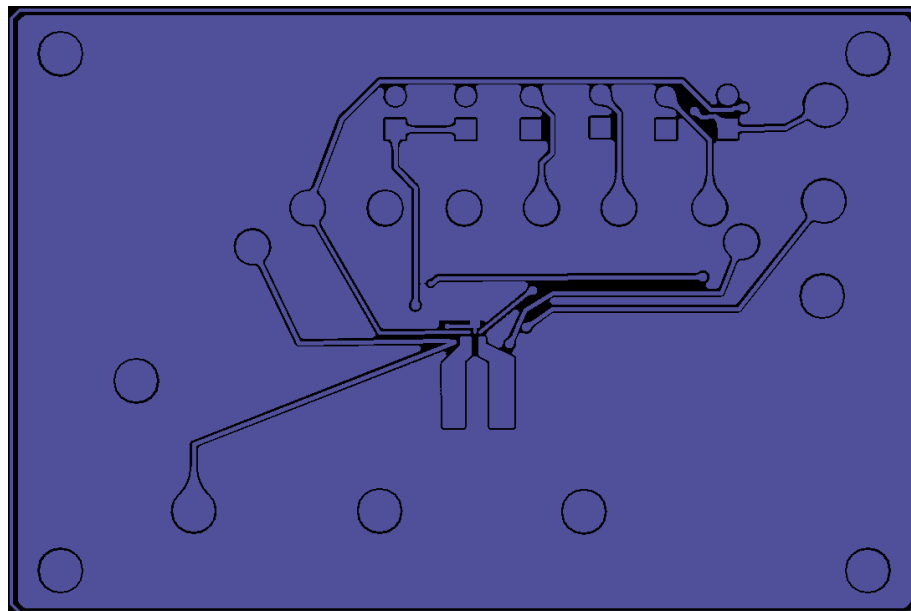


Figure 4. AP72200-EVM – Bottom Layer

BILL OF MATERIALS for AP72200-EVM

Qty	Ref	Value	Description	Package	Manufacturer	Manufacturer P/N
2	C3, C7	22uF	Ceramic Capacitor, 10V, X5R, 20%	0603	Murata	GRM188R61A226ME15D
1	C4	10uF	Ceramic Capacitor, 6.3V, X5R, 20%	0603	Murata	GRM188R60J106ME47D
1	C5	22uF	Ceramic Capacitor, 25V, X5R	1210	Murata	12103D226KAT2A
2	R1, R5	0Ω	Film Resistor	0402	Yageo	RC0402JR-070RL
2	R3, R4	2.2KΩ	Film Resistor, 1%	0402	Yageo	RC0402FR-072K2L
1	L1	1uH	DCR=22mΩ, Isat=9A	4x4x1.8mm	Würth Electronics	74437324010
1	JP3		PCB Header, 40 POS	1X2	3M	2340-611TG
5	JP1, 2, 4, 5, 6		PCB Header, 40 POS	1X3	3M	2340-611TG
9	PG,SDA,SCL,EN, OCP,MODE, PVIN_S, VOUT_S, GND_S		PCB Turrent Term, 0.082"	0.082"	Keystone Electronics	1573-2
7	VIN,PVIN, VIO, PGNDx3		PCB Turrent Term, 0.094"X1/16	0.082"	Keystone Electronics	1598-2
3	SW1,SW2,VOUT		Probe Jack		Tektronix	131-4353-00
1	U1		DC/DC converter	WLCSP-20	Diodes Inc	AP72200

IMPORTANT NOTICE

DIODES INCORPORATED MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, WITH REGARDS TO THIS DOCUMENT, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION).

Diodes Incorporated and its subsidiaries reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to this document and any product described herein. Diodes Incorporated does not assume any liability arising out of the application or use of this document or any product described herein; neither does Diodes Incorporated convey any license under its patent or trademark rights, nor the rights of others. Any Customer or user of this document or products described herein in such applications shall assume all risks of such use and will agree to hold Diodes Incorporated and all the companies whose products are represented on Diodes Incorporated website, harmless against all damages.

Diodes Incorporated does not warrant or accept any liability whatsoever in respect of any products purchased through unauthorized sales channel.

Should Customers purchase or use Diodes Incorporated products for any unintended or unauthorized application, Customers shall indemnify and hold Diodes Incorporated and its representatives harmless against all claims, damages, expenses, and attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized application.

Products described herein may be covered by one or more United States, international or foreign patents pending. Product names and markings noted herein may also be covered by one or more United States, international or foreign trademarks.

This document is written in English but may be translated into multiple languages for reference. Only the English version of this document is the final and determinative format released by Diodes Incorporated.

LIFE SUPPORT

Diodes Incorporated products are specifically not authorized for use as critical components in life support devices or systems without the express written approval of the Chief Executive Officer of Diodes Incorporated. As used herein:

A. Life support devices or systems are devices or systems which:

1. are intended to implant into the body, or
2. support or sustain life and whose failure to perform when properly used in accordance with instructions for use provided in the labeling can be reasonably expected to result in significant injury to the user.

B. A critical component is any component in a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or to affect its safety or effectiveness.

Customers represent that they have all necessary expertise in the safety and regulatory ramifications of their life support devices or systems, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of Diodes Incorporated products in such safety-critical, life support devices or systems, notwithstanding any devices- or systems-related information or support that may be provided by Diodes Incorporated. Further, Customers must fully indemnify Diodes Incorporated and its representatives against any damages arising out of the use of Diodes Incorporated products in such safety-critical, life support devices or systems.

Copyright © 2018, Diodes Incorporated

www.diodes.com