AP72200-EVM

High Efficiency Synchronous DC/DC Buck-Boost Converter With 4.3A Switches

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 I^2C 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 VOUT=3.4V and VIN>2.9V Efficiency Up to 97%
- 2.5MHz Switching Frequency
- I^2C Interface
- Selectable MODE PFM/PWM
- Ultrasonic Operation Programmable through I^2C
- 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

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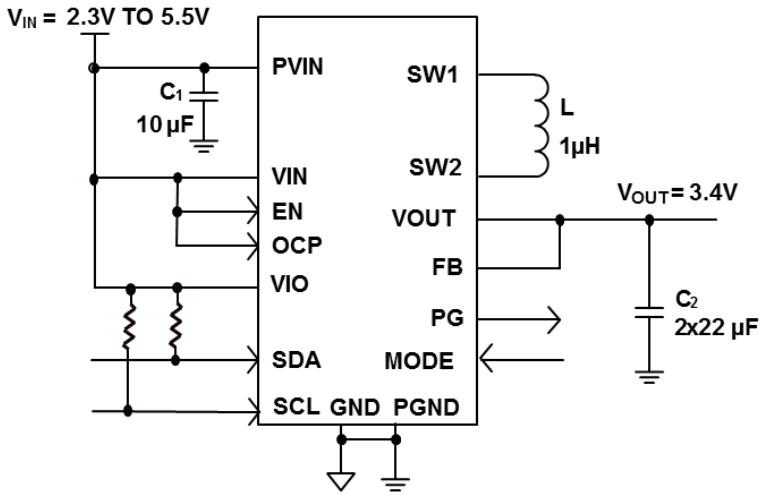
TYPICAL APPLICATIONS CIRCUIT



RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V_{IN}, VIO, PV_{IN}	Supply Voltage	-0.3 to +7.0	V
VOUT	Output Voltage	-0.3 to +6.0	V
V_{SW1},V_{SW1}	Switch Node Voltage	-1.0 to V_{IN} +0.3	V
VIO	I^2C 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

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ORDERING INFORMATION

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

EVALUATION BOARD

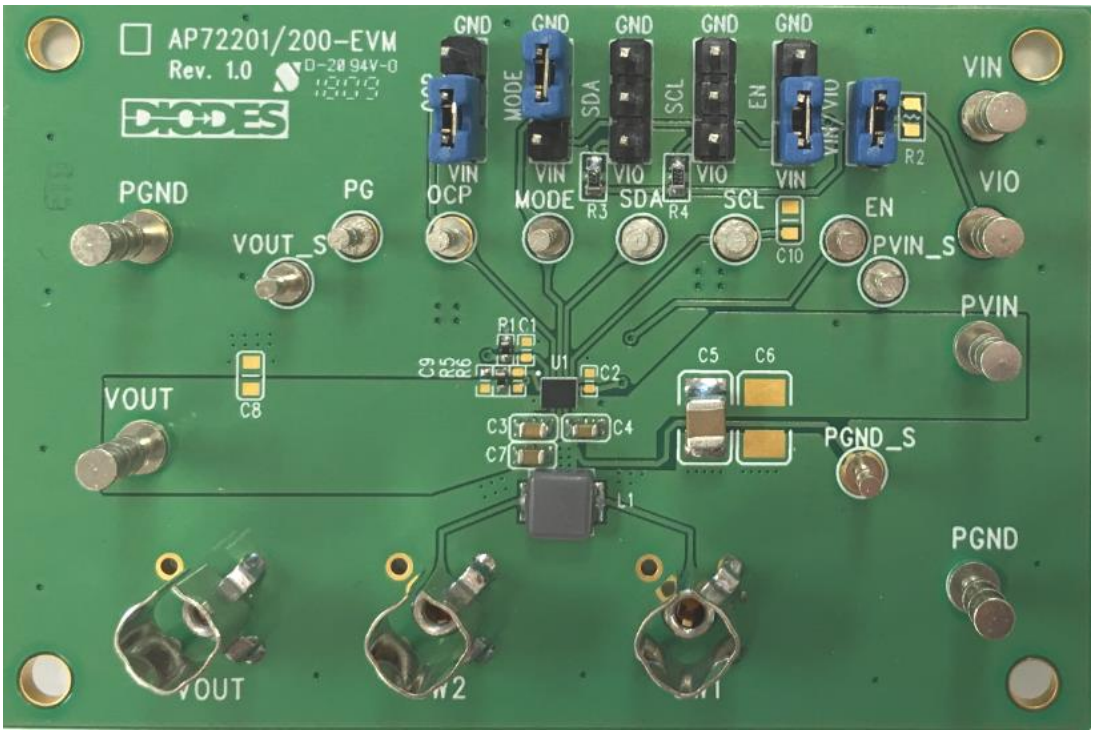

Figure 1. AP72200-EVM

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.

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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

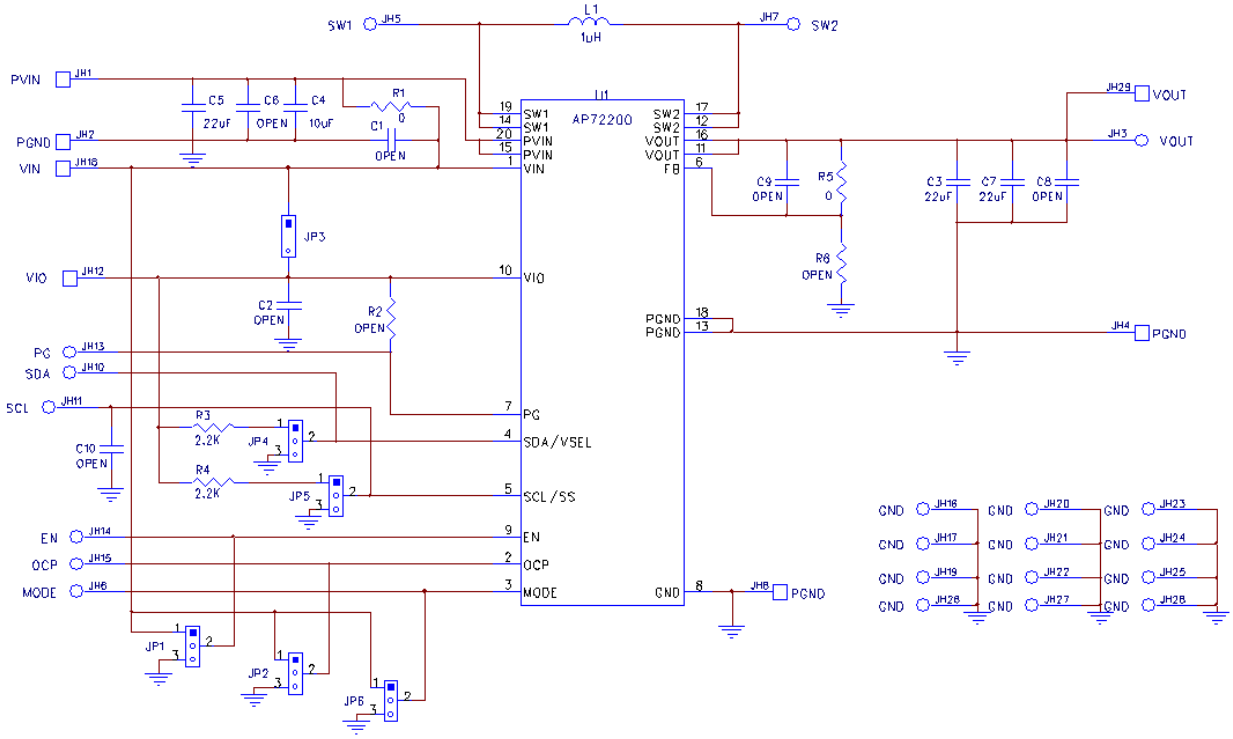

Figure 2. AP72200-EVM Schematics

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PCB LAYOUT

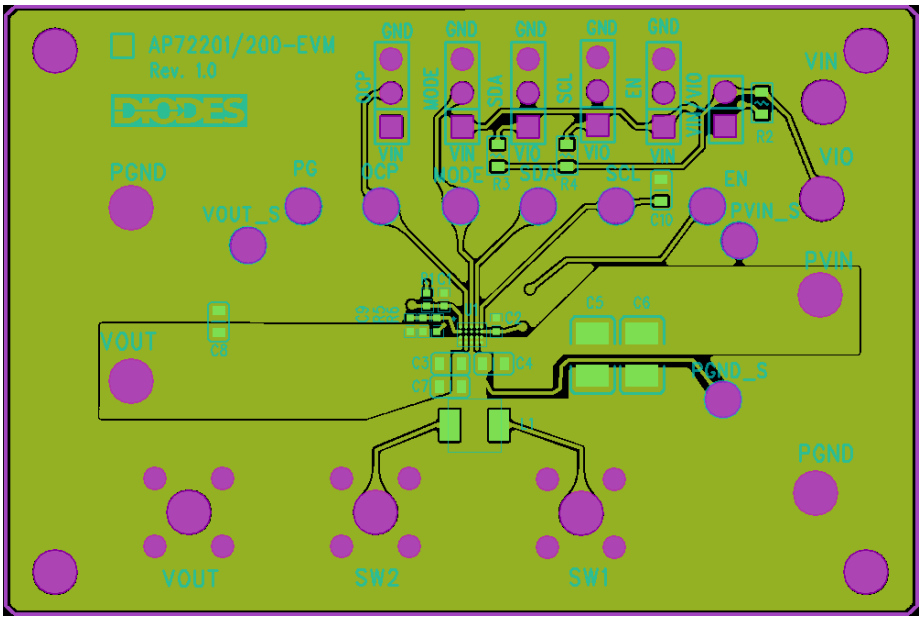

Figure 3. AP72200-EVM – Top Layer

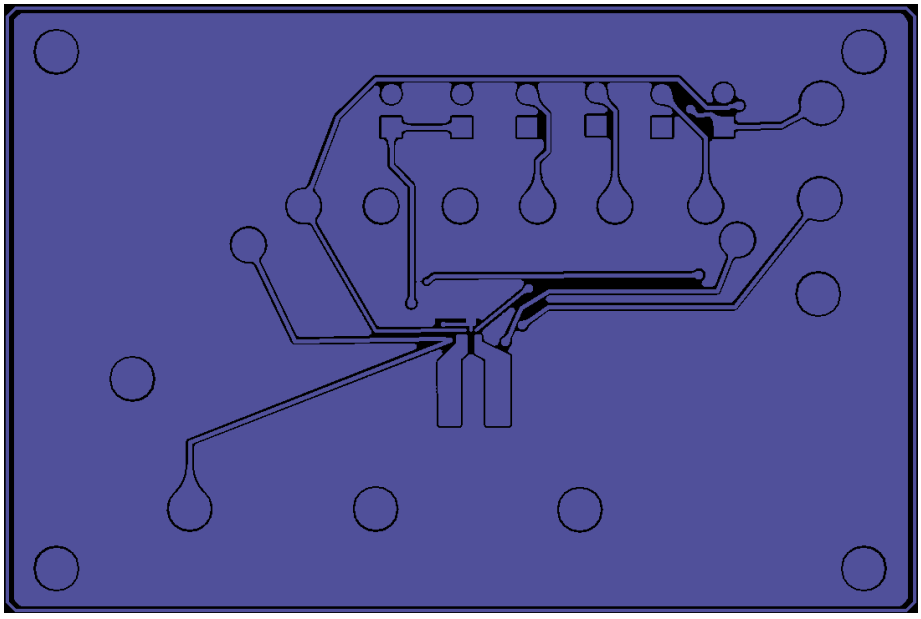

Figure 4. AP72200-EVM – Bottom Layer

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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	Wurth 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

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