

## **DESCRIPTION**

The AP62200/AP62201/AP62200T is a 2A, synchronous buck converter with a wide input voltage range of 4.2V to 18V. The device fully integrates a 90mΩ high-side power MOSFET and a 65mΩ low-side power MOSFET to provide high-efficiency step-down DC-DC conversion.

The AP62200/AP62201/AP62200T device is easily used by minimizing the external component count due to its adoption of Constant On-Time (COT) control to achieve fast transient response, easy loop stabilization, and low output voltage ripple.

The AP62200/AP62201/AP62200T design is optimized for Electromagnetic Interference (EMI) reduction. The device has a proprietary gate driver scheme to resist switching node ringing without sacrificing MOSFET turn-on and turn-off times, which reduces high-frequency radiated EMI noise caused by MOSFET switching.

AP62200/AP62201/200T is available in a TSOT26 package.

## **FEATURES**

- $V_{IN}$  Range: 4.2V -18V
- Output Voltage range: 0.8V to 7V
- 2A Continuous Output Current
- $0.8V \pm 1\%$  Reference Voltage ( $T_A = +25^\circ C$ ) => AP62200 and AP62201
- $0.7625V \pm 1\%$  Reference Voltage ( $T_A = +25^\circ C$ ) => AP62200T
- 135μA Low Quiescent Current
- 740kHz Switching Frequency
- Proprietary Gate Driver Design for Best EMI Reduction
- Protection Circuitry
  - Undervoltage Lockout (UVLO)
  - Cycle-by-Cycle Valley Current Limit
  - Thermal Shutdown
- Totally Lead-Free & Fully RoHS Compliant
- Halogen and Antimony Free. "Green" Device

## **APPLICATIONS**

- Flat Screen TV Sets and Monitors
- Set Top Boxes
- Consumer Electronics
- Network Systems
- General Purpose Point of Load

### TYPICAL APPLICATIONS CIRCUIT

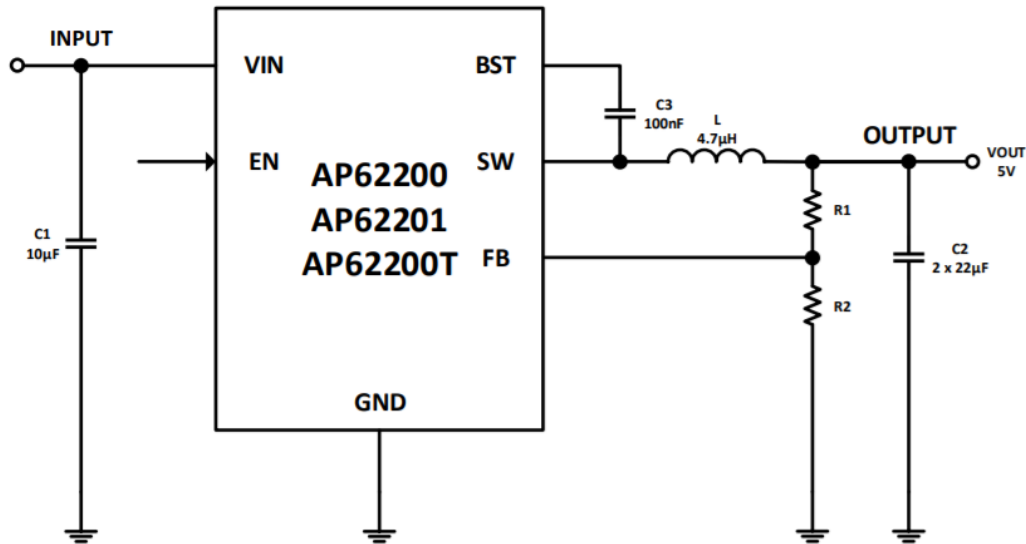


Figure 1. Typical Application Circuit

### ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Rating	Unit
VIN	Supply Pin Voltage	-0.3 to +20.0 (DC)	V
		-0.3 to 22.0 (400ms)	
V <sub>SW</sub>	Switch Pin Voltage	-1.0 to VIN + 0.3 (DC)	V
		-2.5 to VIN + 2.0 (20ns)	
V <sub>BST</sub>	Bootstrap Pin Voltage	V <sub>SW</sub> - 0.3 to V <sub>SW</sub> + 6.0	V
V <sub>EN</sub>	Enable/UVLO Pin Voltage	-0.3 to +6.0	V
V <sub>FB</sub>	Feedback Pin Voltage	-0.3 to +6.0	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	500	V

### RECOMMENDED OPERATING CONDITIONS

Symbol	Parameter	Rating	Unit
V <sub>IN</sub>	Supply Voltage	4.2 to 18	V
V <sub>OUT</sub>	Output Voltage Range	0.8 to 7	V
T <sub>A</sub>	Operating Ambient Temperature	-40 to +85	°C
T <sub>J</sub>	Operating Junction Temperature	-40 to +125	°C

### SETTING OUTPUT VOLTAGE:

Table 1 for AP62200 and AP62201 shows a list of recommended component selections for common output voltages.

V <sub>OUT</sub>	R1	R2	L1
1.0V	2.49KΩ	10KΩ	1.5μH
1.2V	4.99KΩ	10KΩ	2.2μH
1.5V	8.66KΩ	10KΩ	2.2μH
1.8V	12.4KΩ	10KΩ	3.3μH
2.5V	21.5KΩ	10KΩ	3.3μH
3.3V	31.6KΩ	10KΩ	3.3μH
5.0V	52.3KΩ	10KΩ	4.7μH

**Table 1. Common Output Voltages (AP62200/201)**

Table 2 for AP62200T shows a list of recommended component selections for common output voltages.

V <sub>OUT</sub>	R1	R2	L1
1.0V	3.09KΩ	10KΩ	1.5μH
1.2V	5.76KΩ	10KΩ	2.2μH
1.5V	9.76KΩ	10KΩ	2.2μH
1.8V	13.7KΩ	10KΩ	3.3μH
2.5V	22.6KΩ	10KΩ	3.3μH
3.3V	33.2KΩ	10KΩ	3.3μH
5.0V	56.2KΩ	10KΩ	4.7μH

**Table 2. Common Output Voltages (AP62200T)**

### EVALUATION BOARD

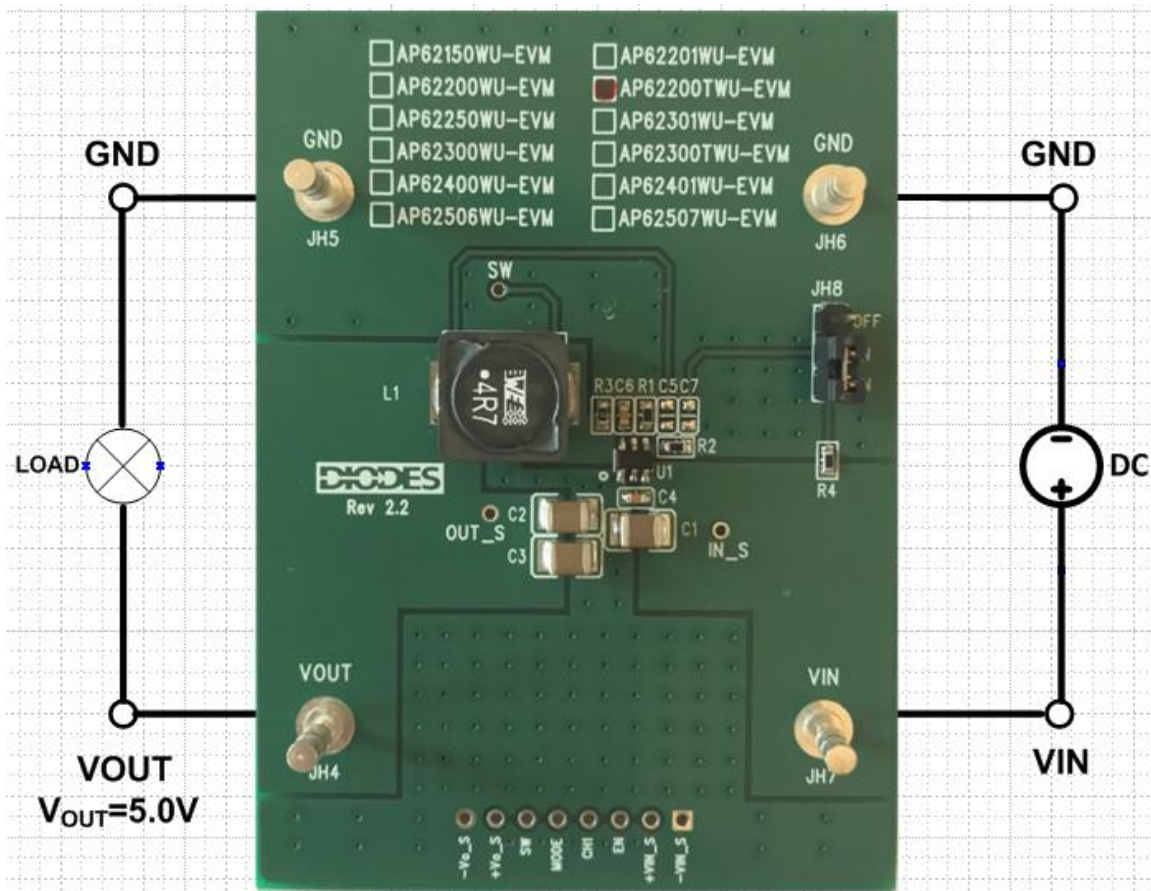


Figure 2. AP62200TWU-EVM

### QUICK START GUIDE

The AP62200/201/200TWU-EVM has a simple layout and allows access to the appropriate signals through test points. To evaluate the performance of the AP62200/201/200TWU, follow the procedure below:

1. Connect a power supply to the input terminals VIN and GND. Set VIN to 12V.
2. Connect the positive terminal of the electronic load to VOUT and negative terminal to GND.
3. For Enable, place a jumper at JH8 to "ON" position to connect EN pin to VIN through 100KΩ resistor to enable IC or leave it OPEN. Jump to "OFF" 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<sub>OUT</sub> and GND. Measurement can also be done with a multimeter with the positive and negative leads between V<sub>OUT</sub> 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.

### EVALUATION BOARD SCHEMATIC

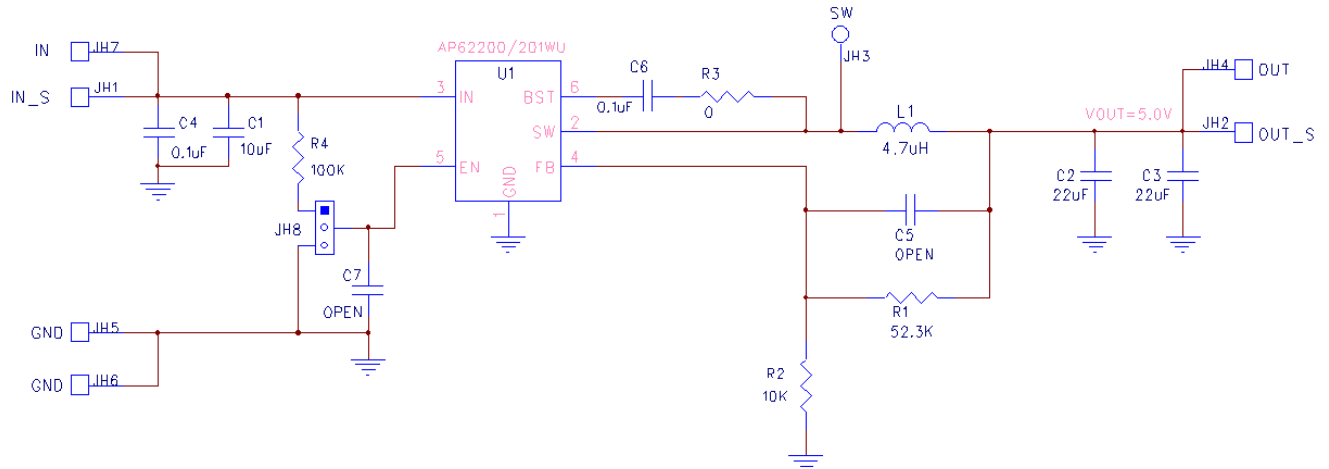


Figure 3. AP62200/201WU-EVM Schematic

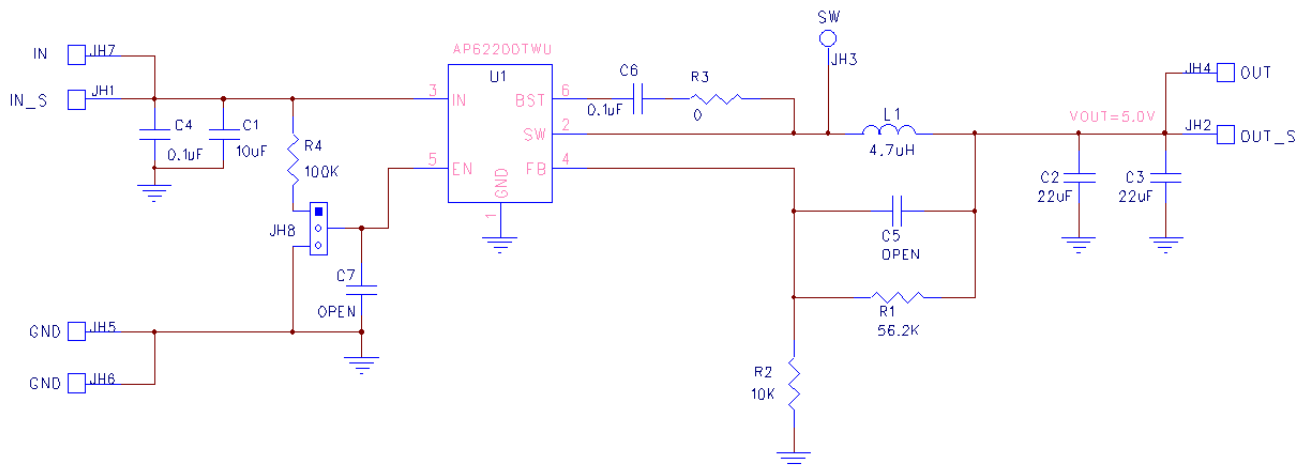


Figure 4. AP62200TWU-EVM Schematic

**PCB TOP/BOTTOM LAYOUT**

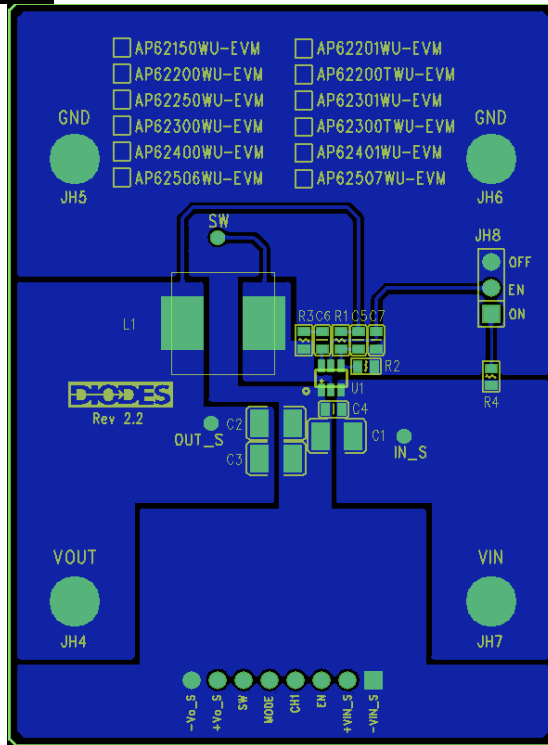


Figure 5. AP62200/201/200TWU-EVM – Top Layer

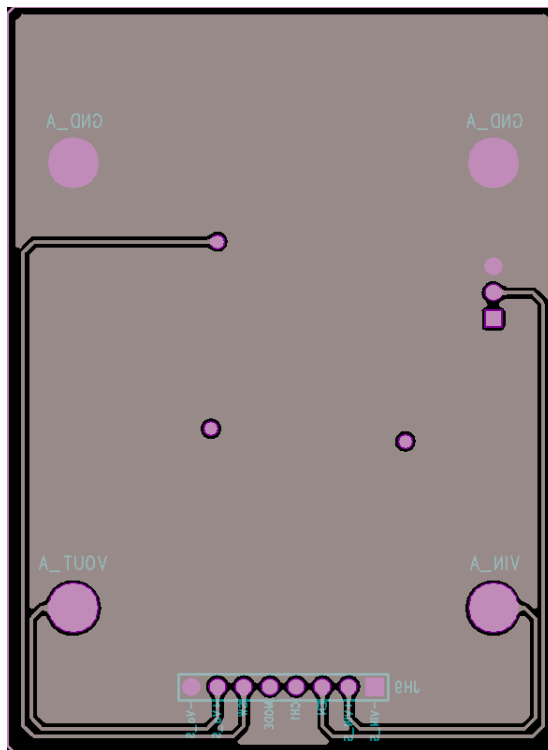


Figure 6. AP62200/201/200TWU-EVM – Bottom Layer

### BILL OF MATERIALS for AP62200/201WU-EVM for $V_{OUT}=5V$

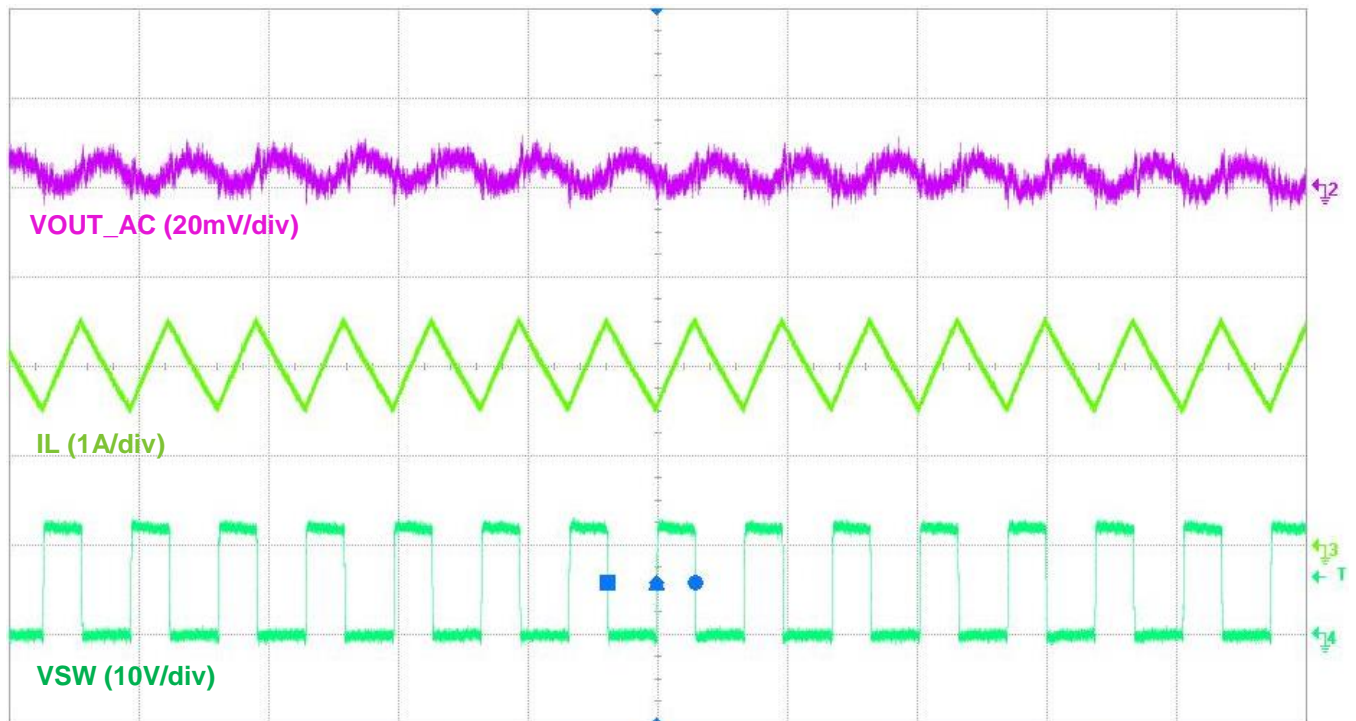
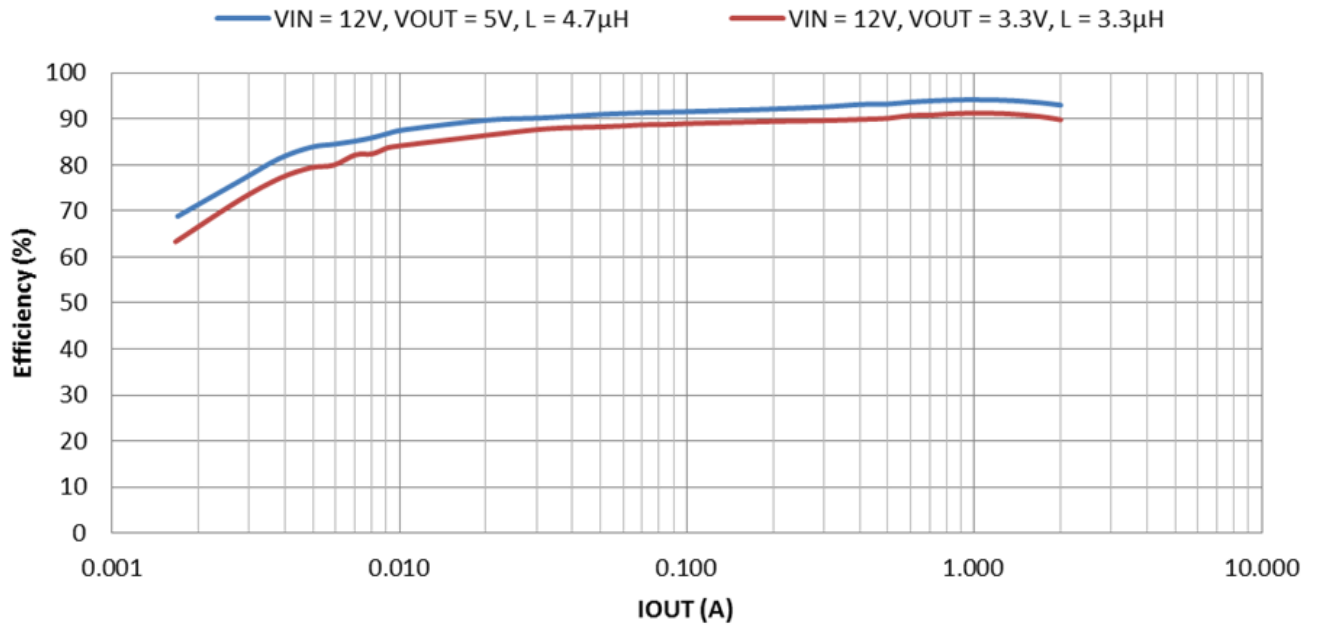
Ref	Value	Description	Qty	Size	Vendor Name	Manufacturer PN
C1	10 $\mu$ F	Ceramic Capacitor, 25V, X7R, 10%	1	1210	KEMET	C1210C106K3RACTU
C2, C3	22 $\mu$ F	Ceramic Capacitor, 25V, X7R, 10%	2	1210	KEMET	C1210C226K3RAC7800
C4, C6	0.1 $\mu$ F	Ceramic Capacitor, 50V, X7R, 10%	2	0603	KEMET	C0603C104K5RACTU
L1	4.7 $\mu$ H	DCR=19.5m $\Omega$ , Ir=6.2A	1	10.2X10.2 x4.5mm	Würth Electronics	744779747
R1	52.3K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF5232V
R2	10K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1002V
R3	0 $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3GEY0R00V
R4	100K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1003V
JH4, JH5, JH6, JH7	1598	Terminal Turret Triple 0.094" L (Test Points)	4	Through-Hole	Keystone Circuit	1598-2
JH8		PCB Header, 40 POS	1	1X3	3M	2340-6111TG
U1	AP62200	Sync Buck DC/DC converter	1	TSOT26	Diodes Inc	AP62200WU-7



### BILL OF MATERIALS for AP62200TWU-EVM for V<sub>OUT</sub>=5V

Ref	Value	Description	Qty	Size	Vendor Name	Manufacturer PN
C1	10 $\mu$ F	Ceramic Capacitor, 25V, X5R	1	1210	Murata	GRM32DR61E106KA12L
C2, C3	22 $\mu$ F	Ceramic Capacitor, 25V, X5R	2	1210	AVX	12103D226KAT2A
C4, C6	0.1 $\mu$ F	Ceramic Capacitor, 50V, X7R, 10%	2	0603	Samsung	GCJ188R71H104KA12D
L1	4.7 $\mu$ H	DCR=19.5m $\Omega$ , Ir=6.2A	1	10.2X10.2x4.5mm	Würth Electronics	744779747
R1	56.2K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF5622V
R2	10K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1002V
R3	0 $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3GEY0R00V
R4	100K $\Omega$	SMD Resistor, 1%	1	0603	Panasonic	ERJ-3EKF1003V
JH4, JH5, JH6, JH7	1598	Terminal Turret Triple 0.094" L (Test Points)	4	Through-Hole	Keystone Circuit	1598-2
JH8		PCB Header, 40 POS	1	1X3	3M	2340-6111TG
U1	AP62200T	Sync Buck DC/DC converter	1	TSOT26	Diodes Inc	AP62200TWU-7

**TYPICAL PERFORMANCE CHARACTERISTICS**



**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 © 2019, Diodes Incorporated

[www.diodes.com](http://www.diodes.com)