FEATURES

High Efficiency: 90% typical
No Heat Sink Required
High Current without Heat Sink: 1A
High Absolute Accuracy: <0.5%
High Stability: ± 5mA@1A
High Modulation Speed: 10 KHz
Current Adjustable or Fixed Versions
Compact Size
Low Cost

APPLICATIONS

General lighting
Dynamo, pharos, electric torch
Safety lamp, street lamp, signal lamp

DESCRIPTION

ABK36V1A1 is a high performance, high efficiency, and high intensity LED constant current controller. It is designed to maximize performance for lighting LED applications. The output current can be adjusted by using an internal resistor or external resistance circuit from 0A to 1A. Its precision can be up to 0.5%. The current fluctuation doesn't exceed ±5mA.It has built-in 2A over-current protection circuit, thermal shutdown circuit, under-voltage lockout circuit, automatic temperature compensation circuit, and so on. The output current is stabile by adjustment of automatic temperature compensation circuit within -25 ℃ to 85 ℃.The efficiency is up to 90%, which can greatly extend the battery life for lighting circuit by charged power. The controller operating input/output voltage range for multiple serial LEDs is widely, which can allow users the cost much lower. The LED controller has a micropower shutdown mode, which is very convenient for users. Shutdown is enabled by applying a logic high to the SDN pin.

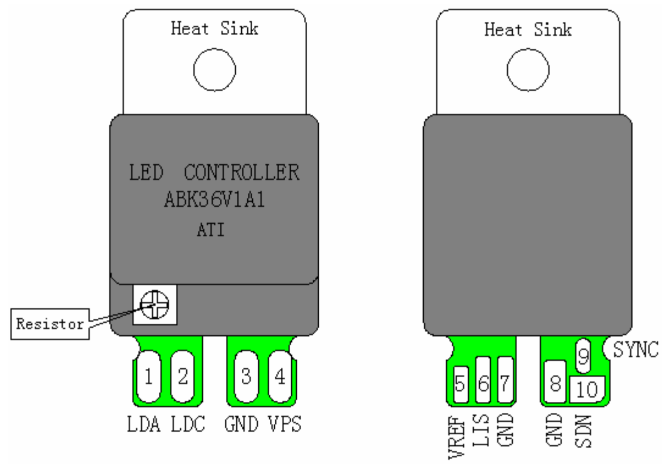
SPECIFICATIONS

Output current: 0 to 1A
Input voltage: 4.5V to 36V
Output voltage: 2.8V to Vps – 1V
(Vps is the power supply voltage)
Efficiency: 90% typical
Operating temperature: –40℃ to 125℃
Output short circuit protection: Yes

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

The ABK36V1A1 pin configuration is shown in figure 1.

The pin function descriptions are shown in table 1.



(a) Front View (b) Back View

Figure 1. ABK36V1A1 Pin Configuration

Table 1 Pin Function Descriptions

#	Name	Meaning	Type	Description	Note
1	LDA	LED anode	Analog output	Connected to LED's anode.	
2	LDC	LED cathode	Analog output	Connected to LED's cathode.	
3	GND	Ground	Power Ground	Connect all control signal related ground to here.	
4	VPS	Power supply voltage	Power input	Connect them to the positive terminal of the power supply.	
5	VREF	Voltage reference	Analog output	Voltage reference of the DAC,3.3V±2%.	
6	LIS	Current limit set	Analog input	Sets the current limit.	
7	GND	Ground	Ground	Connected internally to pin3.	
8	GND	Ground	Ground	Connected internally to pin3.	
9	SYNC	Synchronization	Digital input	This serves as synchronization input port.	

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10	SDN	Shut down	Digital input	Sets this pin high will shuts down the whole controller.	

OPERATION PRINCIPLE

Figure 2 is the block diagram and external application circuit of the LED controller.

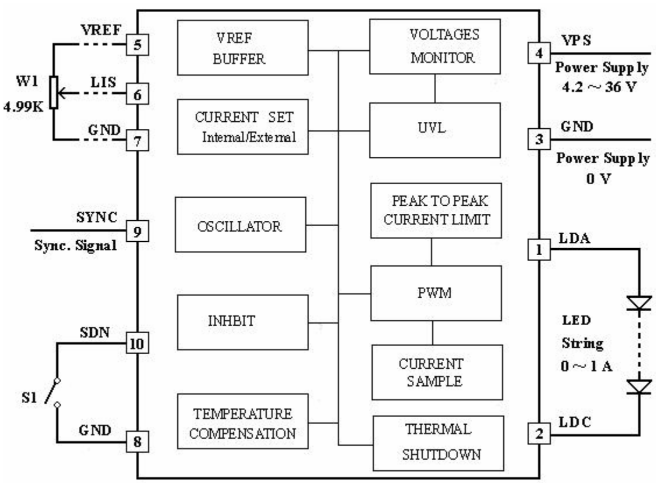


Figure 2. Block Diagram and Typical Application Circuit

APPLICATION CIRCUITS

Figure 3 shows a typical stand-alone application schematic.

Figure 4 shows a typical micro-processor-based application.

ABK36V1A1 is a high performance, high efficiency, LED controller. The output current can be set by using an internal resistor, external resistance circuit (Figure 2) or external DAC (Figure 4). When the output current is set to 0.5A by using an internal resistor, it can also be adjusted from 0A to 1A, by setting input voltages of LIS from 3.3V to 0V.

If you use many an ABK36V1A1 in a system, all the SYNC (9-pin) can be connected together. In this system, each LED controller's switching frequency is synchronal with the highest switching frequency. All the SYNC can be driven by external clock signal within 280 KHz to 500 KHz. The clock signal's high level is from 2.5V to 3.3V, and low level is less than 0.74V. So the generated voltage fluctuation in the power and internal electronic components is the lowest.

The LED controller can be turned on and off by setting the SDN pin low and high respectively. As shown in figure 2. Turn on the LED controller by using the SDN pin connected to the GND pin, then turn on the S1 and pull the SDN pin down to logic low. Turn off the LED controller by using the SDN pin, then turn off the S1 and pull internally the SDN pin up to logic high. When the LED controller is in low-power consumption shutdown mode, the output current is 0A. The LED controller can also be controlled by setting externally digital signals to the SDN pin. Turn on: the logic low voltage values are less than 0.8V, turn off: the logic low voltage values are more than 2.2V.

If the output current need be not set externally by the user, it can be used a very simple connection mode in figure 3.W1 is unconnected, the LIS pin is float. The output current can be adjusted by using an internal resistor in the LED controller.

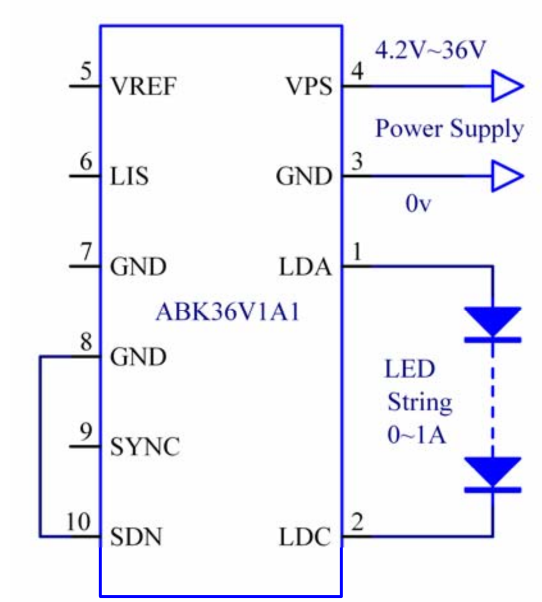


Figure 3. A Typical Stand-alone Application Schematic

Figure 4 shows an application where ABK36V1A1 is interfaced with a micro-controller. In this circuit, the LED controller may be controlled by micro-controller. The output current is set by a DAC (Digital to Analog Converter), which sets input voltages (From 0V to 3.3V) of LIS, pin 6. Voltage reference of the DAC may be provided by voltage (3.3V) of VREF, pin 5.The LED controller can be controlled by setting externally digital signals to the enabled SDN pin. Turn on: the logic low voltage values are less than 0.8V, turn off: the logic low voltage values are more than 2.2V.

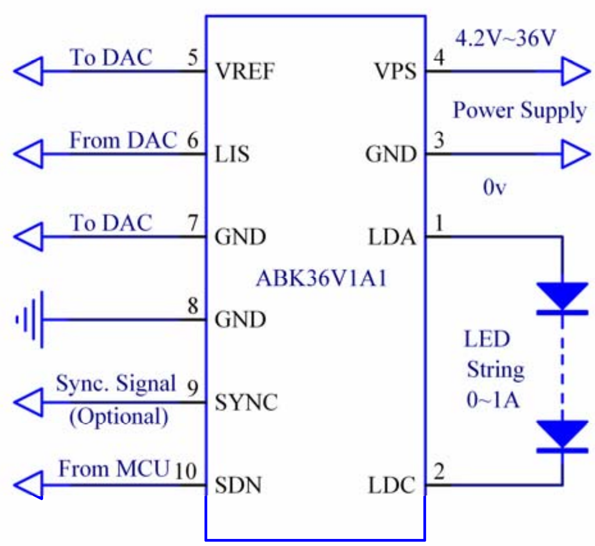


Figure 4. Typical Micro-processor-based Application

The output current can be monitored in real time by measuring the voltage on the LDC pin. The formula is:

$I_{output} = V_{LDC}/0.1V$ (A)

For example, when seeing the LDC pin has a voltage of 0.1V, $I_{output} = 0.1V/0.1V = 1(A)$

Figure 5 shows the measuring voltages of LDC schematic.

Use a high input impedance voltmeter or ADC to monitor the output current, such as >5K. Otherwise, some error will be introduced at the output current.

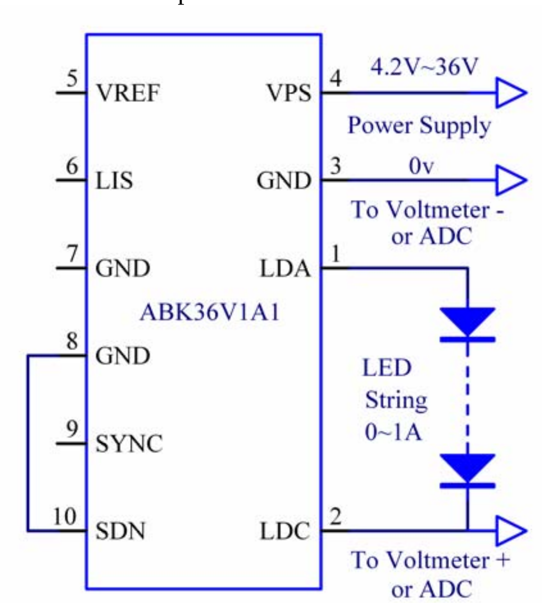


Figure 5. Measuring Voltages of LDC Schematic

TYPICAL PERFORMANCE CHARACTERISTICS

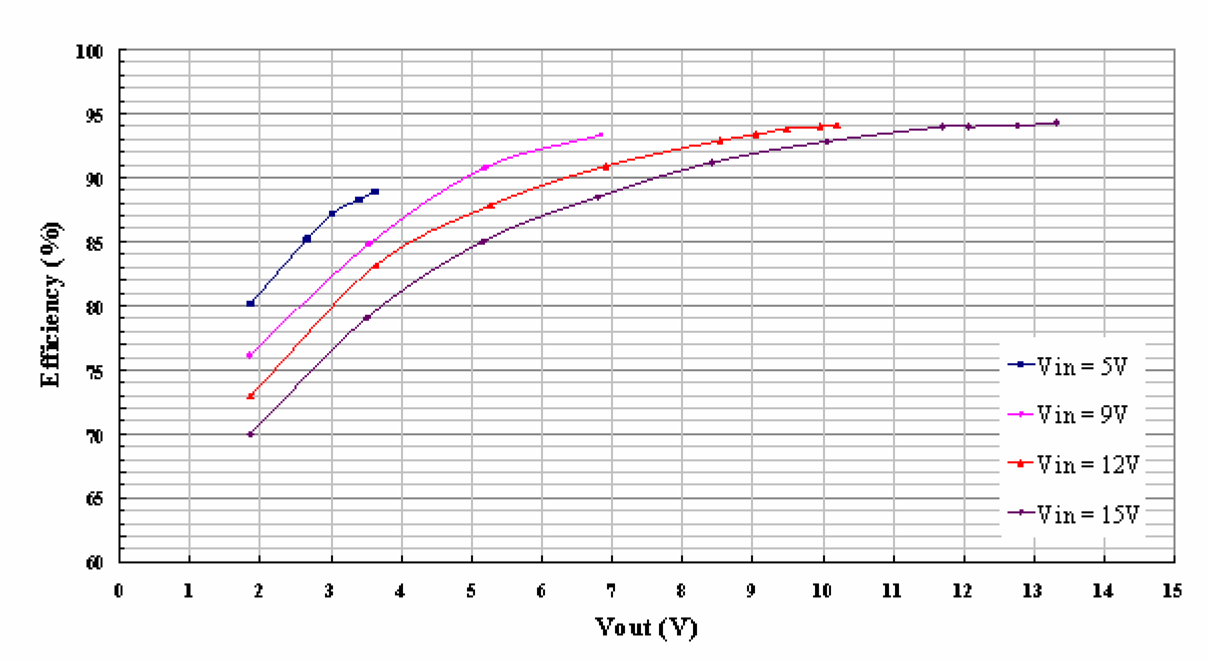


Figure 6. Efficiency vs. Vout, Iout = 350mA and Vin = Constant Values

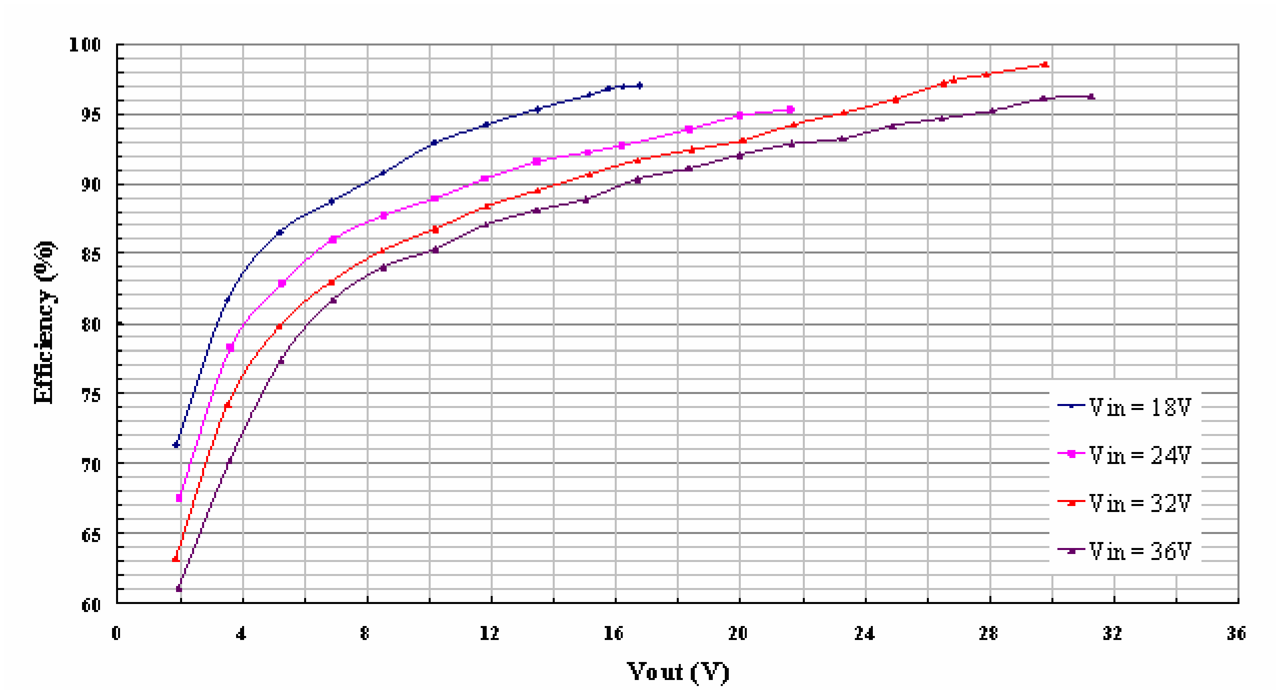


Figure 7. Efficiency vs. Vout, Iout = 350mA and Vin = Constant Values

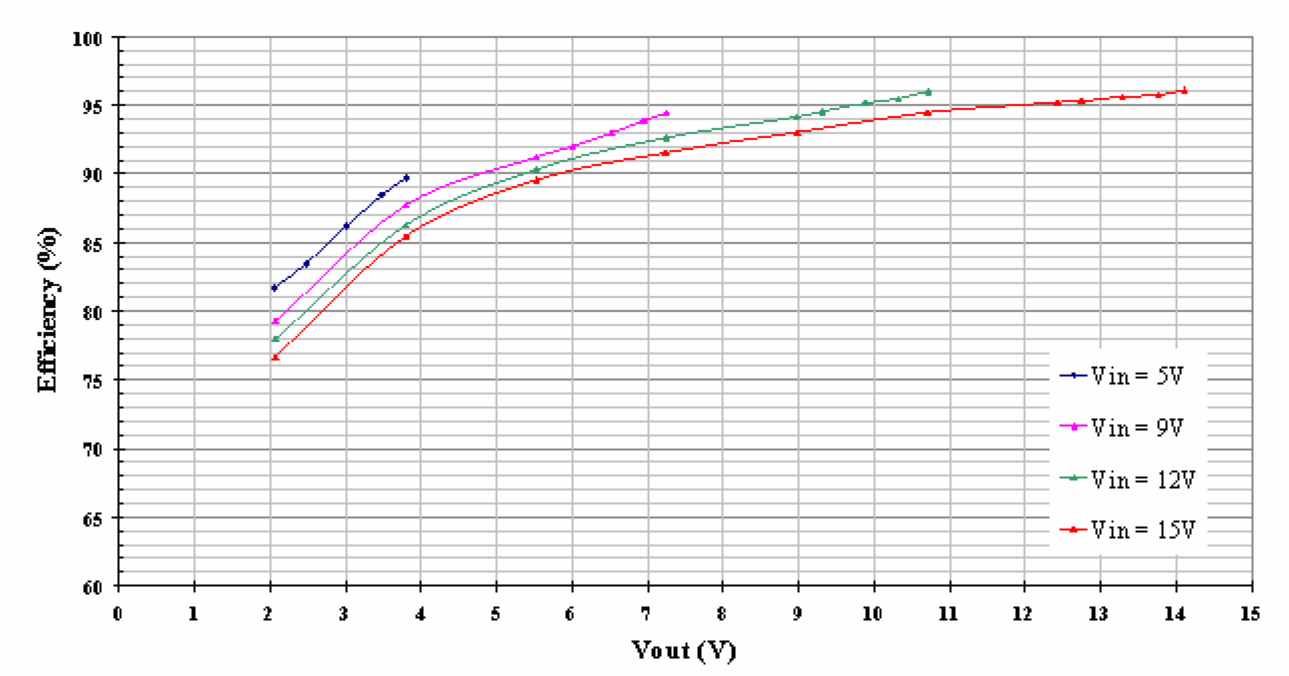


Figure 8. Efficiency vs. Vout, Iout = 700mA and Vin = Constant Values

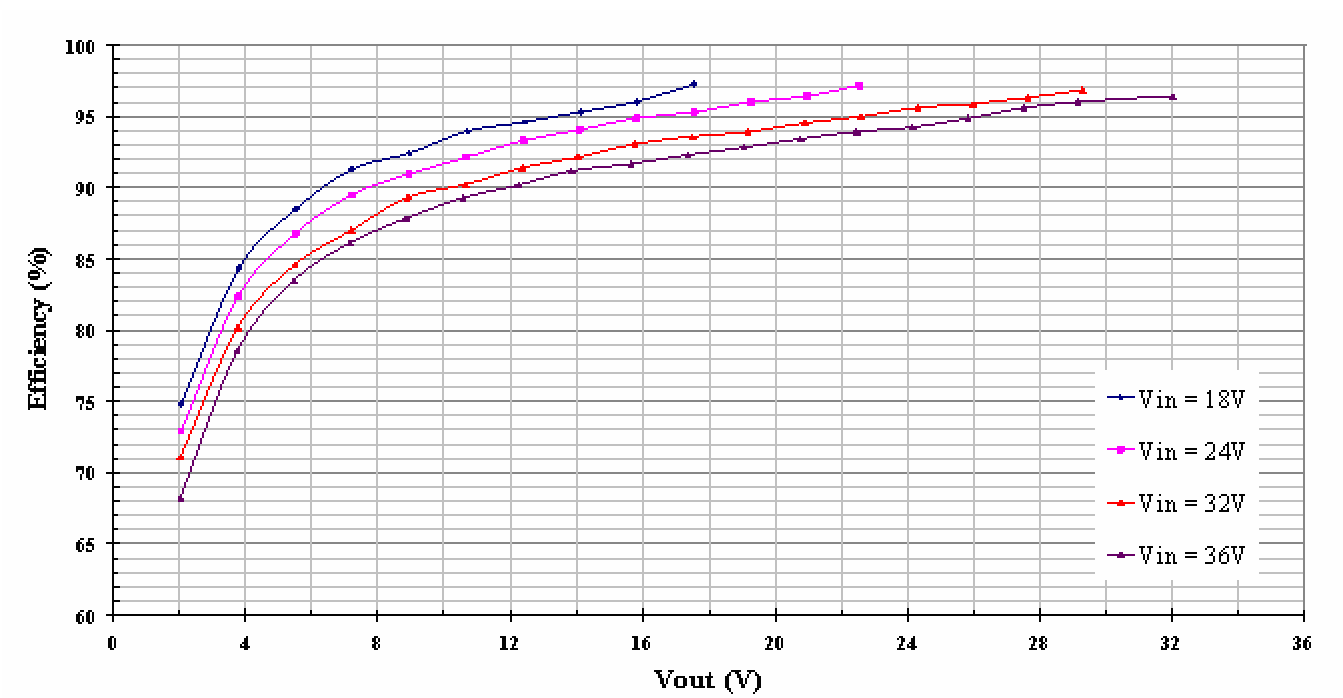


Figure 9. Efficiency vs. Vout, Iout = 700mA and Vin = Constant Values

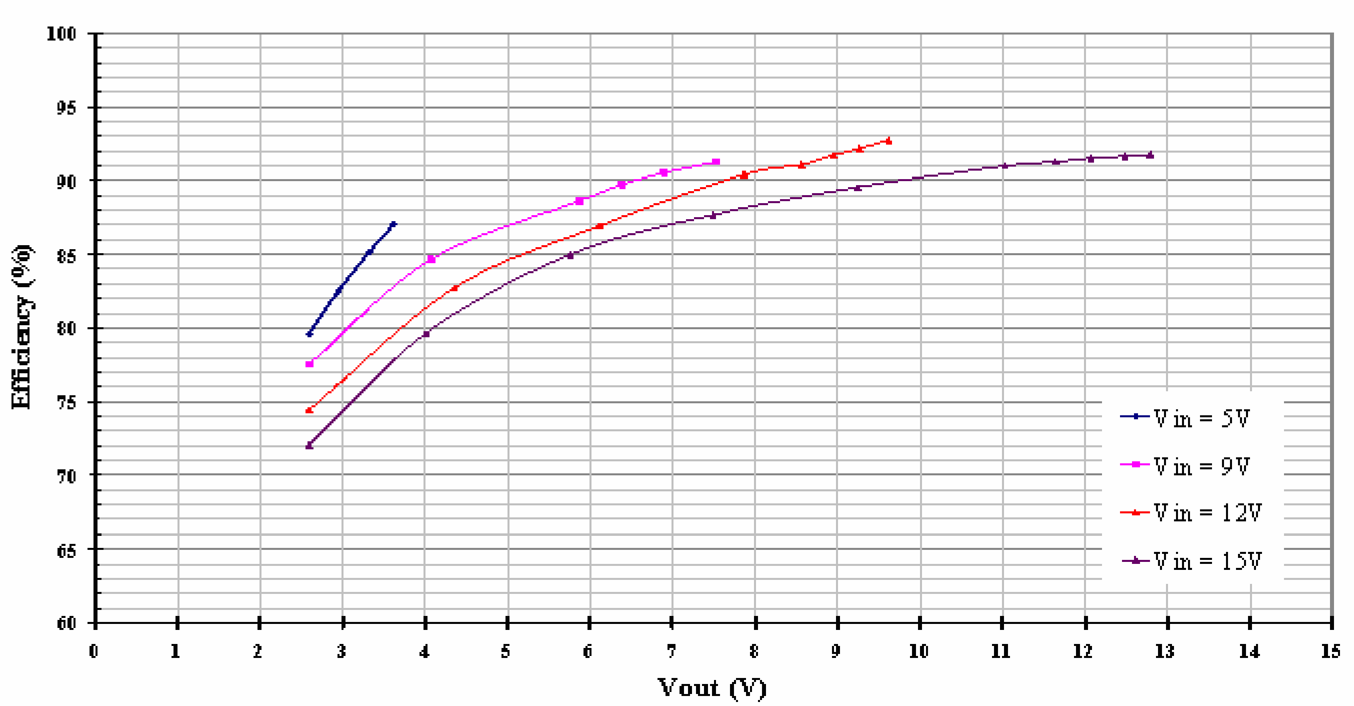


Figure 10. Efficiency vs. Vout, Iout = 1000mA and Vin = Constant Values

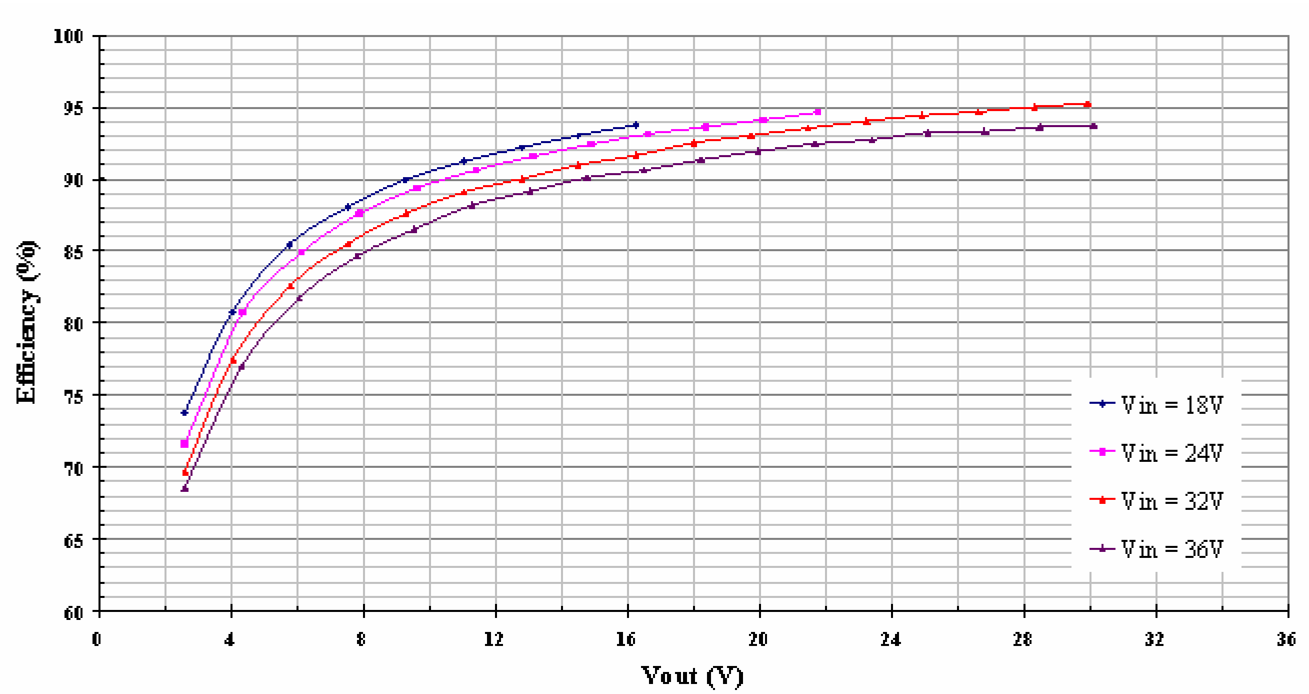


Figure 11. Efficiency vs. Vout, Iout = 1000mA and Vin = Constant Values

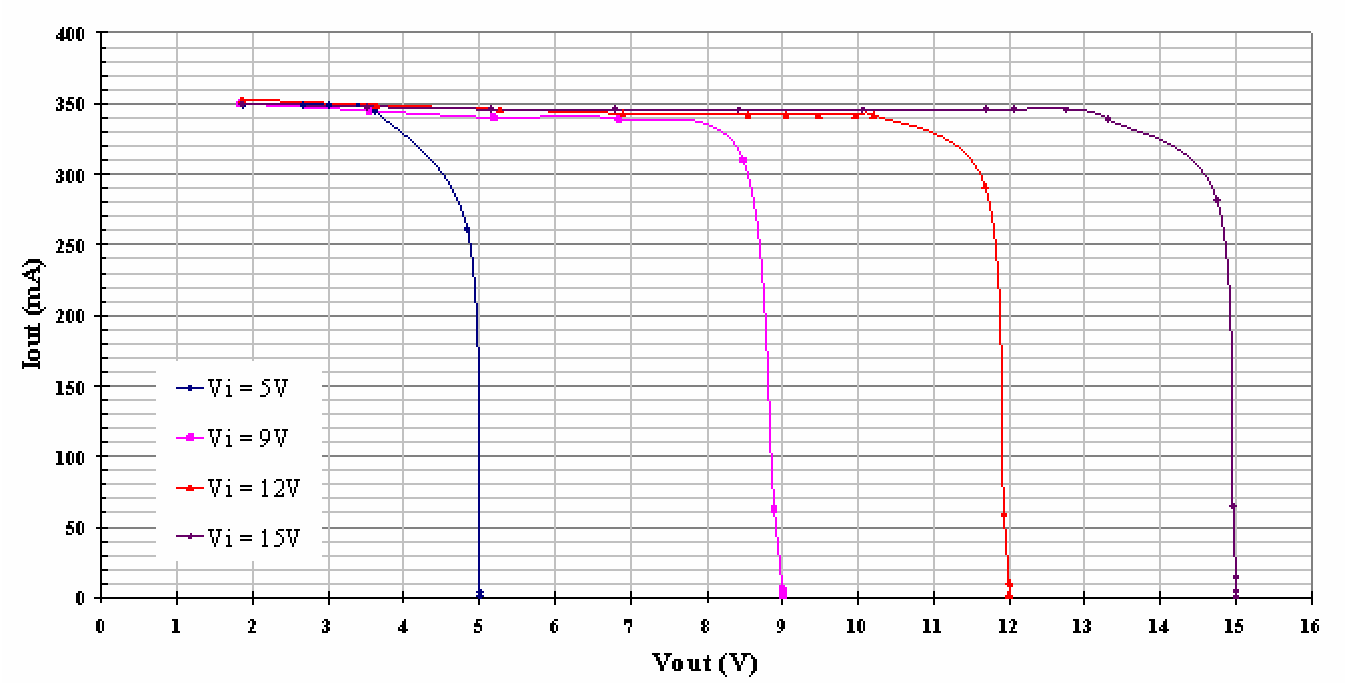


Figure 12. Iout vs. Vout, Iout = 350mA and Vin = Constant Values

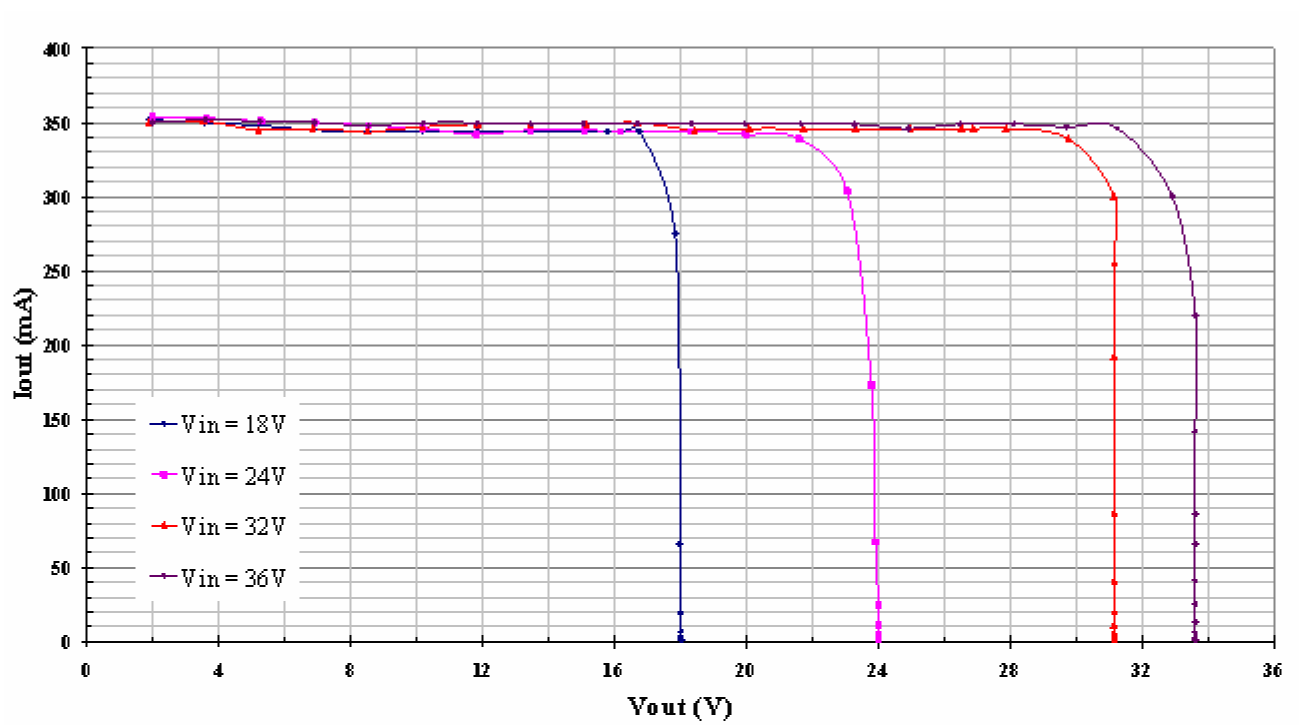


Figure 13. Iout vs. Vout, Iout = 350mA and Vin = Constant Values

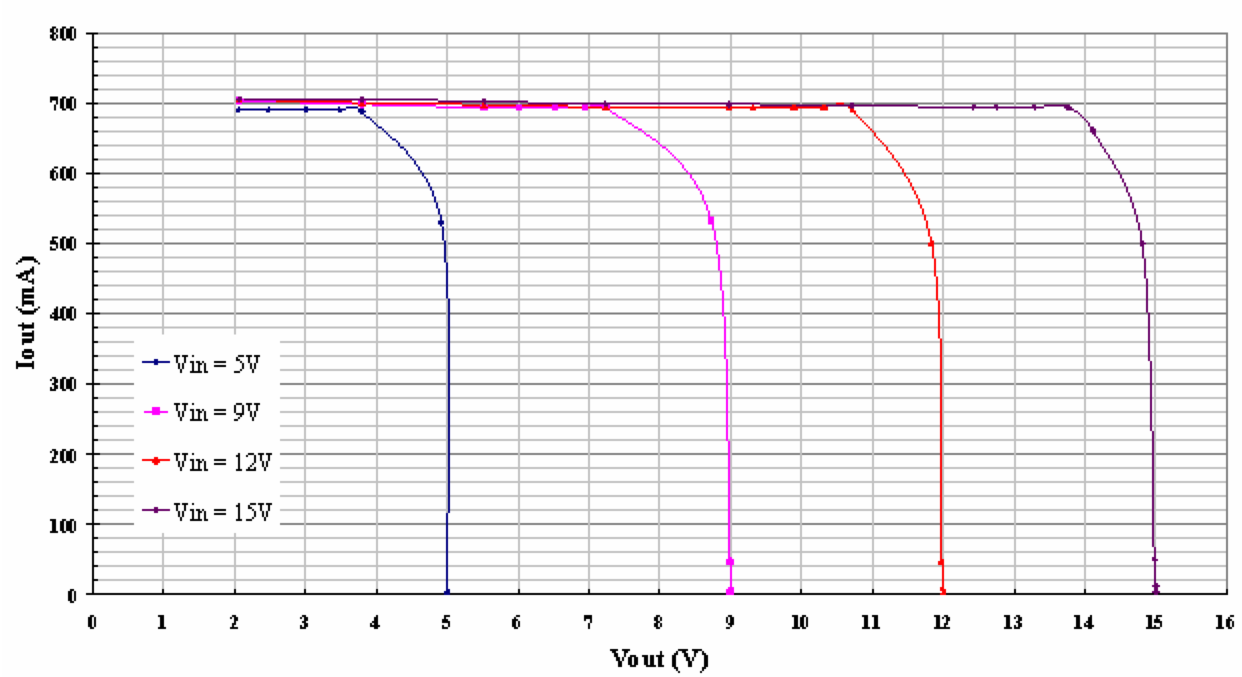


Figure 14. Iout vs. Vout, Iout =700mA and Vin = Constant Values

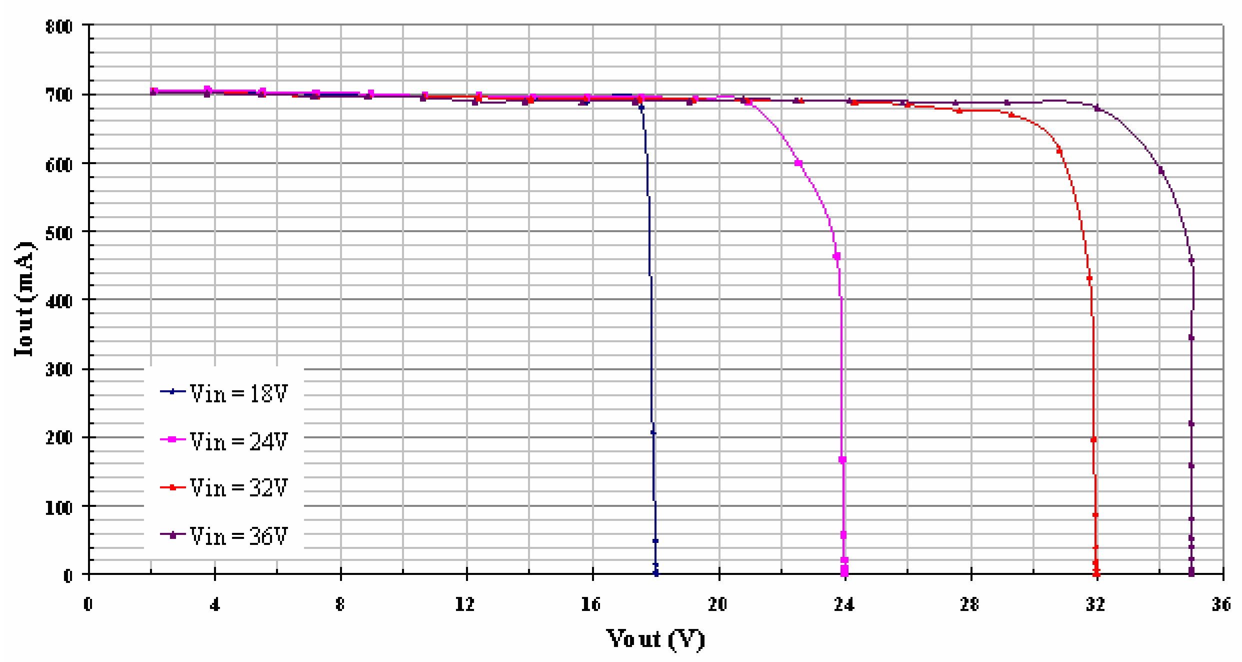


Figure 15. Iout vs. Vout, Iout =700mA and Vin = Constant Values

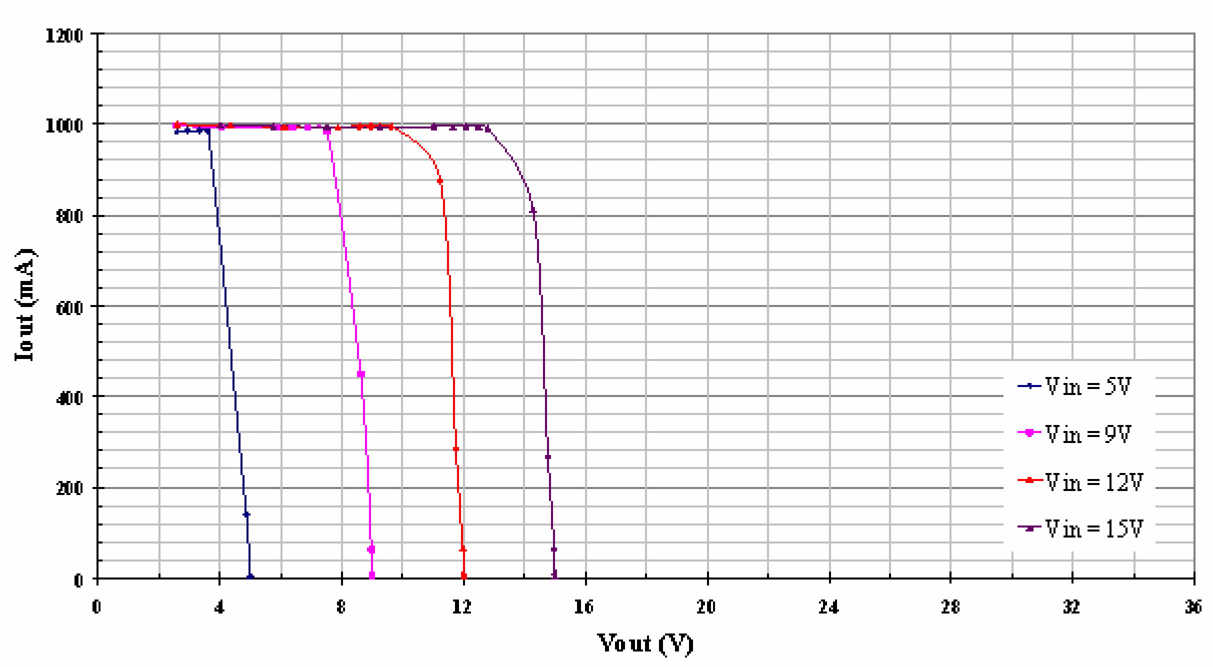


Figure 16. Iout vs. Vout, Iout =1000mA and Vin = Constant Values

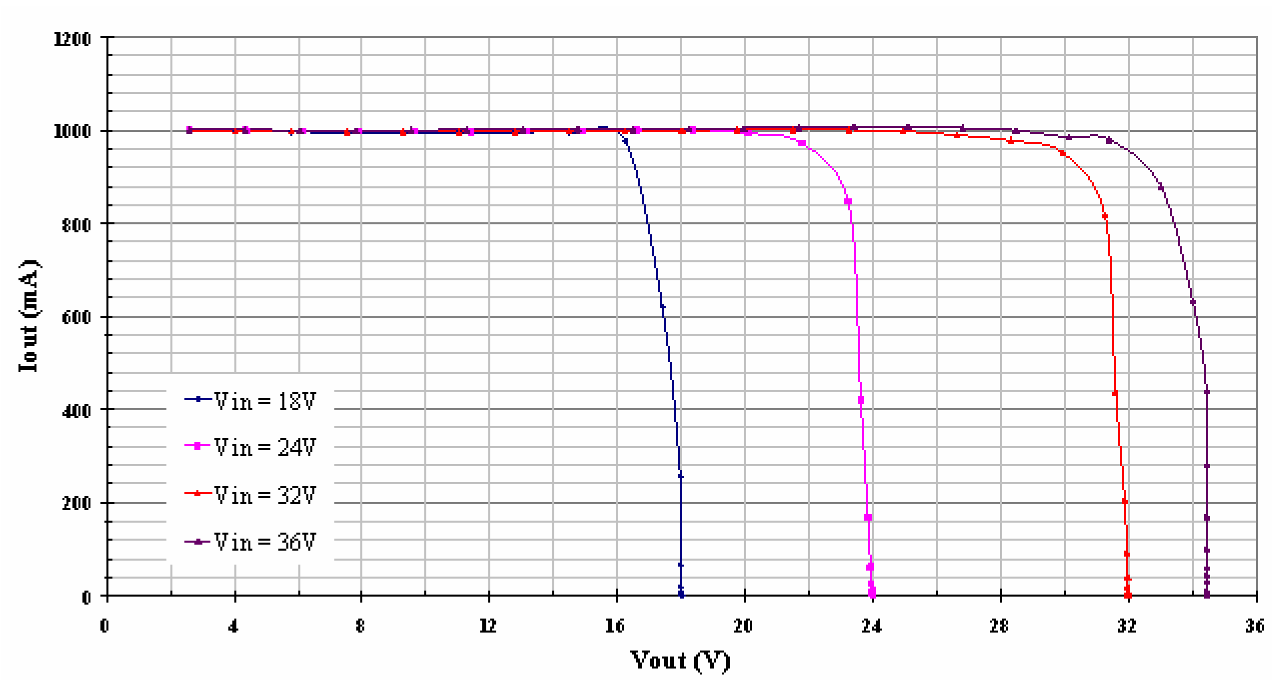


Figure 17. Iout vs. Vout, Iout =1000mA and Vin = Constant Values

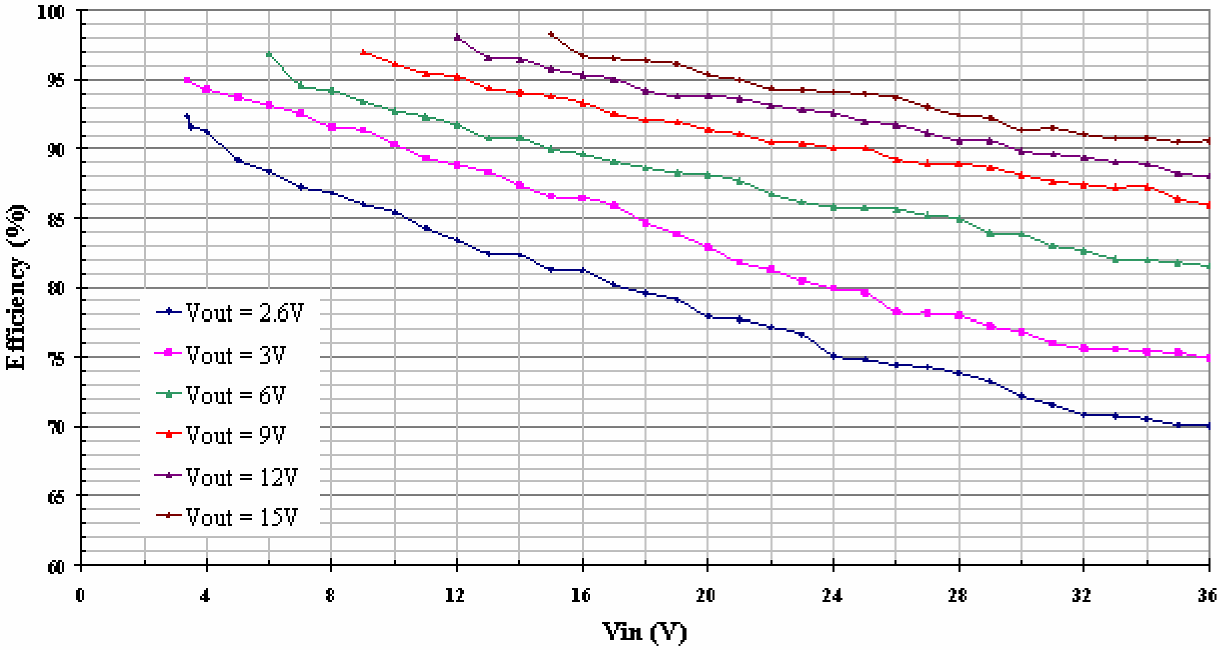


Figure 18. Efficiency vs. Vin, Iout = 350mA and Vout = Constant Values

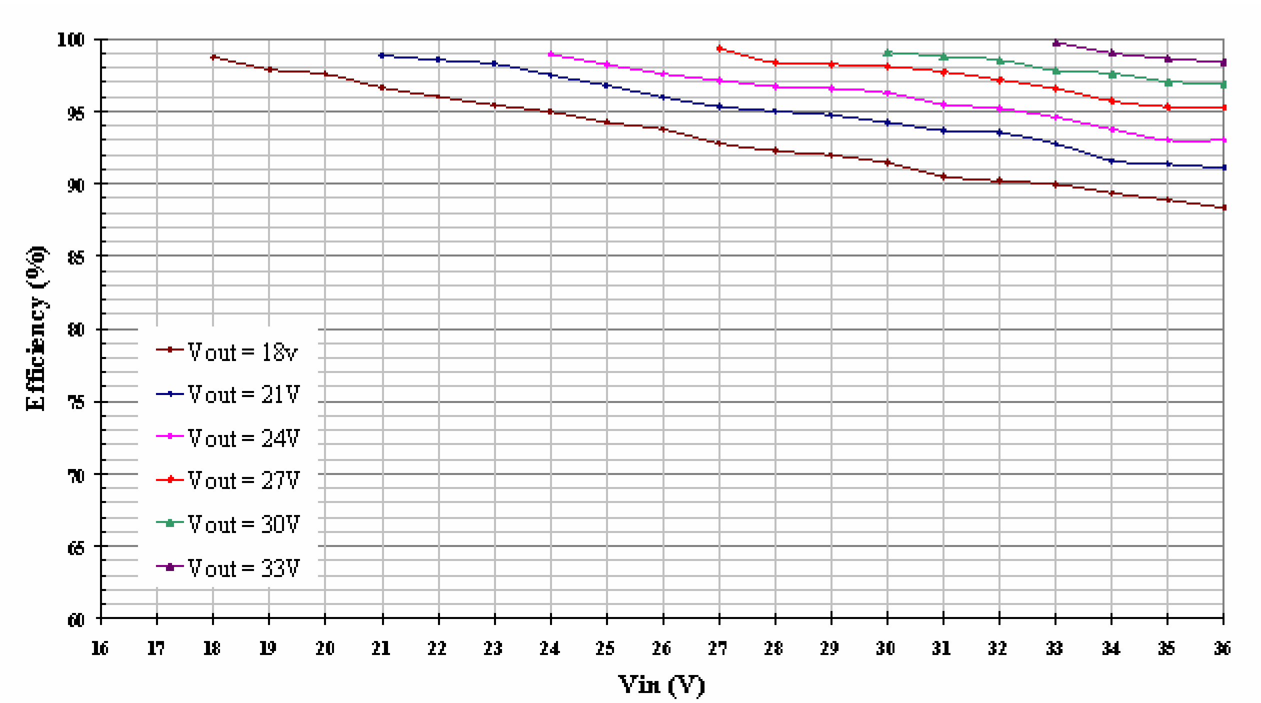


Figure 19. Efficiency vs. Vin, Iout = 350mA and Vout = Constant Values

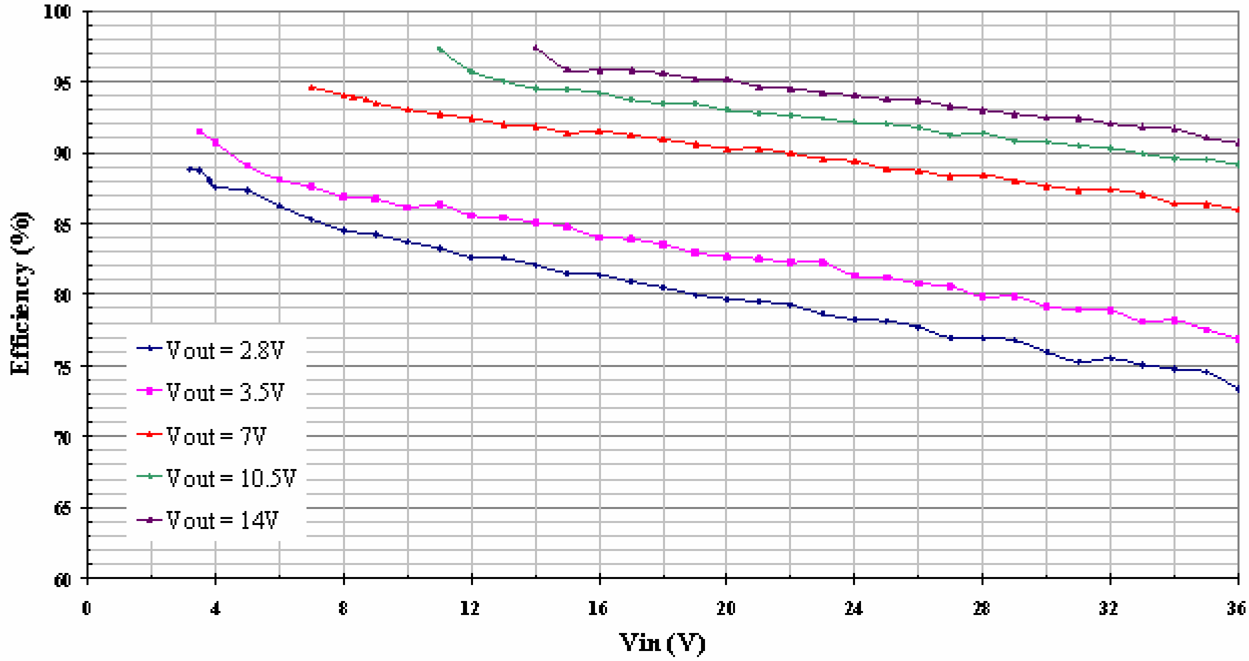


Figure 20. Efficiency vs. Vin, Iout = 700mA and Vout = Constant Values

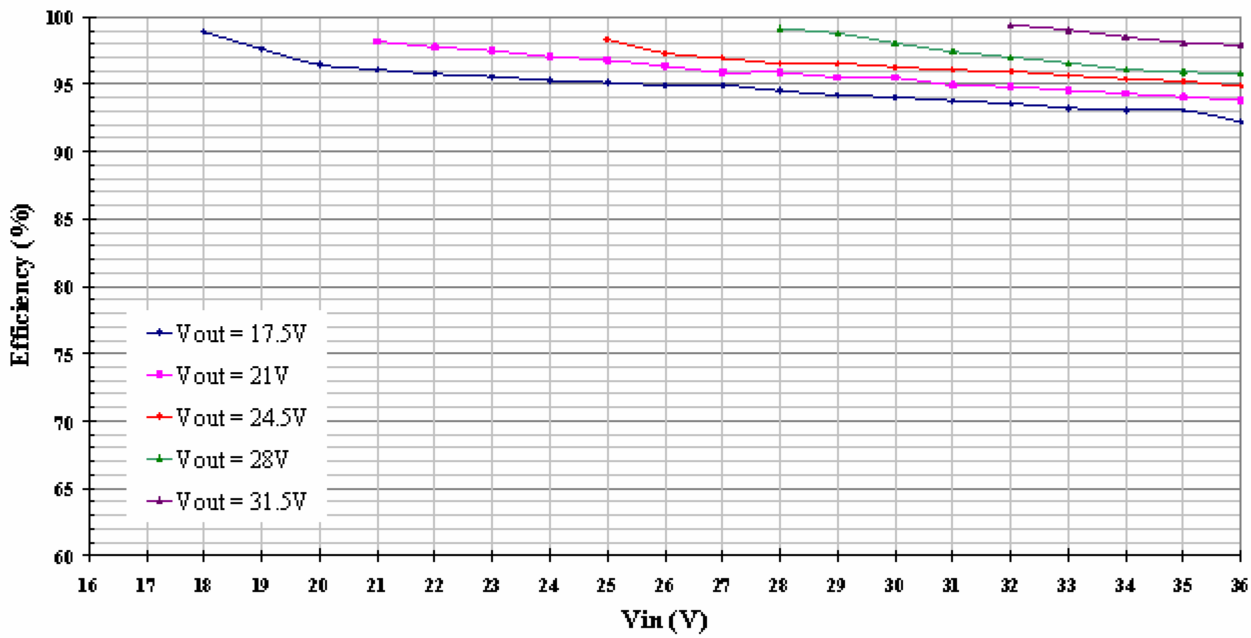


Figure 21. Efficiency vs. Vin, Iout = 700mA and Vout = Constant Values

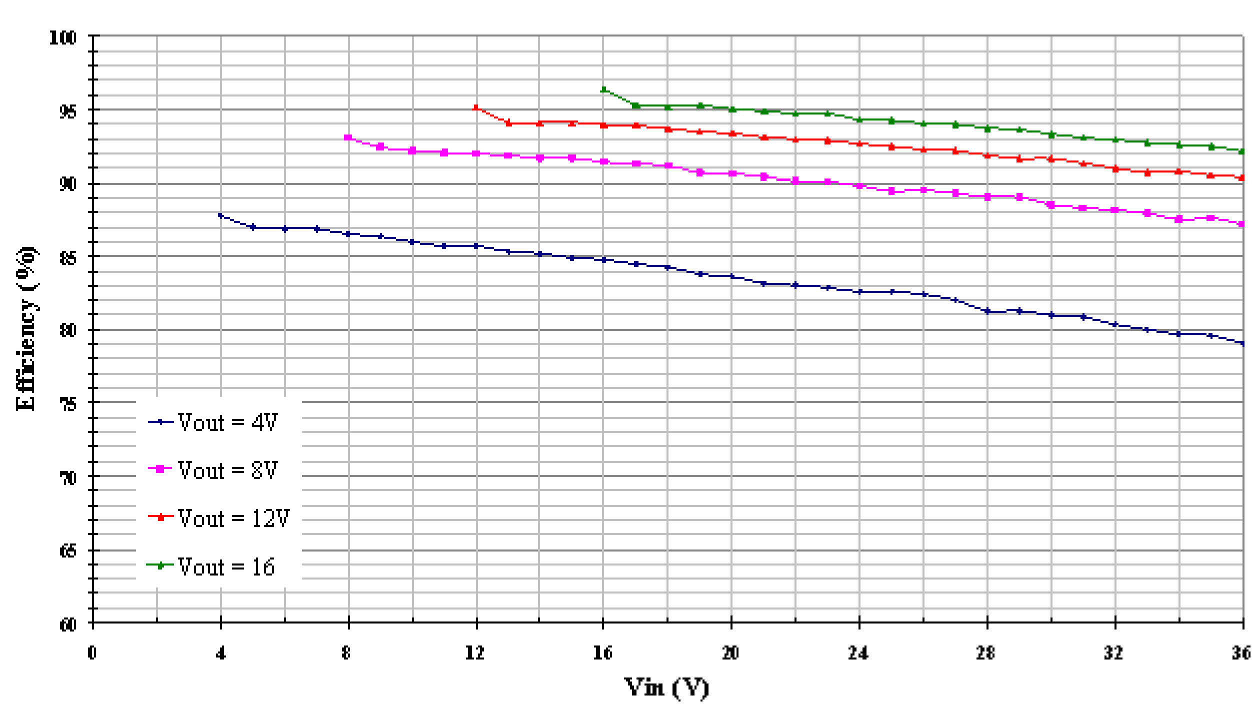


Figure 22. Efficiency vs. Vin, Iout = 1000mA and Vout = Constant Values

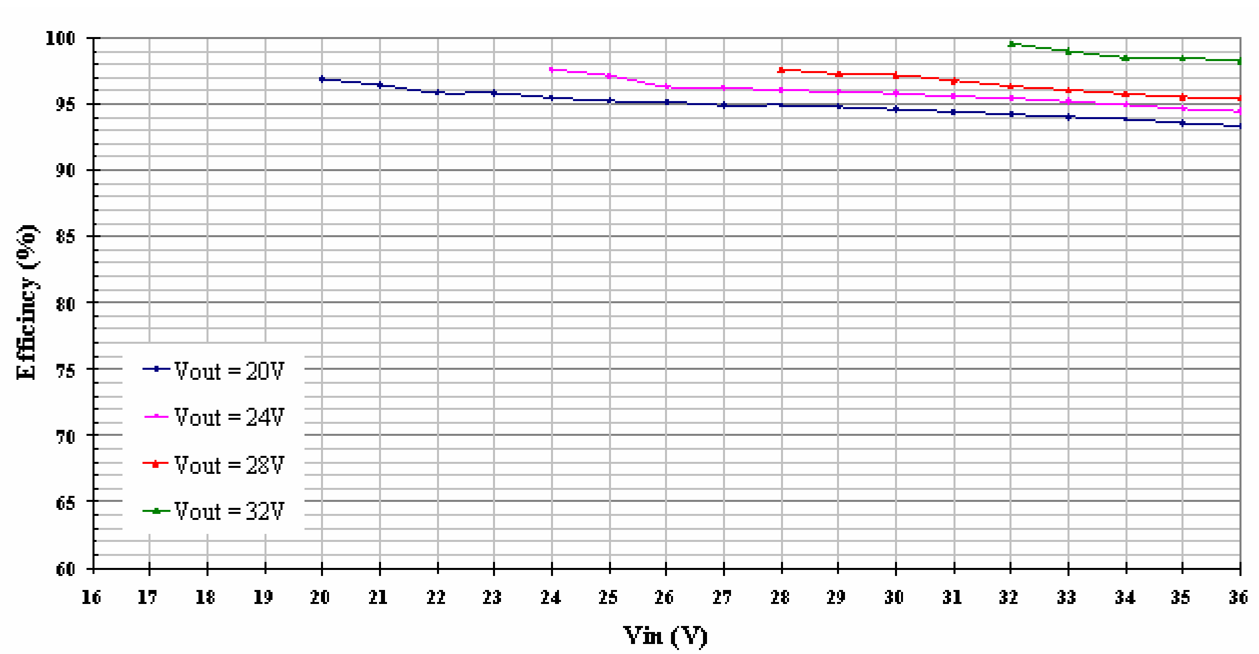


Figure 23. Efficiency vs. Vin, Iout = 1000mA and Vout = Constant Values

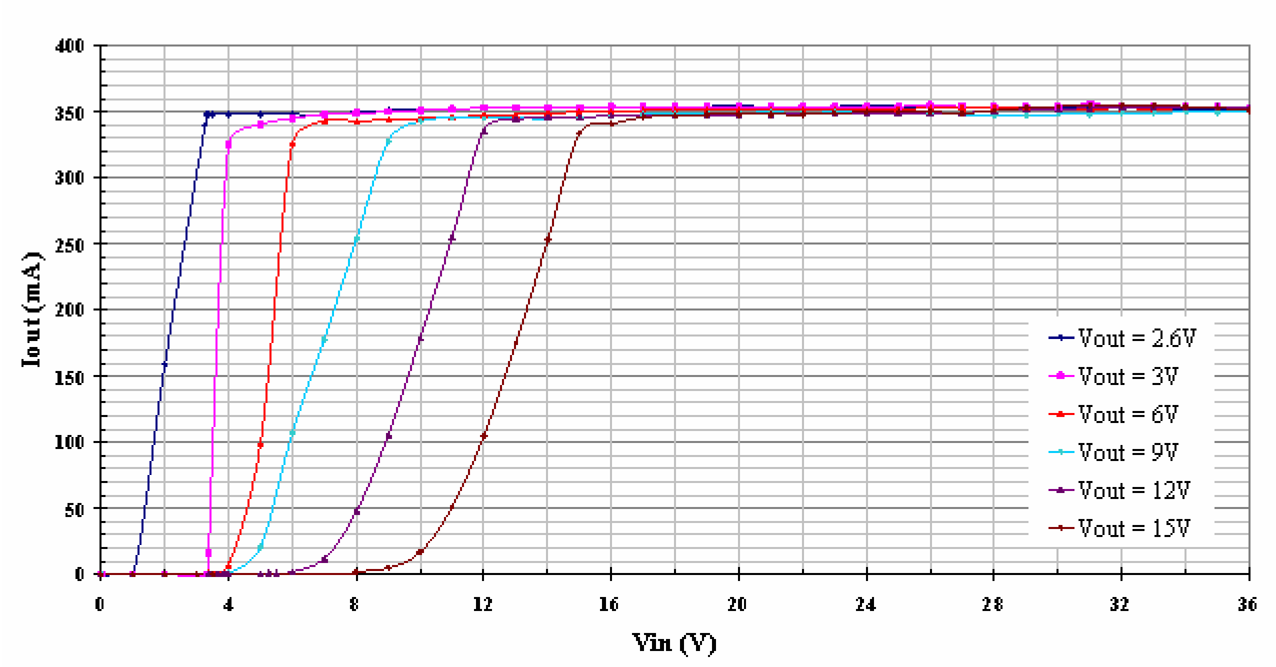


Figure 24. Iout vs. Vin, Iout = 350mA and Vout = Constant Values

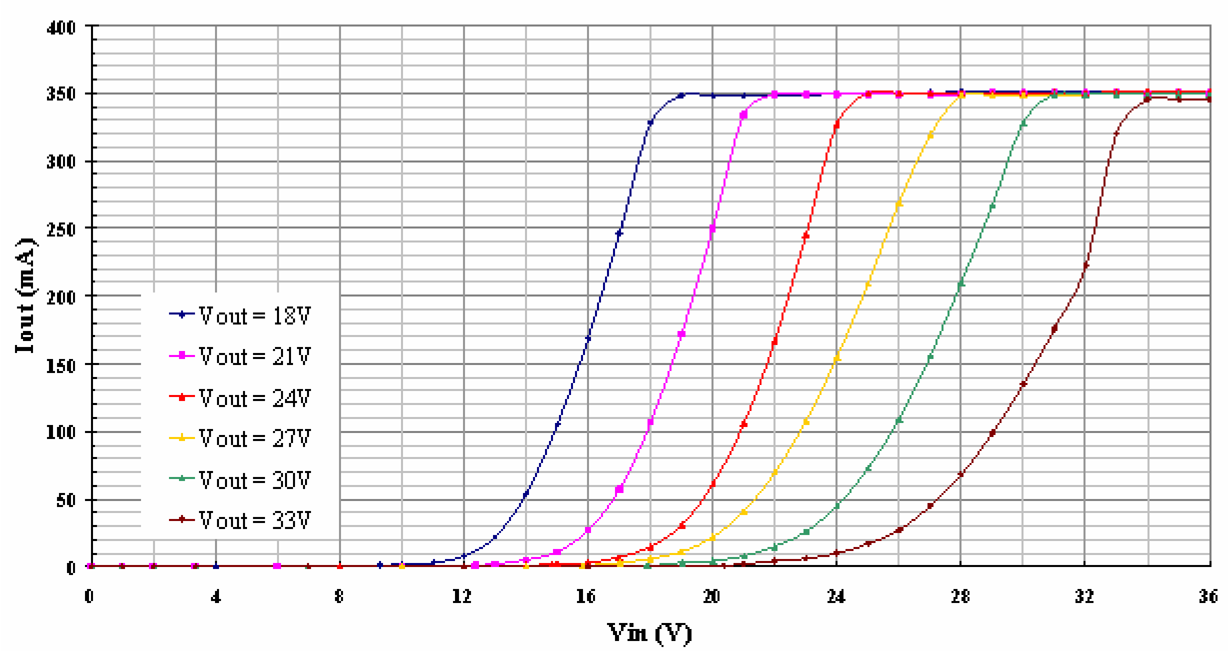


Figure 25. Iout vs. Vin, Iout = 350mA and Vout = Constant Values

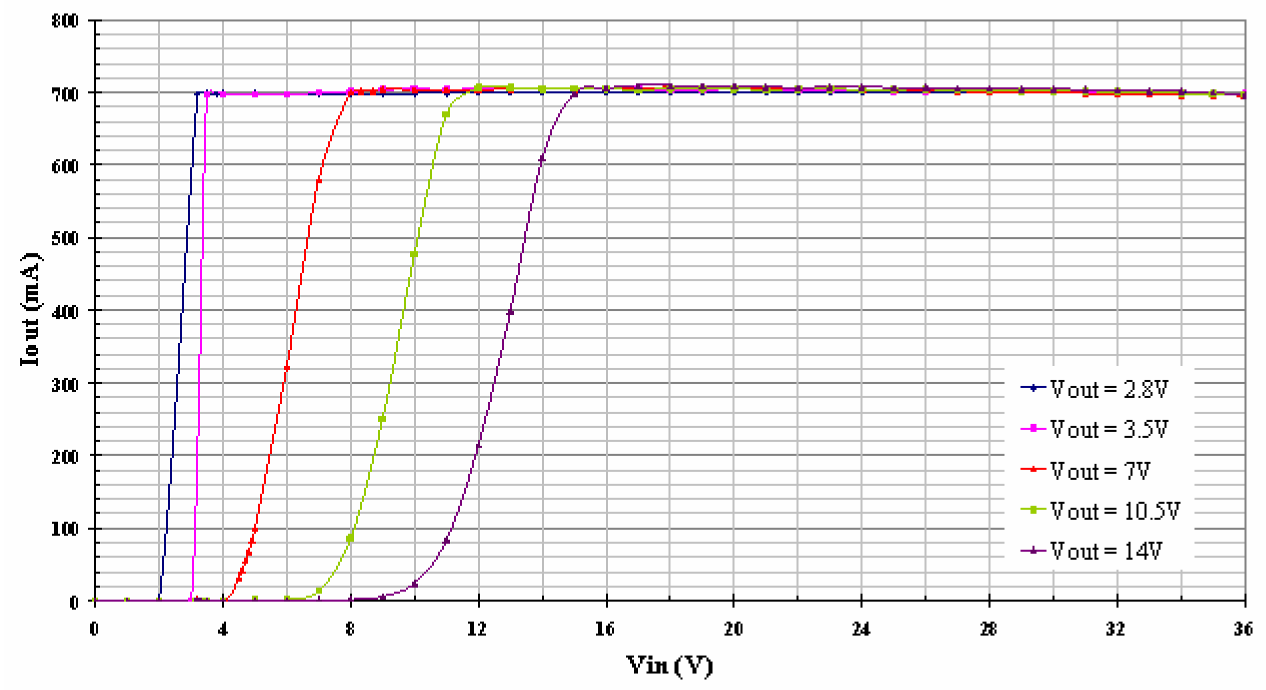


Figure 26. Iout vs. Vin, Iout = 700mA and Vout = Constant Values

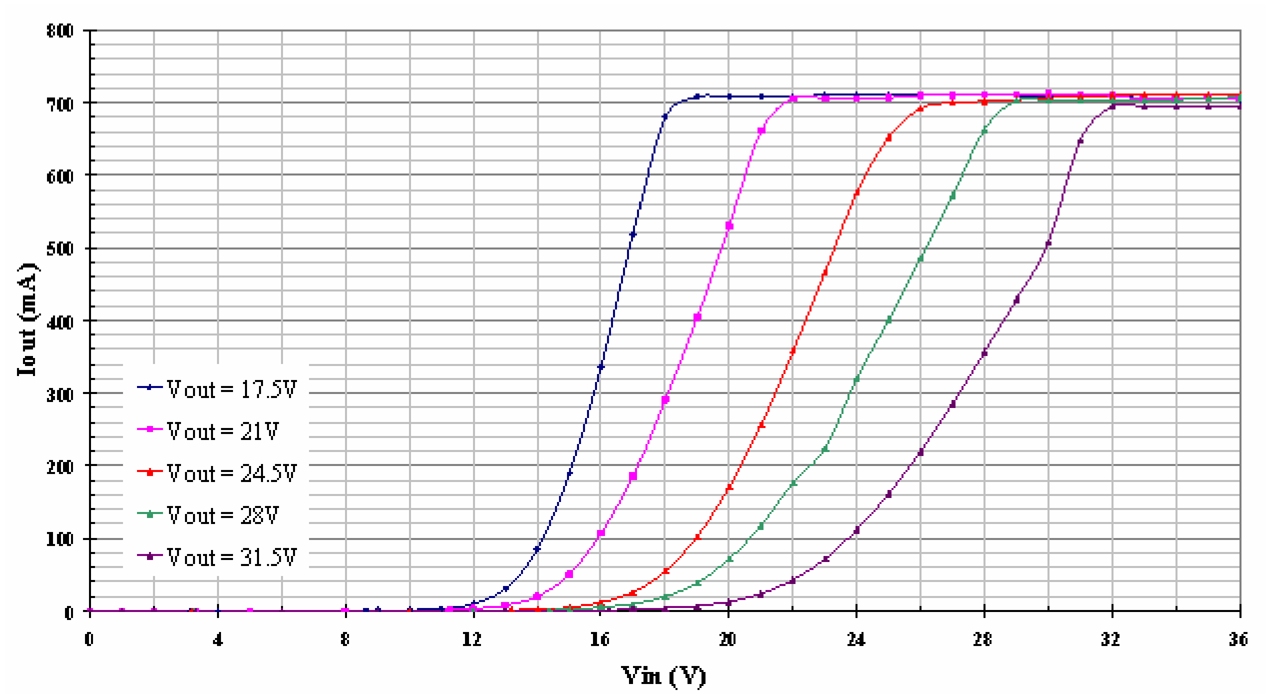


Figure 27. Iout vs. Vin, Iout = 700mA and Vout = Constant Values

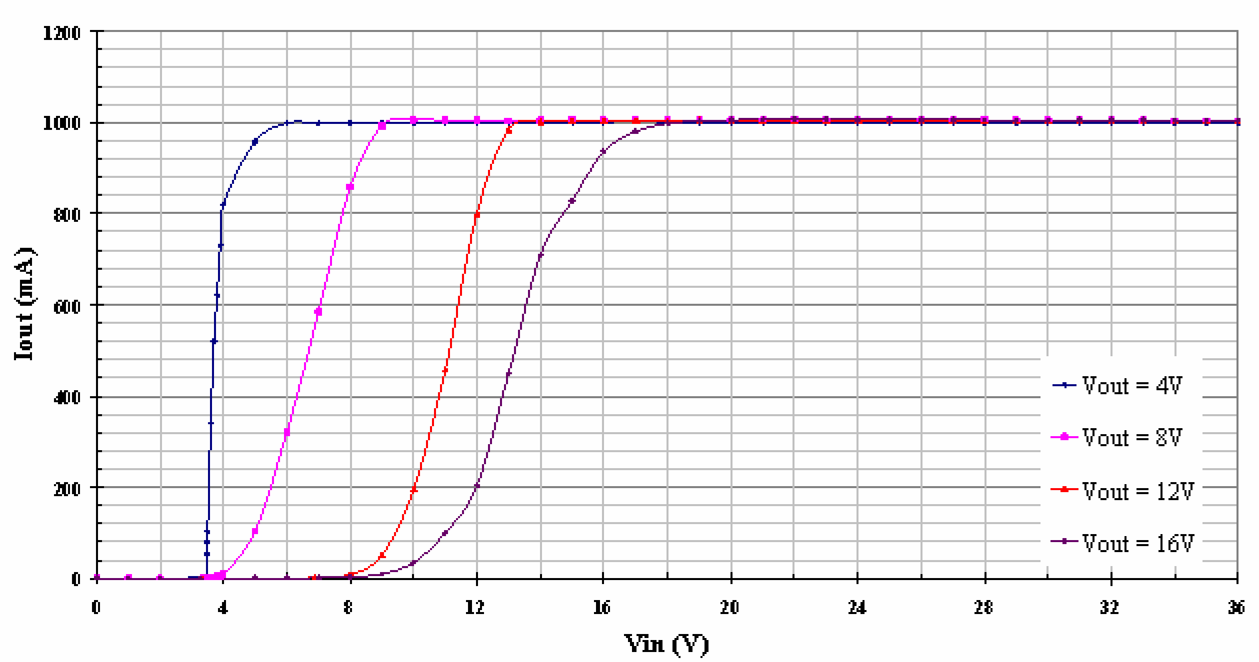


Figure 28. Iout vs. Vin, Iout = 1000mA and Vout = Constant Values

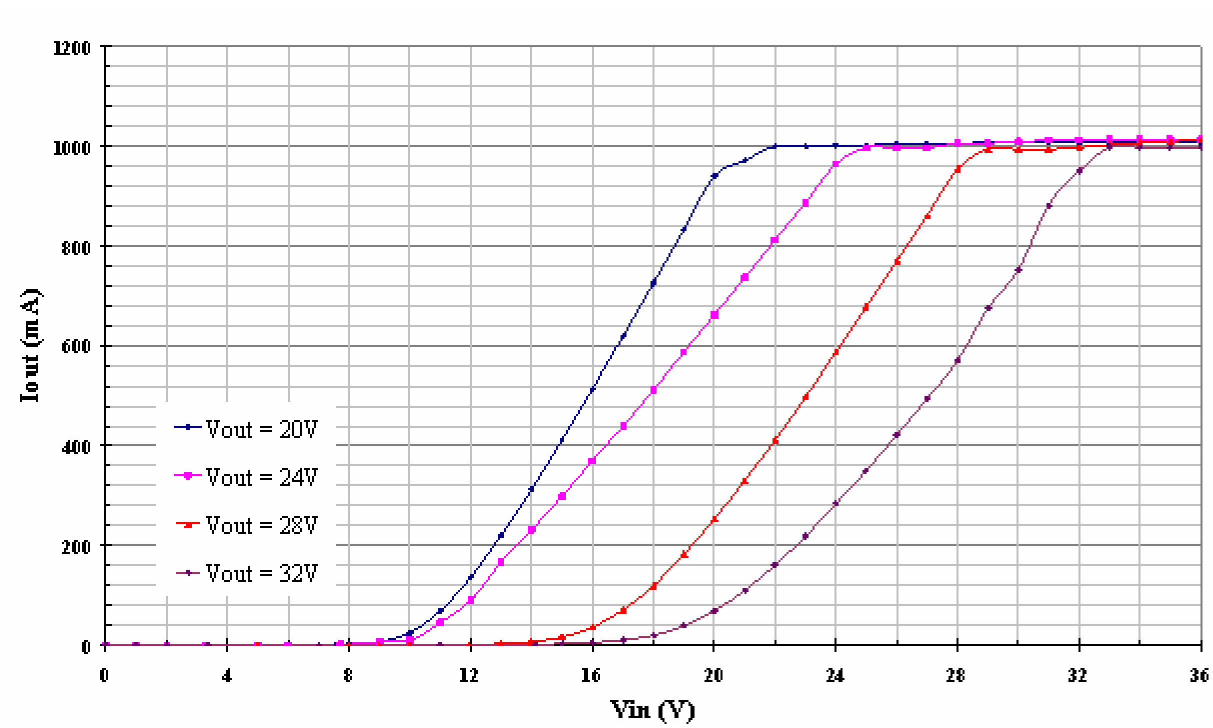


Figure 29. Iout vs. Vin, Iout = 1000mA and Vout = Constant Values

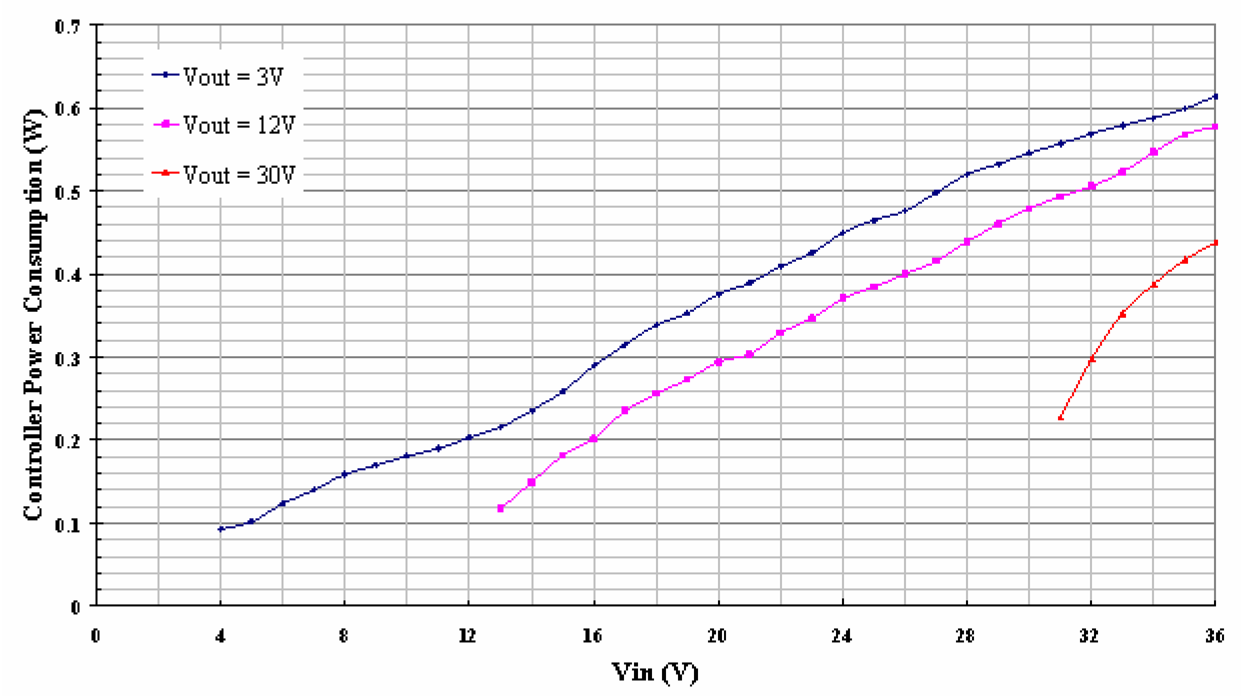


Figure 30. Controller Power Consumption vs. Vin, Iout = 350mA and Vout = Constant Values

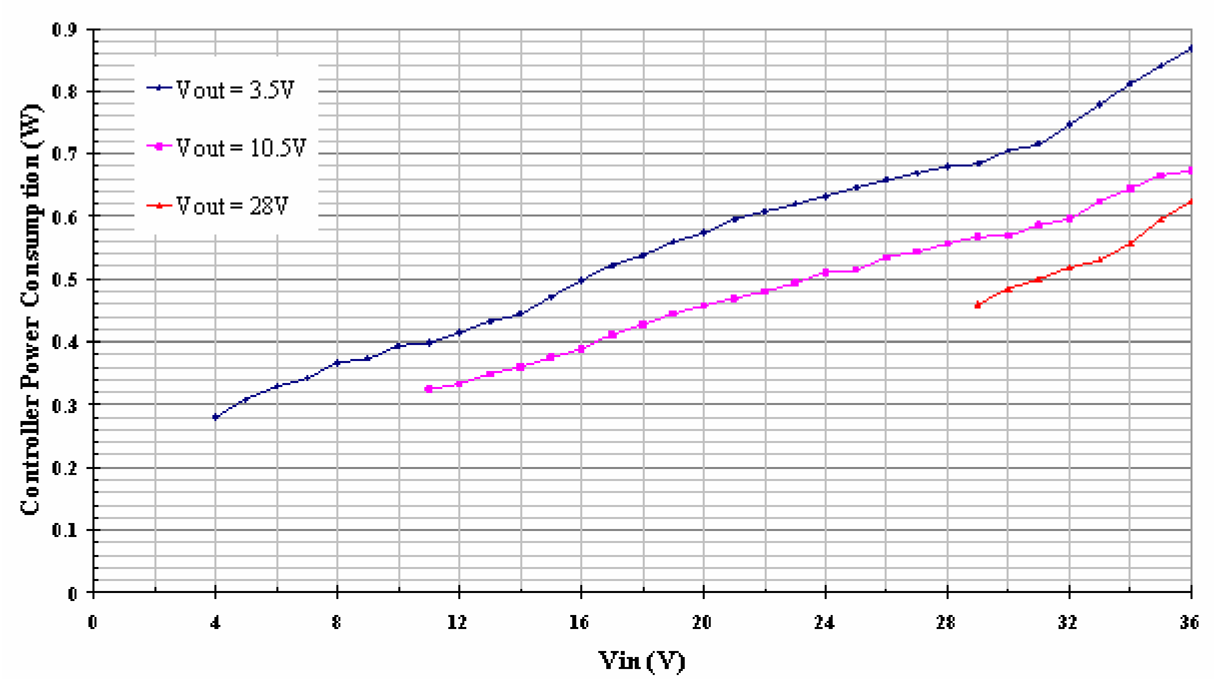


Figure 31. Controller Power Consumption vs. Vin, Iout = 700mA and Vout = Constant Values

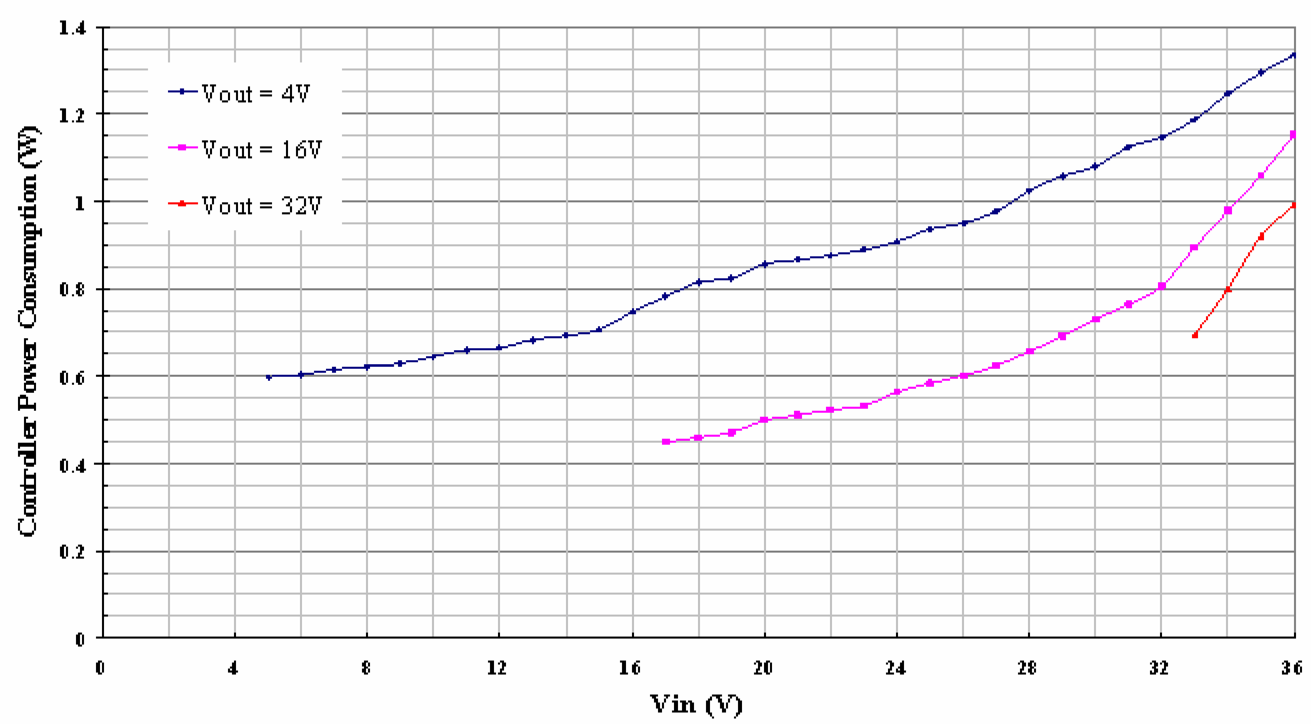


Figure 32. Controller Power Consumption vs. Vin, Iout = 1000mA and Vout = Constant Values

OUTLINE DIMENSIONS

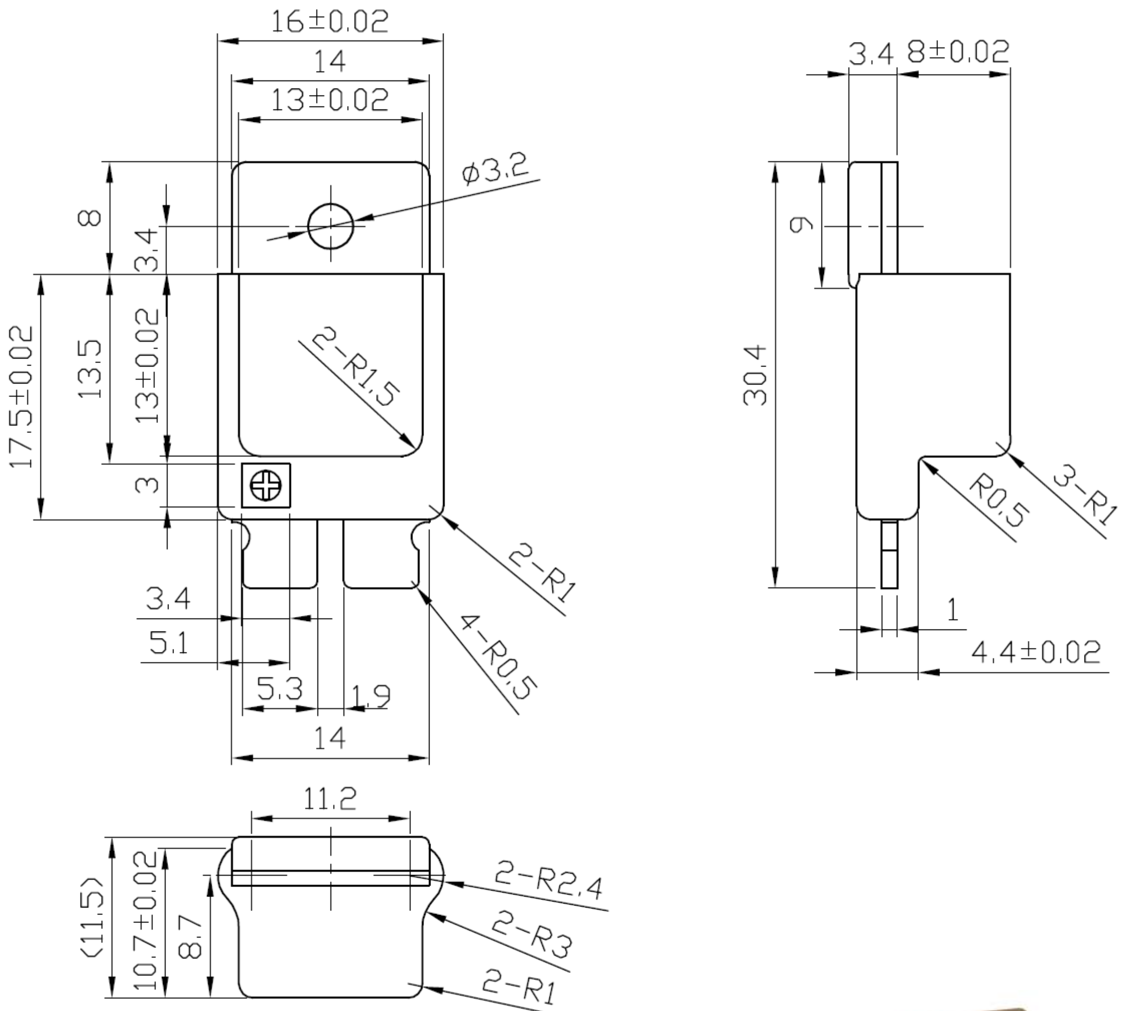
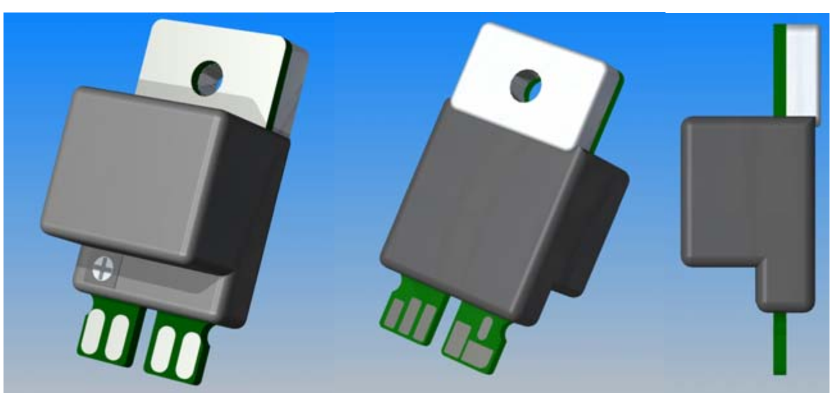


Figure 33. TO-220 Type Package



(a) ABK36V1A1 (b) ABK36V1A1W

Figure 34. Physical photos

ORDERING INFORMATION

Part #	Description
ABK36VFR35A1	Controller of fixed 0.35A output in TO-220 type package without wires
ABK36VFR35A1W	Controller of fixed 0.35A output in TO-220 type package with wires
ABK36VFR7A1	Controller of fixed 0.70A output in TO-220 type package without wires
ABK36VFR7A1W	Controller of fixed 0.70A output in TO-220 type package with wires
ABK36VF1A1	Controller of fixed 1A output in TO-220 type package without wires
ABK36VF1A1W	Controller of fixed 1A output in TO-220 type package with wires
ABK36V1A1	Controller of adjustable 1A output in TO-220 type package without wires
ABK36V1A1W	Controller of adjustable 1A output in TO-220 type package with wires

PRICES

Quantity	1 – 9	10 – 49	50 – 199	200 – 499	≥500
ABK36V1A1 ABK36VF1A1 ABK36VFR35A1 ABK36VFR7A1	\$14.0	\$13.3	\$12.6	\$11.9	\$11.2
ABK36V1A1W ABK36VFR35A1W ABK36VFR7A1W ABK36VF1A1W	\$14.5	\$13.8	\$13.0	\$12.3	\$11.6

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