JM0R15-A: 15V_{dc} Power Supply

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DATE	MAY 5, 2025
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I. OPERATION

This power supply takes the wall outlet (120V_{ac}) and converts it to a constant 15V_{dc}. The supply can produce up to a maximum of 1.5A.

Fig. 1. Assembled module.

II. SPECIFICATIONS

The black binding port is GND, and the red binding port is +15V_{dc}. Refer to Fig. 1.

Absolute Maximum Ratings	
Output current	1.5 A
Delivered Power	11.25 W

Electrical Characteristics				
Parameter	*Min*	*Typ*	*Max*	*Units*
Output Voltage	14.4	15.0	15.6	V
Output Current			1.5	A
Ripple	0.0	4.0		%
Output Impedance	221	229	237	mΩ
Delivered Power			11.25	W

III. CIRCUIT DIAGRAM

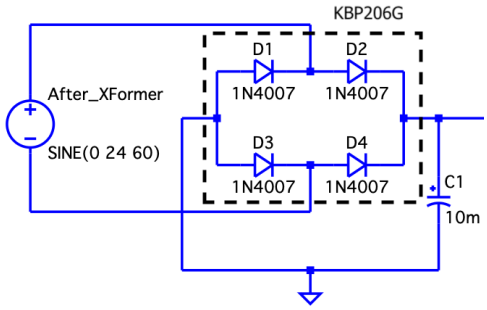

Fig. 2. Stage 1 of the module. The transformer, bridge rectifier, and smoothing capacitor.

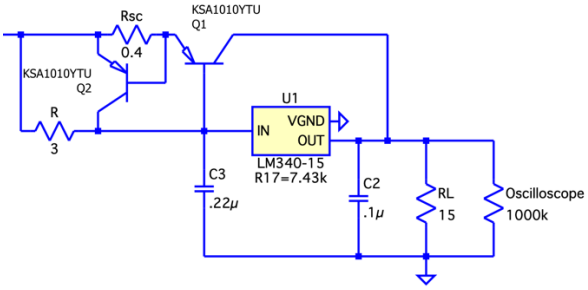

Fig. 3. Stage 2 of the module. The high current BJTs and voltage regulator.

$$R_{sc} = \frac{0.8}{I_{sc}} \qquad \text{Eq. (1)}$$

The device was created in two stages. The first stage, Fig. 2, converts the high AC voltage into a low DC voltage. This is done by first stepping down the voltage with a transformer, then rectifying the wave, and finally "smoothing" out the signal using a high capacitance capacitor.

The second stage amplifies the current and then maintains the voltage at 15V. This is done using a BJT to amplify the current by the β value, and then a voltage regulator to keep the voltage constant.

IV. Additional Features

- On/off switch
- Banana plugs
- Standalone system that only requires to be plugged in
- Supplies up to 1.5 A
- Short circuit protection

References

[1] Learning about Electronics. "How to build a DC power supply." https://www.learningaboutelectronics.com/Articles/How-to-build-a-DC-power-supply.php (accessed Feb. 1, 2025).

[2] Yoocas. "Understanding the basic components of a power supply unit." https://yoocas-electric.com/parts-of-power-supply/#What_Are_the_Essential_Power_Supply_Components (accessed Jan. 30, 2025).