

A bias winding is used to provide feedback to U1. Resistors R2 and R3 should be chosen with 1% tolerance for best voltage accuracy. No opto-coupler or CC sense resistor is required to obtain the CV/CC characteristic shown in Figure 2.

Key Design Points

- Verify that the maximum drain voltage is <650 V at high line and maximum overload condition. Adjust the values of R1 and C2 as necessary. However, avoid making the clamp circuit too dissipative (i.e., low value of R1 and high value of C2) as this will increase the no-load power consumption.
- No-load consumption can be further reduced by increasing C4 to 1 μ F or higher
- A slow blocking diode was selected for D5. Use only a glass passivated (GP) diode type to ensure a reverse recovery time of 2 μ s or less. If unavailable, a fast diode such as FR107 may be substituted. These diode selections recycle some of the clamp energy and increase overall efficiency.
- Capacitor C1 should not be less than 150 nF. This capacitor cannot be eliminated altogether as the switching current must be sourced locally and not directly from the AC input to prevent inductive voltage spikes and increased differential EMI.
- Diodes D1 and D3 are selected as fast diodes for better EMI performance.
- Resistor R4 is a preload resistor to limit no-load output voltage to acceptable limits

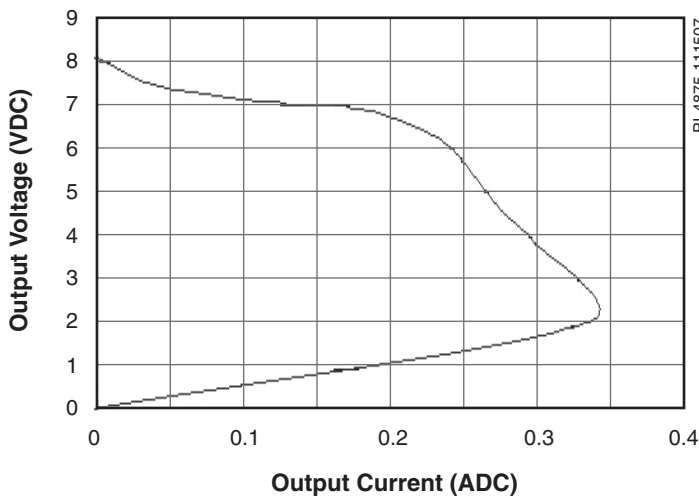


Figure 2. Output VI Characteristics at 230 VAC Input (Measured at Ambient Temperature).

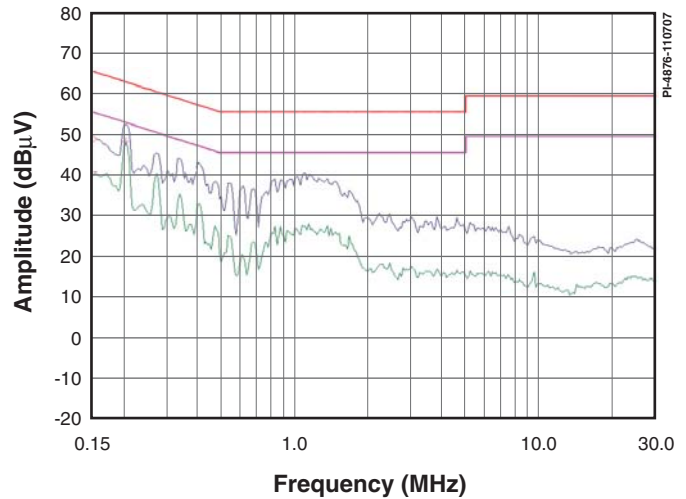


Figure 3. Worst Case Conducted EMI Scan to EN55022 B Limits. (Output RTN Connected to Earth).

Transformer Parameters

Core Material	EE16 NC-2H or equivalent, gapped for ALG of 237 nH/t ²
Bobbin	EE16, 10 pin horizontal
Winding Details	Bias: 25T x 1, 0.2 mm, tape (reverse wound) Primary: 108T x 1, 0.14 mm, tape Shield: 8T x 3, 0.25 mm, 2 layers tape 7 V: 8T x 1, 0.5 mm TIW, tape
Winding Order	Bias (4-5), Primary (1-2), Shield (NC-2), 7 V (7-6)
Primary Inductance	2749 μ H, \pm 5%
Primary Resonant Frequency	400 kHz (minimum)
Leakage Inductance	75 μ H (maximum)

Table 1. Transformer Parameters. AWG = American Wire Gauge, TIW = Triple Insulated Wire, NC = No Connection.

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