

Feedback is provided from the output via photodiode U2A, whose bias point is set through the TL431 programmable shunt regulator U3. Resistors R25 and R11 form a voltage divider network that sets the output voltage to 24 V. Resistor R10 and capacitor C36 provide compensation for the feedback network. Resistor R27 and capacitor C35 form a phase boost network that helps to improve the phase margin of the system. Resistor R9 provides a bias current to the shunt regulator, U3, while the photodiode, U2A, is not conducting. Resistor R26 sets the overall loop gain as well as limiting the current through U2A during transients.

Key Design Points

- RCD clamp components may be sized for normal operation as Zener diode VR1 will assure a safe clamping voltage during start-up and load transients.
- The current limit was programmed to a lower value using resistor R28 to approximately 50% of the internal current limit. This allows a larger TOPSwitch-HX part to be used in the application, increasing efficiency.
- The core size and the winding wire diameter sizes (see Table 1) were chosen based on the average of the peak and the continuous output power.
- The number of turns in the primary and secondary windings and the primary inductance values (see Table 1) were chosen based on the peak output power.
- Resistor R13 is used to dampen the high frequency resonant ringing while diode D2 is still conducting, thereby improving EMI.

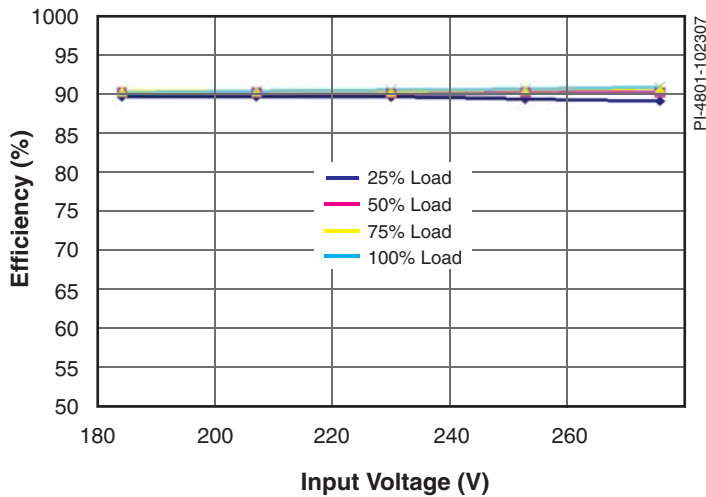


Figure 2. Efficiency Versus Load, at Standard Line Voltages

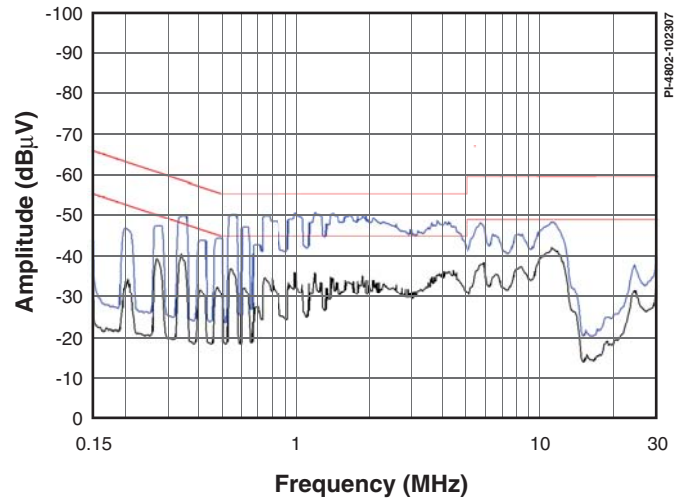


Figure 3. Worst Case Conducted EMI (230 VAC) Output Floating

Transformer Parameters

Core Material	EER28 NC-2H or equivalent, gapped for ALG of 190 nH/t ²
Bobbin	EER28, 12 pin
Winding Details	½ Primary: 38T, 27 AWG, 1 layers tape Secondary: 14T X2, 25 AWG TIW, 3 layers tape Bias: 9T x1, 25 AWG, 3 layers tape ½ Primary: 39T, 27 AWG, 3 layers tape
Winding Order	½ Primary (4–3) Secondary (11,12–7,8) Bias (6–5) ½ Primary (3–2)
Primary Inductance	1240 µH, ±10%
Primary Resonant Frequency	600 kHz (minimum)
Leakage Inductance	31 µH (maximum)

Table 1. Transformer Parameters. (NC = No Connection, TIW = Triple Insulated Wire)

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