

Key Design Points

- Components D5, R1 and C7 form an RCD clamp circuit, absorbing leakage inductance energy during turn off. This energy is partly recovered when C7 resonates with the transformer primary leakage inductance and couples into the secondary side. Resistor R2 damps this resonant ring and improves EMI.
- Diode D5 is a fast diode with reverse recovery t_{RR} of 250 ns. It may be substituted with a cheaper 1N4007GP (glass passivated) diode
- The selectable current limit of U1 allows the current limit and device size to be optimized for the thermal environment. For example, in open frame applications, the TNY276PN part could be used by changing the value of C5 from 0.1 μ F to 10 μ F.
- To prevent an increase in no-load consumption or false OVP triggering, VR1 should be selected to conduct only when the output voltage is outside the normal regulation range. Resistor R5 prevents excessive current from flowing into the BP/M pin.
- To increase coupling between primary and secondary windings, the 3.3 V, 5 V and 8 V windings are all placed on the same layer
- To route currents away from U1 during common-mode surges, the Y1 capacitor C8 is connected between secondary return and the DC bus.

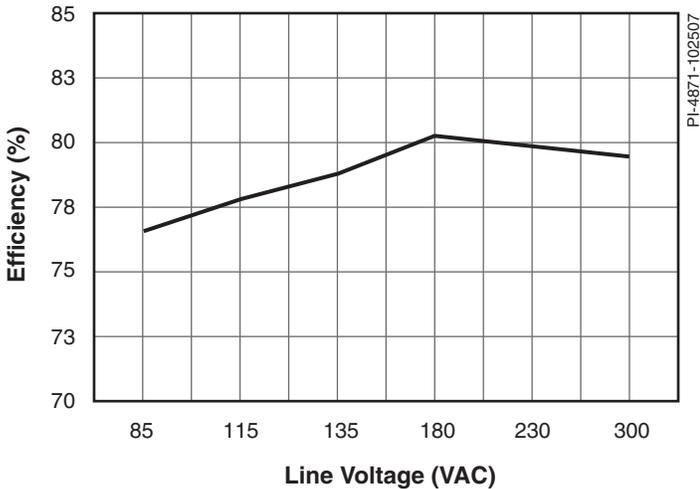


Figure 2. Full Load Efficiency vs Line Voltage.

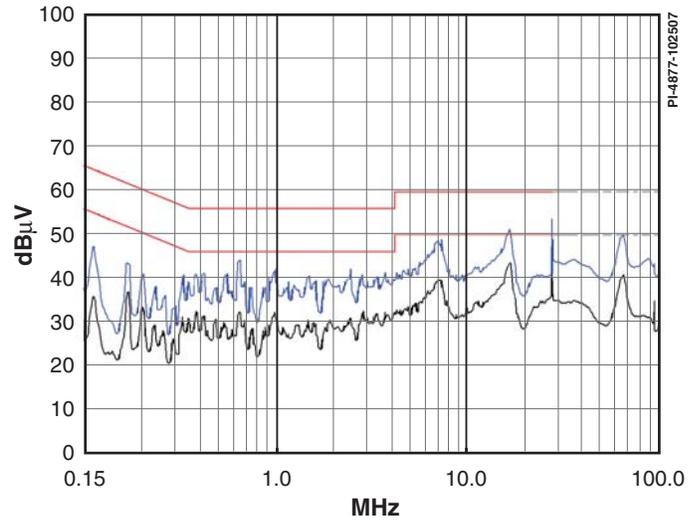


Figure 3. Worst Case Conducted EMI at 230 VAC With Output Grounded (CISPR-22 Limit Lines Shown).

Transformer Parameters

Core Material	EF25 NC-2H or equivalent, gapped for ALG of 420 nH/t ²
Bobbin	EF25, 10 pin, Horizontal
Winding Details	3 mm margins on both sides of bobbin to meet safety Shield: 14T × 2, AWG29, tape Primary-1: 29T × 1, AWG29, tape Bias: 11T × 2, AWG29, 3 layers tape 3.3 V: 2T × 2, AWG25 5 V: 1T × 1, AWG25 (same layer as 3.3 V) 8 V: 1T × 1, AWG25 (same layer as 3.3 V), 1 layer tape 22 V: 8T × 2, AWG29, 3 layers tape Shield: 1T Foil 2 mils thick, tape Primary-2: 29T × 1, AWG29, 2 layers tape
Winding Order	Shield (1 - NC), Primary-1 (3-2), Bias (4-5), 3.3 V (7-6), 5 V (8-7), 8 V (9-8), 22 V (10-9), Shield (NC-1), Primary-2 (2-1)
Primary Inductance	1547 μ H, \pm 10%
Primary Resonant Frequency	500 kHz (minimum)
Leakage Inductance	40 μ H (maximum)

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

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