Flyback Inductor Specification for the UCC28600 Greenmode Quasi-Resonant Converter

The flyback transformer plays a crucial role in the performance of the green mode controller. Considerations must be given to adequate coupling for the bias windings, minimizing leakage inductance, and minimizing audible noise. All of these criteria can easily be met with proper transformer design from the start.

GENERAL:

Topology:	Quasi-Resonant Flyback with Bias Winding	
Main Output Power:	90	W
Anticipated Overall Efficiency of the Converter:	0.9	
Maximum Switching Frequency:	130.0E+3	Hz
Minimum Switching Frequency:	Burst packets of 40kHz pulses at loads of 15% or less	

INPUT:

Minimum Input Voltage:	101.82	V
Maximum Input Voltage:	374.77	V
Peak PRIMARY Current:	3.96	A
PRIMARY RMS Current:	1.61	A
Duty Cycle at Minimum Input Voltage, Maximum Load:	0.50	
Duty Cycle at Maximum Input Voltage, Maximum Load:	0.21	

OUTPUTS:

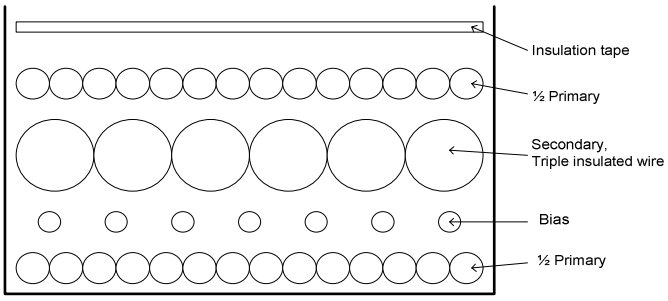
SECONDARY Output Voltage:	24	V
SECONDARY Output Peak Current:	16.93	A
SECONDARY RMS Current:	6.764	A
BIAS Voltage:	12	V
Approximate RMS BIAS Current:	44.5E-3	A

INDUCTANCE AND TURNS RATIO:

Magnetizing Inductance:	239.9E-6	H
Maximum Leakage Inductance:	6.0E-6	H
PRIMARY to SECONDARY Turns Ratio (N_{PRI}/N_{SEC}):	4.276	
PRIMARY to BIAS Turns Ratio (N_{PRI}/N_{BIAS}):	8.552	
Isolation Requirement:	1500	V

SPECIAL NOTES REGARDING THE FLYBACK TRANSFORMER:

1. The BIAS windings must be well coupled to the PRIMARY. Interleave BIAS ans SECONDARY windings between the primary for equal coupling.
2. Use bundled stranded wire.
3. Encase the windings in as much Ferrite as possible; a round post core is a must to help reduce leakage.
4. Do not use tape barriers. Use triple insulated wire on the SECONDARY to meet the isolation requirement while minimizing leakage inductance.
5. Must be potted or heavily varnished to reduce audible noise. Also, fill the gap with flexible epoxy to reduce audible noise.
6. Distribute the BIAS windings over the entire width of the bobbin.
7. Place the dot end of the PRIMARY winding as close to the core as possible to help shield the dv/dt noise.
8. Wind the SECONDARY so that the non-dot end is the outer most layer.



Example of a recommended transformer design. Use multiple strand wire to distribute each of the coils across the layer.

For more information refer to: http://focus.ti.com/lit/an/slua418/slua418.pdf