

Engineering Test Report (12V/500mA Adapter, LNK625PG)

Date: Aug 27, 2008

FAE: Tiny He

1. Power supply specification:

| Description | Symbol | Min | Typ | Max | Units | comment/conditions |
|---------------------------|-----------|-----|-------|-----|-------|----------------------------|
| Input | | | | | | |
| Voltage | V_{IN} | 90 | | 264 | Vac | 2 Wire no P.E |
| No-load Input Power | | | | 100 | mW | Input 264 Vac |
| Output | | | | | | |
| Load Output Voltage | V_{out} | | 12.0 | | V | |
| Load Output Current | I_{out} | | 0.5 | | A | |
| Ripple | | | | 50 | mV | 20 MHz Bandwidth |
| Total Output Power | | | | | | |
| Continuous Output Power | P_{out} | | 6 | | W | Total power |
| Peak Output Power | | | 6 | | W | |
| Conducted EMI Margin | | | 10 | | dB | EN55022 class B |
| Efficiency(ES2.0) | η | | 73.41 | | % | 115 and 230VAC only |
| Ambient Temperature | T_{amb} | 0 | | 40 | C | Free convection, sea level |

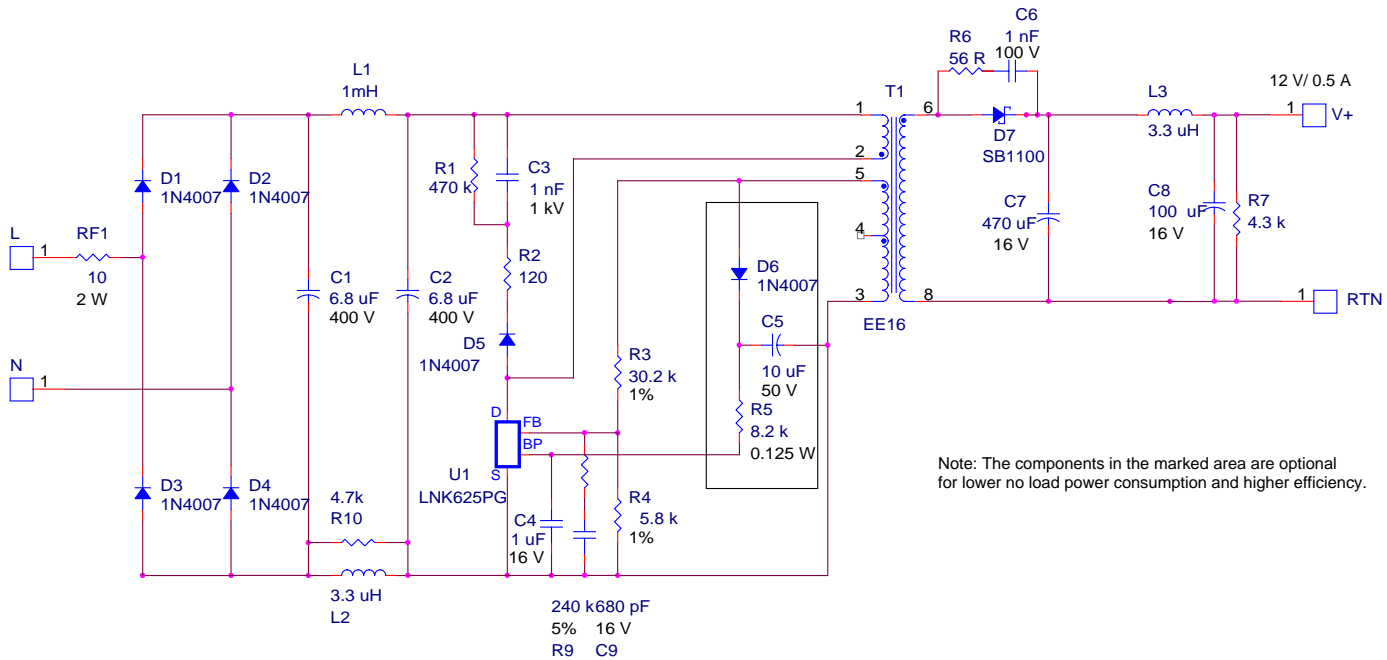
2. Features:

- 1) Low part count
- 2) Higher efficiency and low no load power consumption
- 3) No Opto and TL431
- 4) Meet energy star 2 efficiency requirement.

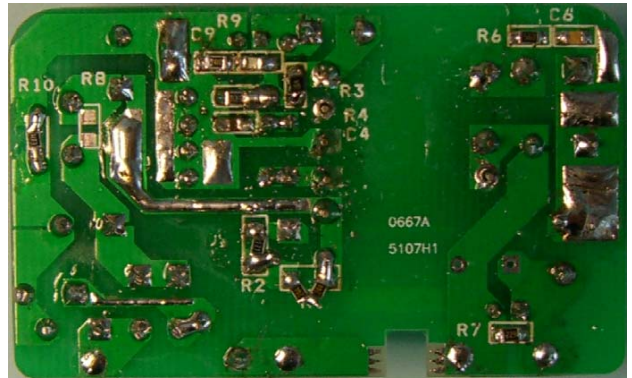
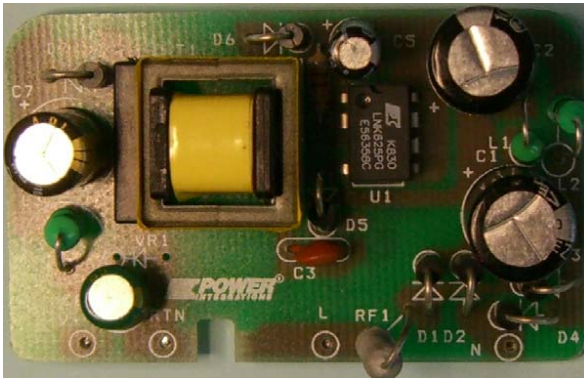
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3. Schematic:



4. Photograph:



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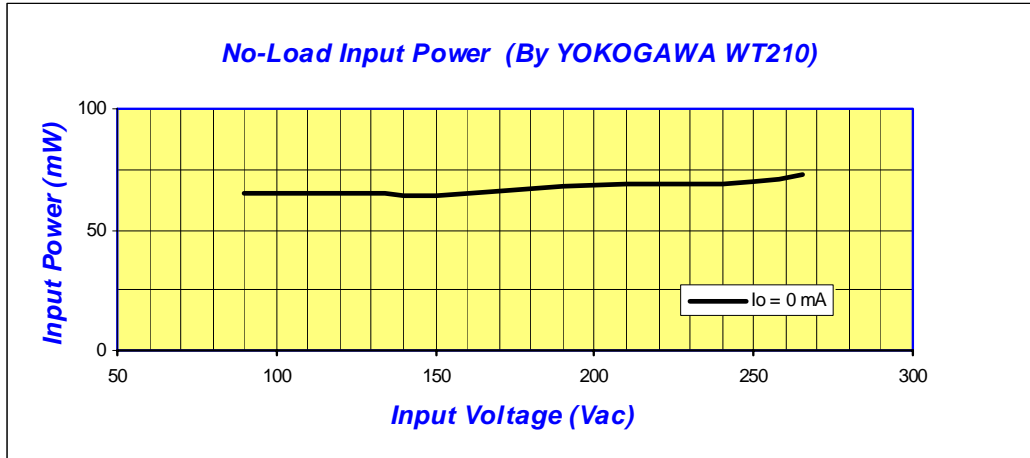
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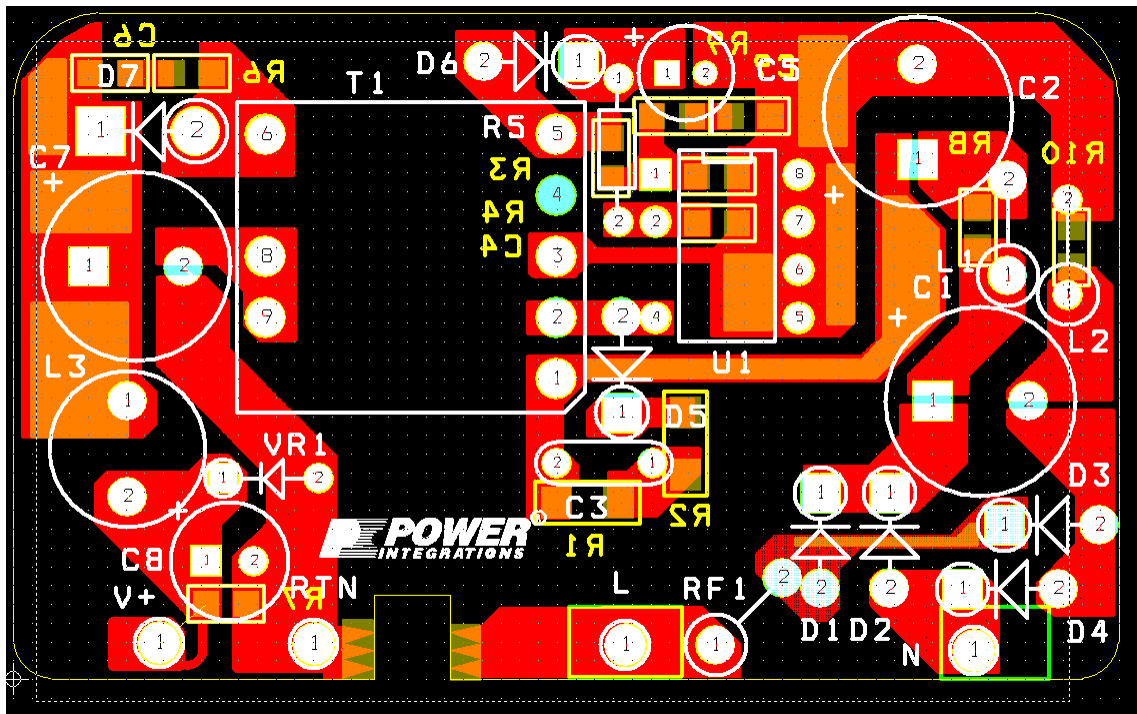
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5. No-load power consumption:



6. PCB layout:



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7. Efficiency test:

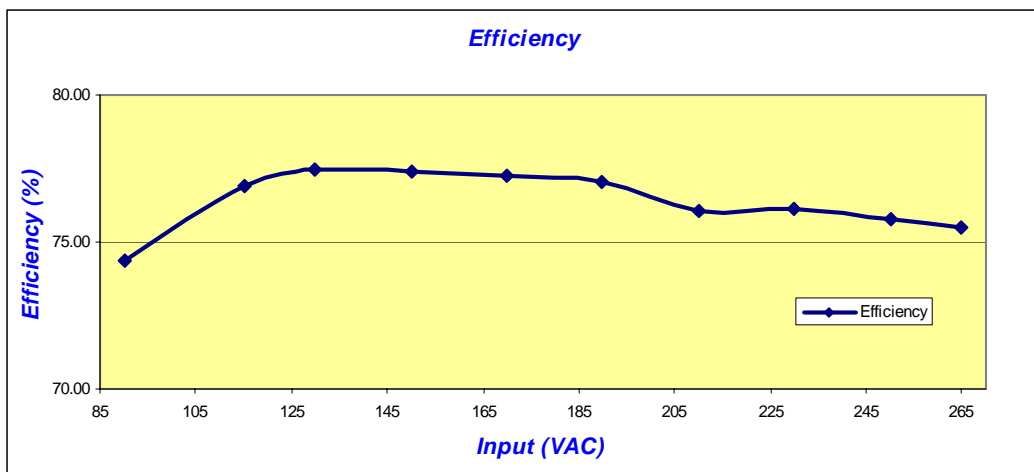
Condition:

Tested at load terminal with 1.8m 26 AWG output cable.

| Loading | 125mA | 250mA | 375mA | 500mA | Ave. Eff. |
|---------|--------|--------|--------|--------|---------------|
| 230Vac | 74.83% | 75.86% | 76.34% | 75.42% | 75.61% |
| 115Vac | 77.50% | 77.88% | 77.56% | 76.99% | 77.48% |

CEC requirement: $0.09 * Ln6 + 0.5 = 66.13\%$

ES2.0 requirement: $0.0626 * Ln6 + 0.622 = 73.41\%$



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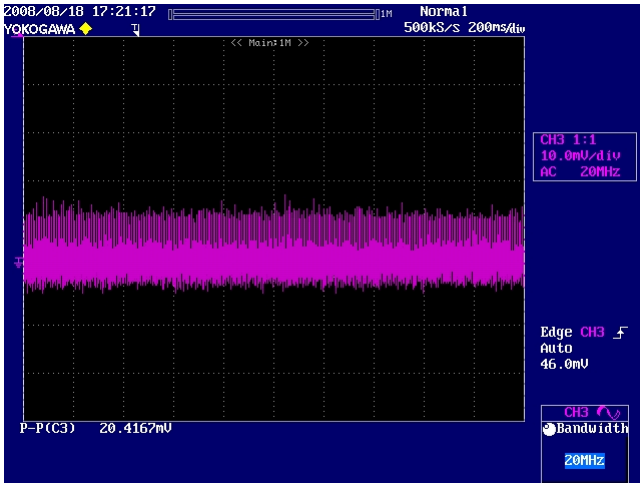
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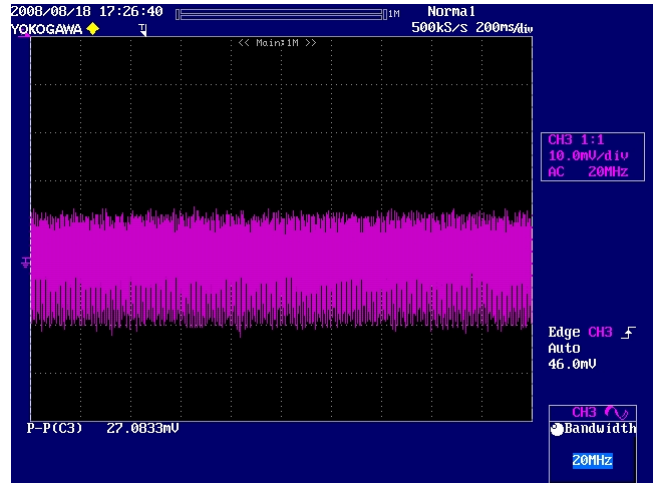
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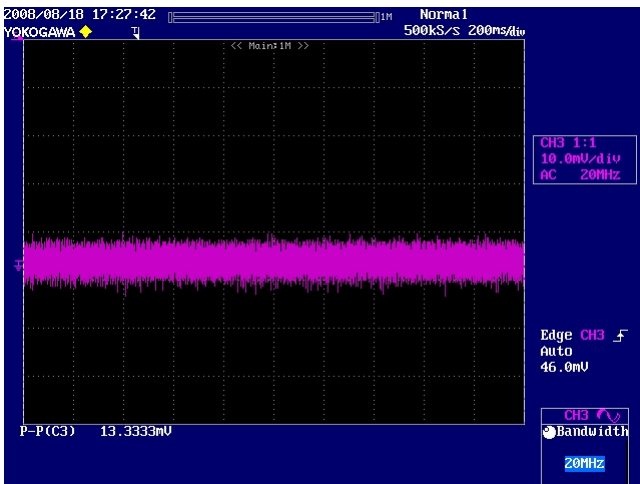
9. Output ripple @500mA(Electronic Load):



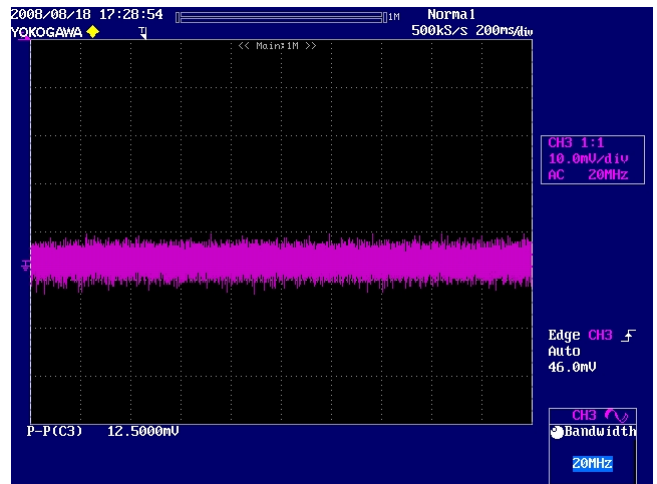
90VAC



115VAC



230VAC



264VAC

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10. Maximum start up drain voltage at full load at high line:



90VAC



264VAC

11. BOM:

| Item | Part Ref. | Qty. | Value | Description |
|------|-------------|------|----------|--|
| 1 | C1 C2 | 2 | 6.8 uF | 6.8 uF, 400 V, Electrolytic, (10 x 15) |
| 2 | C3 | 1 | 1 nF | 1 nF, 1 kV, Disc Ceramic |
| 3 | C6 | 1 | 1 nF | 1 nF, 100 V, Ceramic, X7R, 0805 |
| 4 | C4 | 1 | 1 uF | 1 uF, 16 V, Ceramic, X5R, 0805 |
| 5 | C5 | 1 | 10 uF | 10 uF, 50 V, Electrolytic, Gen Purpose, (5 x 11) |
| 6 | C7 | 1 | 470 uF | 470 uF, 16 V, Electrolytic, Very Low ESR, (8 x 15) |
| 7 | C8 | 1 | 100 uF | 100 uF, 16 V, Electrolytic, Very Low ESR, (6.3 x 11) |
| 8 | C9 | 1 | 680 pF | 680 pF, 50V, Ceramic, X7R, 0805 |
| 9 | D1 D2 D3 D4 | 6 | 1N4007 | 1000 V, 1 A, Rectifier, DO-41 |
| 10 | D7 | 1 | SB1100 | 100V, 1A, Schottky, DO-41 |
| 11 | L1 | 1 | 1 mH | 1000 uH, Axial Ferrite Inductor |
| 12 | L2 L3 | 2 | 3.3 uH | 3.3 uH, Axial Ferrite Inductor |
| 13 | R1 | 1 | 470 k | 470 k, 5%, 1/4 W, Metal Film, 1206 |
| 14 | R2 | 1 | 120 R | 120 R, 5%, 1/4 W, Metal Film, 1206 |
| 15 | R3 | 1 | 30.2 k | 30.2 k, 1%, 1/8 W, Metal Film, 0805 |
| 16 | R4 | 1 | 5.8 k | 5.8 k, 1%, 1/8 W, Metal Film, 0805 |
| 17 | R5 | 1 | 8.2 k | 8.2 k, 5%, 1/4 W, Carbon Film |
| 18 | R6 | 1 | 56 R | 56 R, 5%, 1/8 W, Metal Film, 0805 |
| 19 | R7 | 1 | 4.3 k | 4.3 k, 5%, 1/8 W, Metal Film, 0805 |
| 20 | R9 | 1 | 240 k | 240 k, 5%, 1/8 W, Metal Film, 0805 |
| 21 | R10 | 1 | 4.7 k | 4.7 k, 5%, 1/8 W, Metal Film, 0805 |
| 22 | RF1 | 1 | 10 R | 10 R, 2 W, Fusible/Flame Proof Wire Wound |
| 23 | T1 | 1 | EE16 | EE16, Bobbin, Horizontal, 10 pins |
| 24 | U1 | 1 | LNK625PG | LinkSwitch-CV, LNK625PG |

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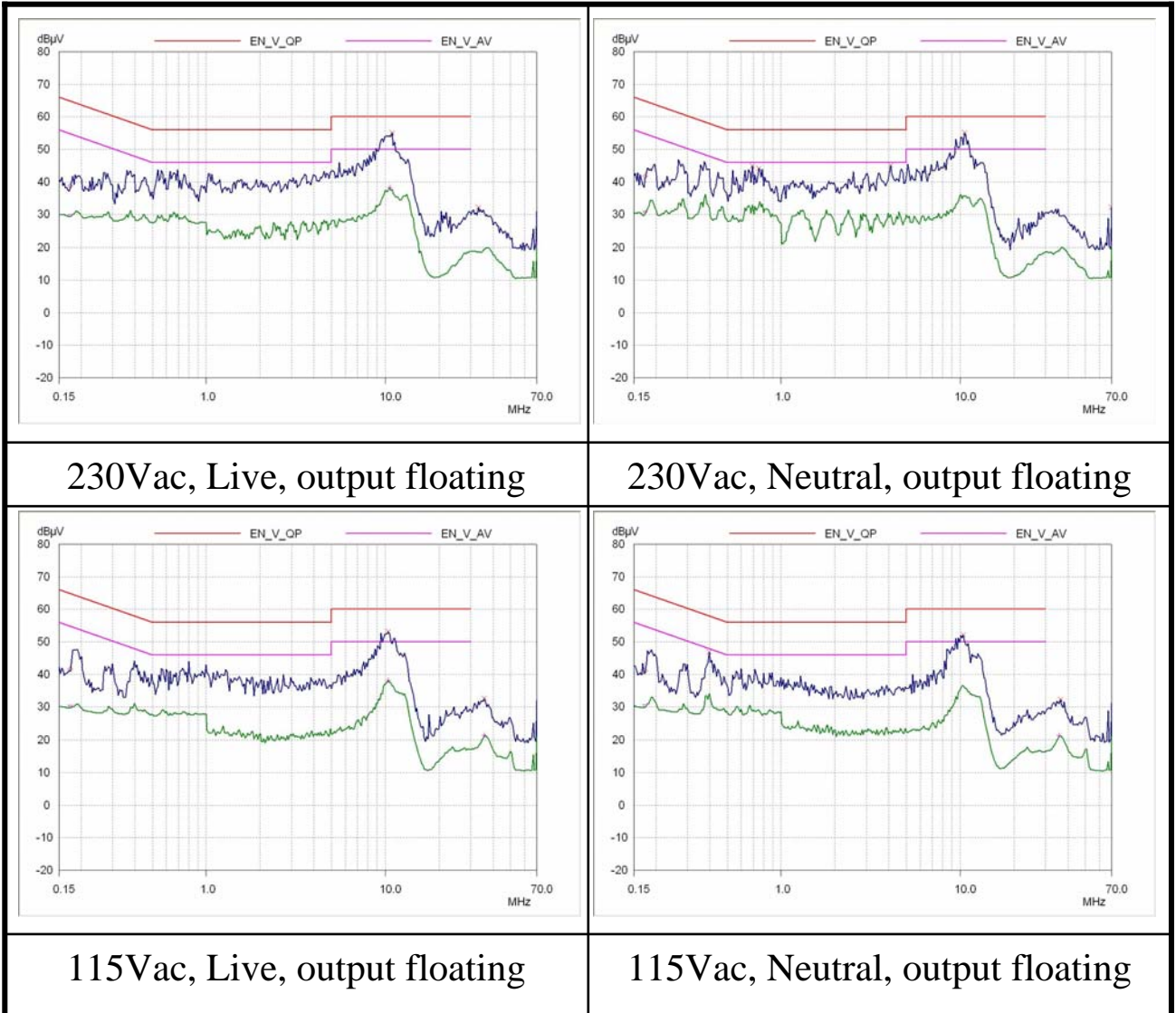
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12. EMI performance @EN55022 class B Limited (PK&AV scan):

Loaded at 500mA resistive load.



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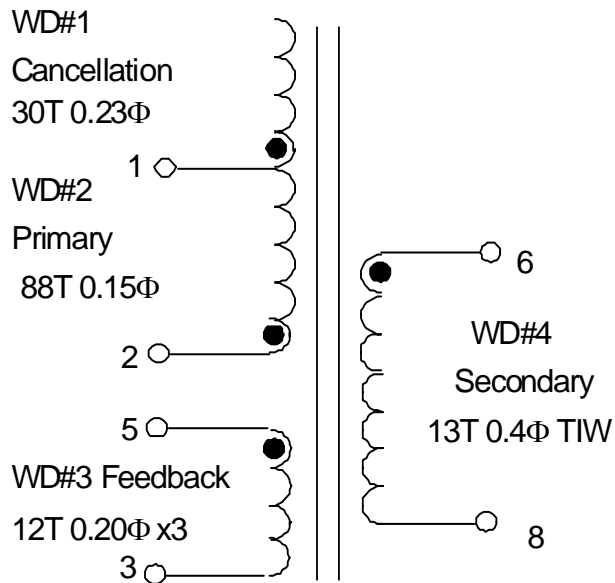
13. Transformer Information:

A. PARAMETERS:

$L_p = 1424\mu\text{H} \pm 10\% @ 100\text{KHz } 1\text{V}$

Leakage inductance: $60\mu\text{H max } @ 100\text{KHz } 1\text{V}$

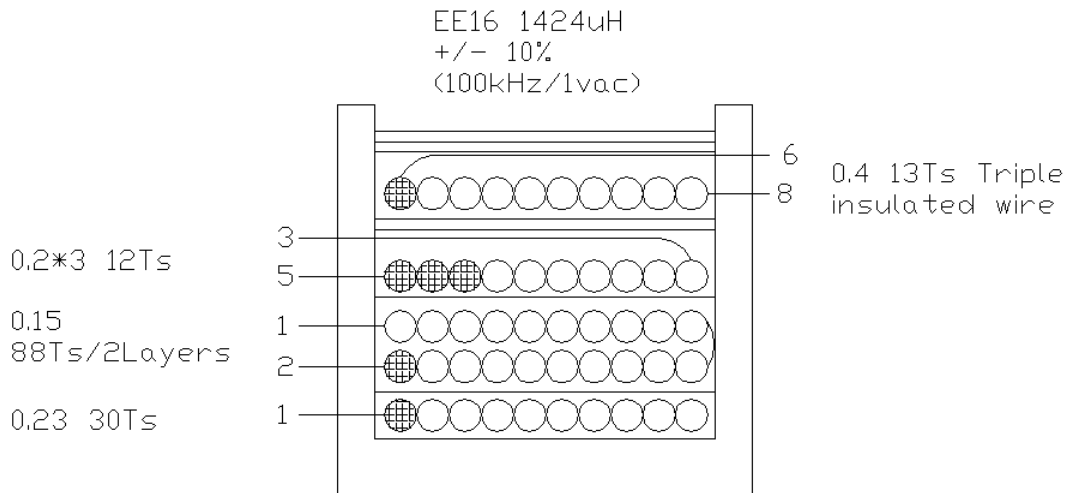
B. SCHEMATIC:



C. WINDING ORDER:

| WINDING | START | FINISH | WIRE | WDG TURNS | Winding Direction |
|---------|-------|----------|---------|-----------|-------------------------|
| WD#1 | PIN1 | Floating | 0.23 | 30 | Left to Right |
| WD#2 | PIN2 | PIN1 | 0.15 | 88 | 2 layers, Left to right |
| WD#3 | PIN5 | PIN3 | 0.20*3 | 12 | Left to Right |
| WD#4 | PIN6 | PIN8 | TIW 0.4 | 13 | Left to Right |

D. WINDING CONSTRUCTION:



14. Thermal Performance:

MEASURE TEMPERATURE OF KEY COMPONENTS AT BOTH ROOM AND HOT (IF APPLICABLE)

| Item | Temperature (°C) | | | |
|------------------|------------------|---------|---------|---------|
| | 90 VAC | 115 VAC | 230 VAC | 264 VAC |
| Ambient | 40 | 40 | 40 | 40 |
| Transformer (T1) | 80.5 | 77.3 | 80.4 | 82 |
| CASE | 55.2 | 53.6 | 54.3 | 54.9 |
| PI Device (UX) | 98.8 | 85 | 88.4 | 91.4 |
| Rectifier (Dx) | 86.5 | 86.3 | 90.9 | 93.2 |

Important Note:

- Although this board is designed to satisfy safety isolation requirements, the engineering prototype has not been agency approved. Therefore, all testing should be performed using an isolation transformer to provide the AC input to the prototype board.
- The products and applications illustrated herein (including circuits external to the products and transformer construction) may be covered by one or more U.S. and foreign patents or potentially by pending U.S. and foreign patent applications assigned to Power Integrations. A complete list of Power Integrations' patents may be found at www.powerint.com.

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