Planar Magnetics For 2 kW to 6.0 kW Converters

Transformers based on our 350 size core are designed for a wide variety of topologies such as forward, half and full bridge, full bridge ZVS, and push-pull. These parts are used in 2 kW to 6.0 kW off-line power supplies and DC-DC converters delivering up to 300 amperes for a single output or 20-50 amperes for multi-output magnetics. Applications are industrial and military where small size, high quality, reliability, repeatability and superior thermal management are of the most importance. For the power it is capable to deliver, this is a very small and rugged package. A typical P350 transformer has a footprint that is smaller than a standard credit card and height from 0.800” to 1.100”. A portable welding equipment is one of many applications where P350 is very suitable. Depending on power rating 350 parts can run without any air flow for cooling. In this case they must be attached to a base plate with controlled temperature. Transformers operating close to a maximum of specified power limit must be cooled by a combination of conduction and air flow. Custom transformers and inductors are available.

6kW Output P/N 1002, Description: P350-8-8
P/N 1002 Application:

This transformer is based on our proprietary 350 size ferrite core and delivers 6 kW of continuous power in a half bridge, 100 kHz industrial power supply. It is powered by DC voltage bus 450V to 750V and, therefore, requires high voltage isolation and long creepage and clearance distance between primary and secondary. This distance is 16mm and the distance between any winding and the core is 8mm. Although efficiency is very high 99.4%, it still means that the package must dissipate 36W. Low thermal impedance allows for only 40 degrees temperature rise when mounted on +60 deg.C base plate and cooled with a moderate air flow. One feature to take into consideration is the full wave bridge rectification on the secondary side. Therefore secondary does not have a center-tap.

P/N 1002 Specification:

1. Input Bus Voltage Range: 504 to 750 VDC
2. Converter Output After Rectification maximum: 6000W
   Ns: 200V/30A
3. Turns Ratio Np/Ns: 8 turns / 8 turns
4. Optimum Clock Switching Frequency: 100 kHz
5. Maximum Duty Cycle: 81.0 %.
6. Efficiency At Full Power: 99.4 %.
7. Base Plate/Heatsink Maximum Temperature: +60 °C
8. Air Flow temperature, Speed: +50 °C, 200 LFM
9. Temperature Rise Hot Spot- Base Plate maximum: 40 °C
10. Minimum Isolation Voltage
    Primary To Secondary and To Core: 5000 VDC
    Secondary to Core: 5000 VDC
11. Minimum Primary Inductance: 512 uH
12. Maximum resistance Rdc, Primary Winding: 5 mOhm
13. Maximum resistance Rdc, Secondary Windings Ns: 5 mOhm
14. Maximum Dimensions: 2.580" x 2.050" x 1.100"
15. Maximum Weight: 300 g
**P/N 1032 Application:**

This transformer is based on our proprietary 350 size ferrite core and delivers 4.5 kW of continuous power in a full bridge, 50 kHz industrial power supply. It is powered by DC voltage bus 220V to 320V and, therefore, requires high voltage isolation and 8mm creepage and clearance distance primary to secondary, and primary to core. Efficiency is very high 99.2%. It means that the package must dissipate 36W. Low thermal impedance allows for only 40 degrees temperature rise when mounted on +60 deg.C base plate and cooled with a moderate air flow.

**P/N 1032 Specification:**

1. Input Bus Voltage Range: 220 to 320 VDC
2. Converter Output After Rectification max.: 4500W
3. Turns Ratio Np/Ns 10 turns / 2 turns
4. Optimum Clock Switching Frequency: 50 kHz
5. Maximum Duty Cycle: 71.0 %.
6. Efficiency At Full Power: 99.2 %.
7. Base Plate/Heatsink Max. Temperature: +60 °C
8. Air Flow temperature, Speed: +50 °C, 200 LFM
9. Temperature Rise Hot Spot- Base Plate max.: 40 °C
10. Min. Isolation Voltage Primary To Secondary and To Core: 5000 VDC
   Min. Isolation Voltage Secondary and To Core: 500 VDC
11. Minimum Primary Inductance: 800 uH
12. Maximum resistance Rdc, Np: 9 mOhm
13. Maximum resistance Rdc, Ns: 0.14 mOhm

5.5kW Output P/N 1045, Description: P350-4-2C

P/N 1045 Application:
This transformer is based on our proprietary 350 size ferrite core and delivers 5.5 kW of continuous power in a full bridge, 80 kHz industrial power supply. It is powered by DC voltage bus 125V to 165V and, therefore, requires high voltage isolation and 8mm creepage and clearance distance primary to secondary, and primary to core. Efficiency is very high 99.33%. It means that the package must dissipate 37 Watts. Low thermal impedance allows for 40 degrees temperature rise when mounted on +60 deg.C base plate and cooled with a moderate air flow.

P/N 1045 Specification:
1. Input Bus Voltage Range: 125 to 165 VDC
2. Converter Output After Rectification max.: 5520W
   Ns (1T+1T with center-tap): 24V/230A
3. Turns Ratio Np/Ns: 4 turns / 2 turns
4. Optimum Clock Switching Frequency: 80 kHz
5. Maximum Duty Cycle: 80.0 %.
6. Efficiency At Full Power: 99.33 %.
7. Base Plate/Heatsink Max. Temperature: +60 °C
8. Air Flow temperature, Speed: +50 °C, 200 LFM
9. Temperature Rise Hot Spot- Base Plate max.: 40 °C
10. Min. Isolation Voltage Primary To Secondary and To Core: 5000 VDC
    Min. Isolation Voltage Secondary and To Core: 500 VDC
11. Minimum Primary Inductance: 48 uH
12. Maximum resistance Rd, Np: 1.8 mOhm
13. Maximum resistance Rd, Ns: 0.18 mOhm

1.8kW Output P/N 1047, Description: P350-8-4

P/N 1047 Application:
This transformer is based on our proprietary 350 size ferrite core and delivers 1.8 kW of continuous power in a forward topology, 120 kHz power supply, which is powered by DC voltage bus 125V to 165V. Transformer
has 4kVDC isolation and 8mm creepage and clearance distance primary to secondary, and primary to core.

Efficiency is 98.85%. The package dissipates 21 Watts when mounted on +60 deg.C base plate without any air flow.

**P/N 1047 Specification:**

1. **Input Bus Voltage Range:** 125 to 165 VDC
2. **Converter Output After Rectification max.:** 1820W
   
   **Ns (1T+1T with center-tap):** 28V/65A
3. **Turns Ratio Np/Ns** 8 turns / 4 turns
4. **Optimum Clock Switching Frequency:** 120 kHz
5. **Maximum Duty Cycle:** 47.0 %
6. **Efficiency At Full Power:** 98.85 %
7. **Base Plate/Heatsink Max. Temperature:** +60 °C
8. **Air Flow temperature, Speed:** Not required
9. **Temperature Rise Hot Spot- Base Plate max.:** 42 °C
10. **Min. Isolation Voltage Primary To Secondary and To Core:**
    
    **Min. Isolation Voltage Secondary and To Core:** 500 VDC
11. **Minimum Primary Inductance:** 512 uH
12. **Maximum resistance Rdc, Np:** 5.0 mOhm
13. **Maximum resistance Rdc, Ns:** 1.2 mOhm

**2.0kW Output P/N 1048, Description: P350-4C-4C**
P/N 1048 Application:
This transformer is based on our proprietary 350 size ferrite core and delivers 2.0 kW of continuous power in a push-pull topology, 50 kHz military DC-DC converter, which is powered by 36V to 75V voltage bus. Transformer has 500VDC isolation, which is quite acceptable for low voltage applications. Efficiency is 99.3%. The package dissipates 14.5 Watts when mounted on +60 deg.C base plate without any air flow cooling.

P/N 1048 Specification:
1. Input Bus Voltage Range: 36 to 75 VDC
2. Converter Output After Rectification max.: 2002W
   Ns1+Ns2 with center-tap: 28V / 71.5A
3. Turns Ratio Np1/Np2/Ns1/Ns2: 2 turns / 2 turns / 2 turns / 2 turns
4. Optimum Clock Switching Frequency: 50 kHz
5. Maximum Duty Cycle: 81.0 %.
6. Efficiency At Full Power: 99.3 %.
7. Base Plate/Heatsink Max. Temperature: +60 °C
8. Air Flow temperature, Speed: Not required
9. Temperature Rise Hot Spot- Base Plate max.: 30 °C
10. Min. Isolation Voltage Primary To Secondary and To Core: 500 VDC
    Min. Isolation Voltage Secondary and To Core: 500 VDC
11. Minimum Primary Inductance Ns1=Ns2: 32 uH
12. Maximum resistance Rdc, Np1, Np2: 0.3 mOhm
13. Maximum resistance Rdc, Ns1, Ns2: 0.3 mOhm