CFM130M/S Baseplate-cooling & Cover Power Supply

Never Stop Improving Switching Power Supplies :

With the advance of technology, the design of the devices in telecom, medical, industrial, and more applications has become more complex and sophisticated. Also, the size has become slimmer. Therefore, the mission of designing a power supply with higher performance for these devices is challenging. The main issue of high-performance power supplies is heat dissipation. Cincon has dedicated to the continuous improvement of power supplies. To solve the heat dissipation problem, Cincon has introduced a series of baseplate-cooling design power supplies as fanless power solution by taking the advantage of conduction cooling. Today we are going to introduce the CFM130M/S, which are part of the product family.

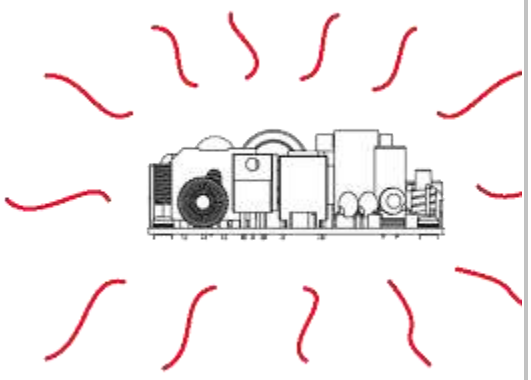
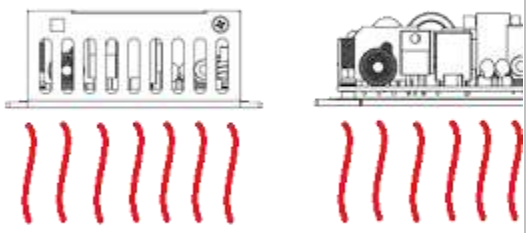
Advantages of CFM130M/S Power Supplies :

The heat is mainly generated by power components and magnetic components. The design structure of CFM130M/S is PFC+LLC and the efficiency is increased up to 94%, leading to less power loss and generation of heat. It could also operate stably output power of 130W under fanless condition. In general, most power supplies on the market require a fan to reach to the 130W output power. Therefore, it seems that the CFM130M/S have the advantage.

The CFM130S series has IEC/UL/EN 62368-1 approvals, and EMC meets the requirement for heavy industrial use. Also, the CFM130S meets IEC/EN 60335-1 for household applications. The CFM130M has IEC/UL/EN 60601-1 approvals for medical applications.

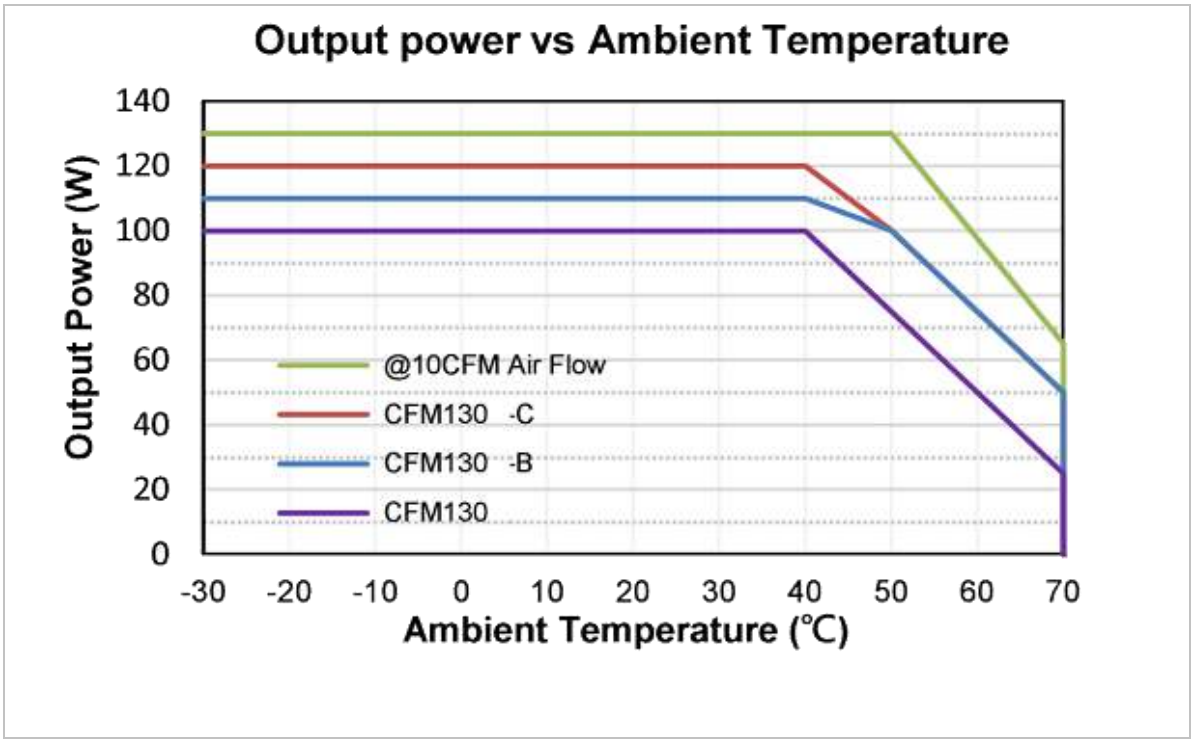
Advantages of Baseplate-cooling & Cover Structure :

Unlike others, the most distinctive feature of CFM130M/S is that it can direct most of heat to the bottom due to the baseplate-cooling design. You may see the difference from the photos below. Generally, it may take more time for people using others to solve the heat dissipation issue. The CFM130M/S could save users from the trouble of dealing with the heat dissipation and shorten the development time of users.

Others	Cincon CFM130M/S
	

Baseplate-cooling & Cover Structure :

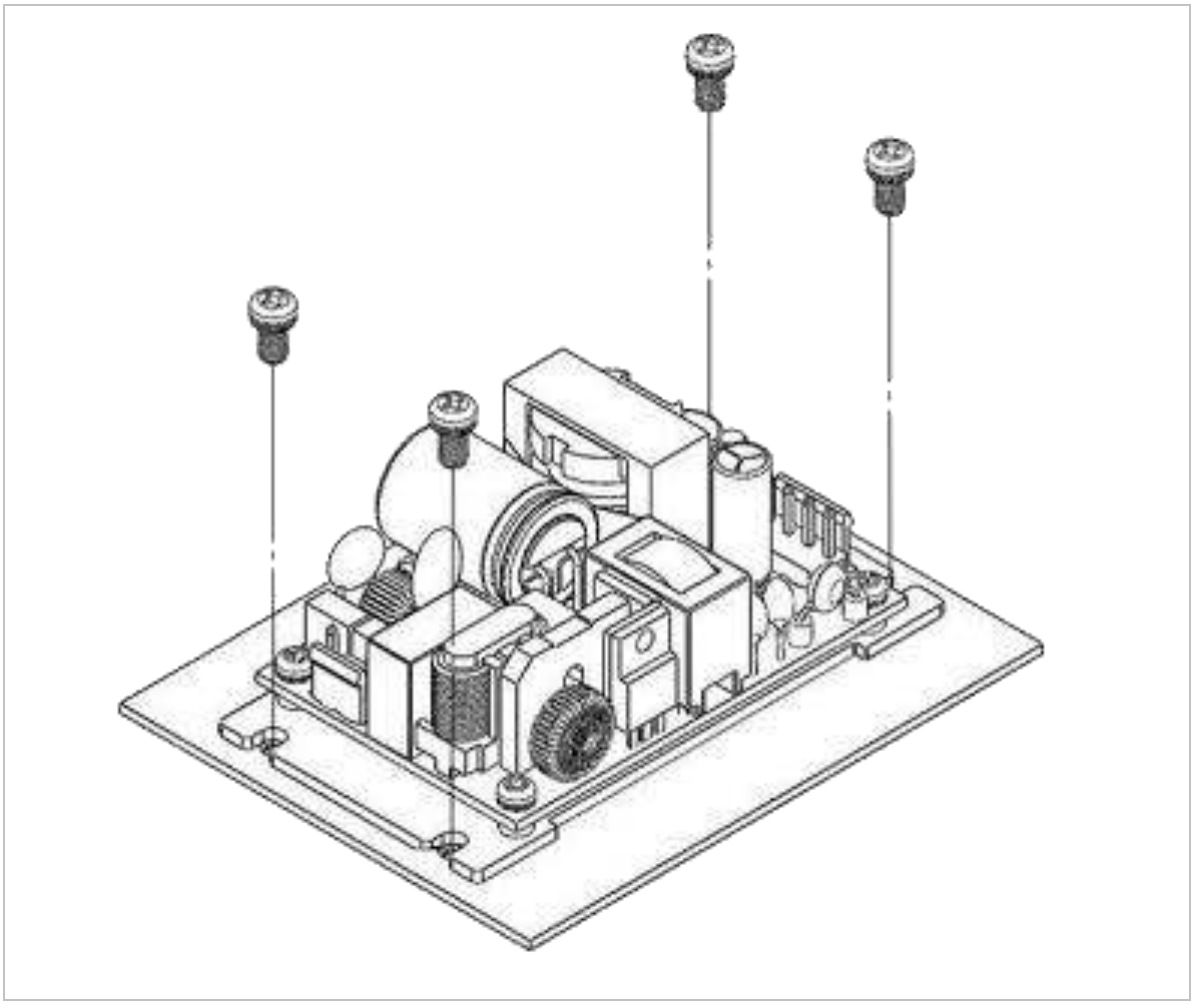
Below is the standard derating curve CFM130M/S.



CFM130-B	CFM130-C
	
Based on the data of CFM130-B: Under the ambient temperature 40℃(Natural Convection), the output power would be 115W.	Based on the data of CFM130-C: Under the ambient temperature 40℃(Natural Convection), the output power would be 120W.

The performance of output power could be higher while the CFM130M/S are installed on the case of user's device or an aluminum plate. The following are the experiments tested under natural convection condition. You may find the great advantage of baseplate-cooling design.

Experiment 1:
CFM130-B screwed on an aluminum plate with size of 210 x 135 x 2mm to simulate the test run on user's device.



Input V: 115 Vac, Ambient Temperature 40 & 50℃(Natural Convection)

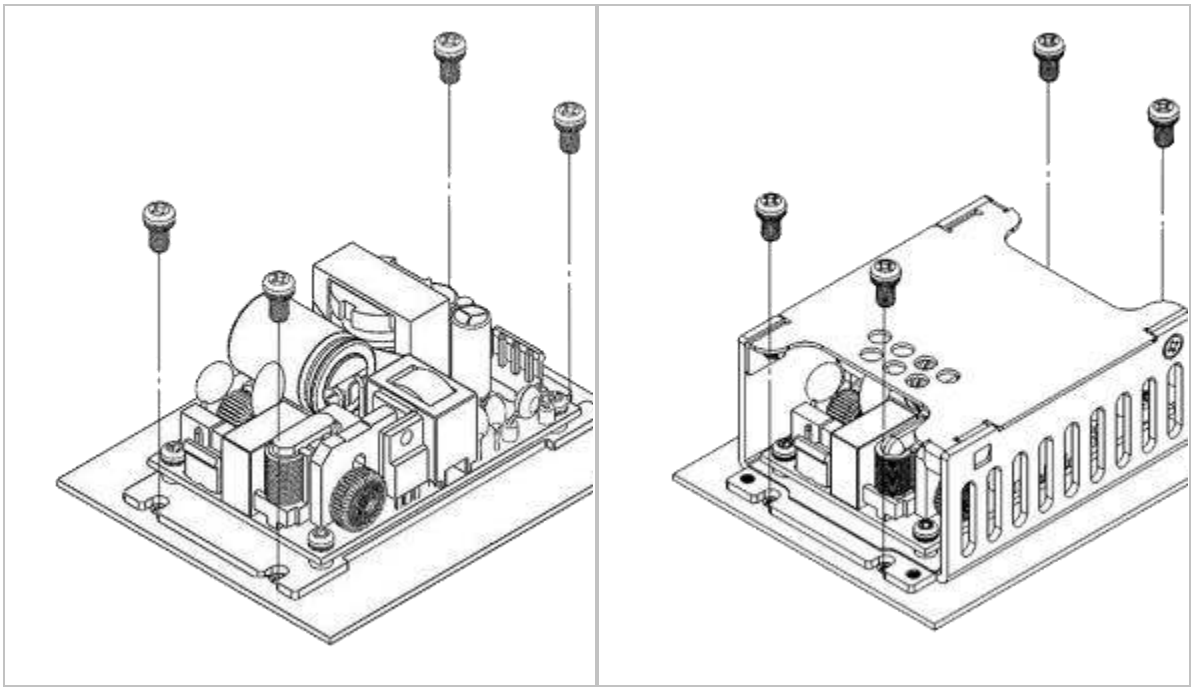
Part Number	CFM130-B	CFM130-B
Rated Power	130W	130W
Ambient	40℃	50℃
EMI FILTER	90.1	103.6
BRIDGE DIODE	105	118.6
PFC Inductance	98.05	109.5
1 cm next to PFC Inductance	55.25	64.4
Buck Cap.	80.25	93.3
PFC MOS	103.2	111.3
PFC DIODE	105.7	114.4
LLC MOS	77.3	86.6
Output MOS	82.95	92.5

Transformer	102.7	115.4
1 cm next to Transformer	51.5	67.4
Output Cap.2	89.65	99.9
Output Cap.1	76.5	83.8

Now you may see the component temperatures are under the limitation. Screwing the CFM130M/S on the aluminum plate would let the output power reach to 130W due to the advantage of baseplate-cooling.

In addition, under the ambient temperature 40 & 50℃(Natural Convection), the CFM130M/S could work at full load condition which is 130W because the heat is effectively directed to the aluminum plate by the baseplate-cooling structure.

Experiment 2:
Comparison of CFM130-B & CFM130-C screwed on the aluminum plate with size of 350 x 200 x 2 mm



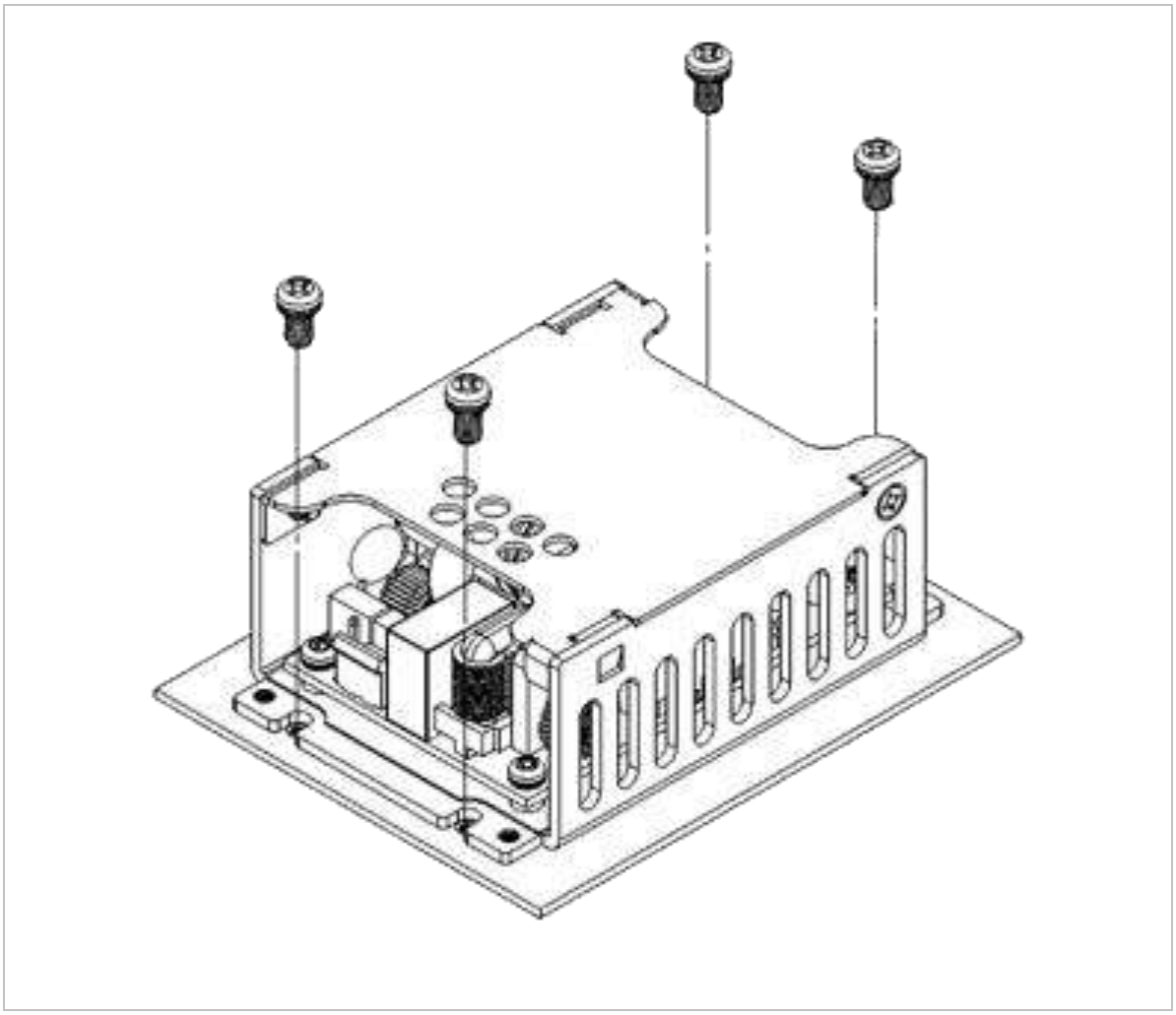
Input V: 115 Vac, Ambient Temperature 50℃(Natural Convection)

Part Number	CFM130-B	CFM130-C
Rated Power	130W	130W
Ambient	50℃	50℃
EMI FILTER	102.8	99.3
BRIDGE DIODE	116.6	113.4

PFC Inductance	108.1	96.9
1 cm next to PFC Inductance	63.3	60.5
Buck Cap.	92.9	91.4
PFC MOS	109.5	112.5
PFC DIODE	110.4	112.3
LLC MOS	84.7	85.4
Output MOS	94.5	84.6
Transformer	111.5	96.4
1 cm next to Transformer	58.8	57.9
Output Cap.2	97.6	95.4
Output Cap.1	82.3	84.6

Under the condition of ambient temperature 50℃(Natural Convection), now the CFM130M/S are still able to operate at full load. Also, you may see the measured points around the components which generate heat. Most of heat is directed to the baseplate. Furthermore, for many components, the CFM130-C (cover type) has lower temperature, meaning the cover type has better performance on heat dissipation.

Experiment 3:
We run the further test for CFM130-C to operate under ambient temperature 55℃, and screw the CFM130M/S on the aluminum plate with size of 350 x 200 x 2 mm.



Input V: 115 Vac, Ambient Temperature 55℃(Natural Convection)

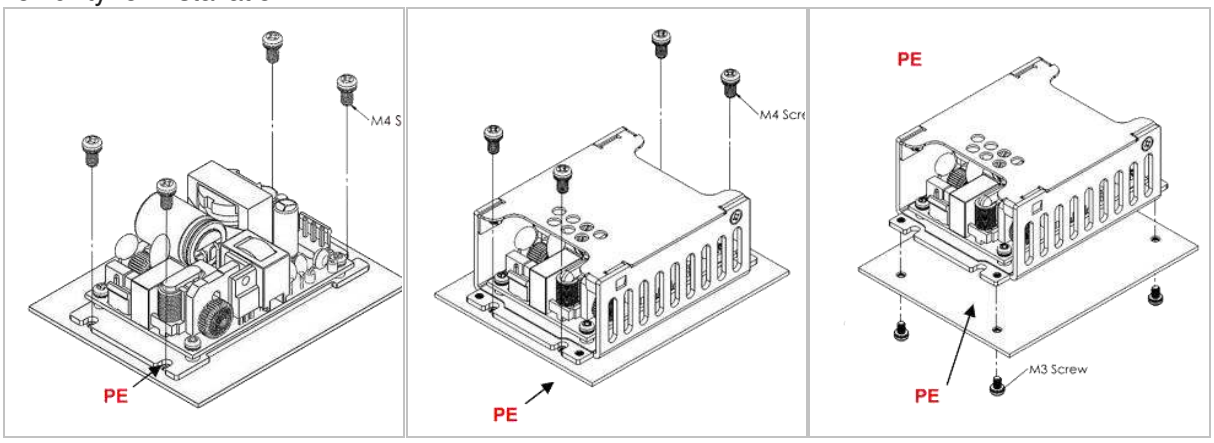
Part Number	CFM130-C
Rated Power	130W
Ambient	55℃
EMI FILTER	104.8
BRIDGE DIODE	117.5
PFC Inductance	102.4
1 cm next to PFC Inductance	62.2
Buck Cap.	97.6
PFC MOS	118.7
PFC DIODE	118.1
LLC MOS	91.8

Output MOS	91.2
Transformer	99.6
1 cm next to Transformer	61.3
Output Cap.2	99.8
Output Cap.1	91.6

For CFM130-C operating under ambient temperature 55℃(Natural Convection), it could still work at full load and the temperature of the components is still under limitation.

Installation Instruction:

The CFM130M/S have mechanical design to be fixed on a metal plate or on the surface of user system case. For the cover version, there are two types to screw the power supply, increasing the flexibility for installation.



Conclusion:

Due to the limitation of size of user system device, the difficulty of solving the heat dissipation issue coming from the power products would be higher. Therefore, Cincon has developed a series of baseplate-cooling design power supplies. Mostly, for other 2x3 inches products to operate at 130W, they require a fan. However, according to the experiments we showed, Cincon power supplies could be the fanless power solution and save the development time and space. Also, users would have less concerns about the system reliability, heat dissipation and cost issue.