

## Current Limits for COMET Vacuum Capacitors

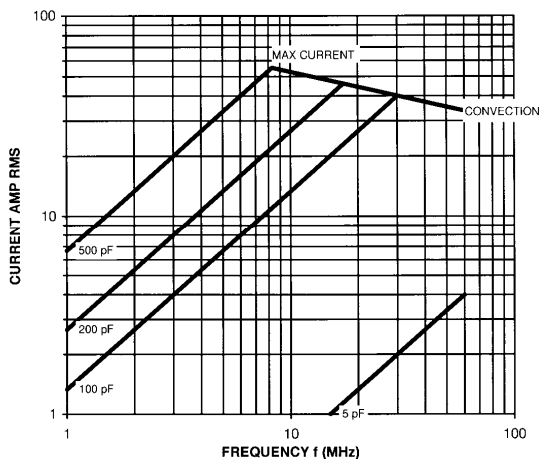
Over the years we have noticed that some customers have difficulty how to interpret our current curves. Our competition indicates the maximum reading i.e. the maximum current shown for any frequency value in accordance with the impedance presented and not for a given frequency value, whereas COMET shows the current either at 16 MHz or 13.56 MHz. It is obvious that at the higher frequencies the current limit is lower. In addition COMET as a standard procedure shows the current limit **for pure convection cooling only**. No provision has been made for possible conduction cooling through the connections. The reason for this is that we as the capacitor manufacturer do not know what type of connection may be used and therefore have no information about the amount of conduction cooling (this does not apply for forced air cooled or water cooled capacitors).

The COMET way of showing the current limit is a conservative one. It is strongly recommended that whoever has contact with design engineers points this out. As an example we show the following drawings:

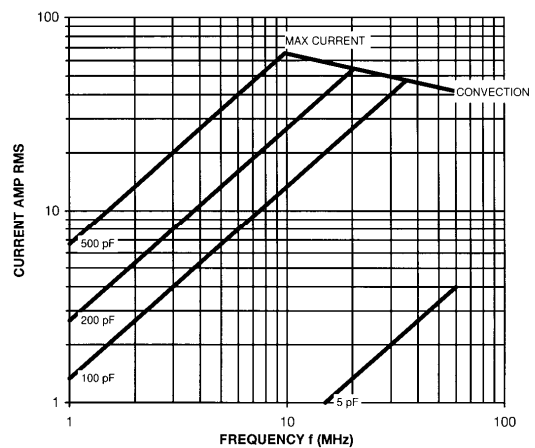
### CVBA-500BC/5-BEA-L

The standard way of presenting the current with a flange temperature of 125 °C indicates a maximum current of 55 A at a frequency of 8.2 MHz; at 13.56 MHz the current is 49 A and at 16 MHz 47 A. Permitting a conduction cooling in the amount of 35 Watts, the maximum current is 65 A at 9.8 MHz and at the other two frequencies we see a similar increase of approximately 10 A.

Flange temperature of 125°C max.



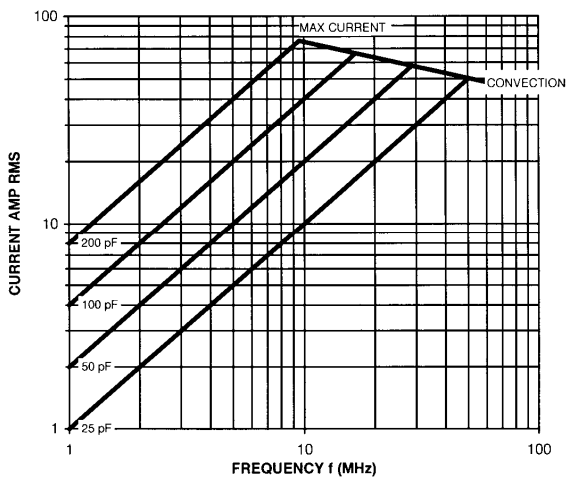
Flange temperature of 50°C max. and 35 W conduction cooling



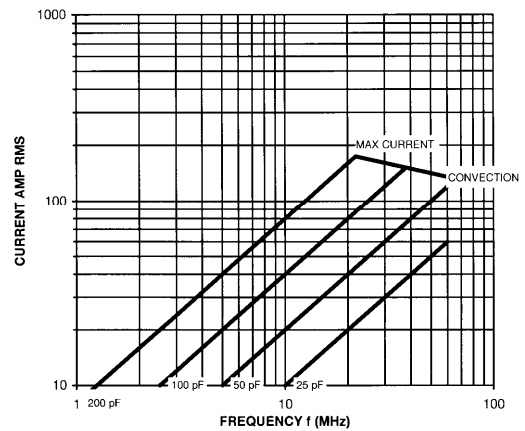
**CFMN-200CAC/15-AF-G**

As an extreme example we show the influence of conduction cooling with our Mini Cap: Under standard conditions (convection cooling only) the maximum current is 75 A at 9.5 MHz and at 13.56 MHz is 70 A. With conduction cooling of 100 W, easily possible with normal connecting straps, the current increases to 180 A at 22 MHz. The current at 13.56 MHz is in the order of 100 A. If one would be able to show an even higher conduction cooling, for instance 200 W, the maximum current increases to 220 A at 28 MHz. The current at 13.56 MHz is not affected since it is governed by the impedance and the maximum peak working voltage of 9 kV.

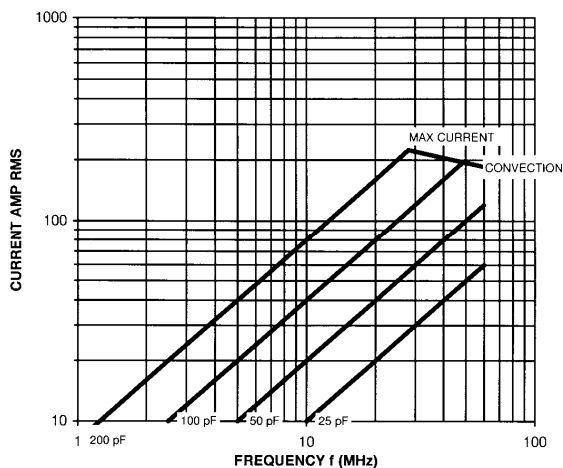
Flange temperature of 125°C max.



Flange temperature of 125°C max. and 100 W conduction cooling



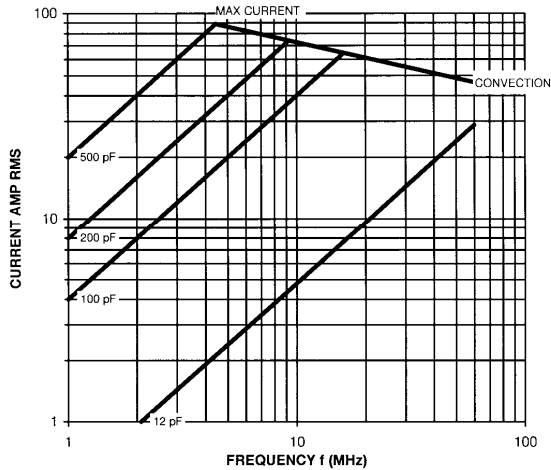
Flange temperature of 125°C max. and 200 W conduction cooling



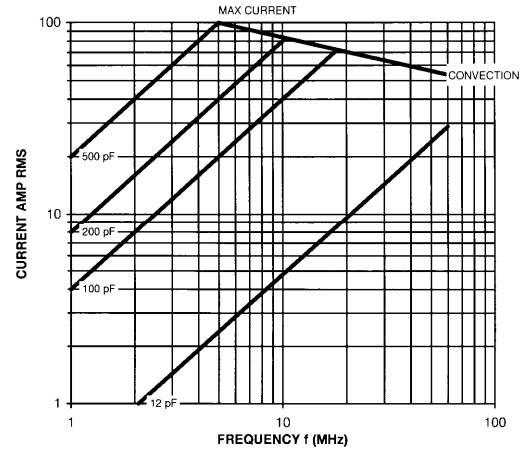
**CVMI-500AC/15-AAC-M**

Under standard conditions, this capacitor has a maximum current of 90 A at 4.5 MHz, at 13.56 MHz 67 A and at 16 MHz 65 A respectively. With a mere 14 W of conduction cooling the current further increases by approximately 10 A. It should be noted that for the larger capacitors the influence of conduction cooling is less or none at all.

Flange temperature of 125°C max.



Flange temperature of 125°C max. and 14 W conduction cooling



As the examples show, in our way of presenting the current curves we have a safety factor which is not readily apparent to the user. In case a customer is close to the current limit, COMET can always calculate new limits for specific values of conduction cooling to assist the designer.