

Power Distribution Modules

FAQs – 5-5-17

Can PDM Modules be configured to produce negative voltages?

PDM modules can be configured to produce negative voltages. Because an iPOL output is truly a floating output, simply reverse the polarity of the iPOL output + and – terminals to produce a negative voltage.

Can IRM modules be operated in parallel?

IRM modules cannot be operated in parallel. Keep in mind that IRMs can produce more power than any single iPOL. If greater power is required at a specific voltage, say 100W of 1V power, then two separate 1V power outputs can be generated (one from each IRM/iPOL source). Keep the two 1V outputs isolated from each other so that neither IRM is overloaded.

Can iPOL modules be operated in parallel?

It is possible to operate iPOLs of the same K factor in parallel. Be sure to operate them in the same start up mode (613xxx iPOLs from the same VC pulse, 612xxx iPOLs should be started together from their PC command input). Current sharing between two parallel iPOLs can be 60% / 40%, so total output current capability will be 1.66 times the iPOL rated current. Also, keep the iPOL efficiency in mind so that the IRM used is not overloaded.

Can PDM modules be synchronized?

No, PDM modules cannot be synchronized. Because these modules are zero-voltage/zero-current switching converters, which eliminates unwanted switching noise, and operate at higher than typical switching frequencies, synchronization has not been needed when proper EMI filtering is applied.

What is the best way to sequence power with PDM modules?

When starting the 613xxx iPOL modules, always float the iPOL PC command input and use the IRM PC command input to start this part. For starting 612xxx iPOL modules, always use the iPOL PC command. This often becomes difficult when using a single IRM with two iPOLs of differing K factors. For instance, using a single IRM to produce 40V, with a 1/40 iPOL used to produce 1V and a 1/8 iPOL to produce 5V. If the 5V needs to precede the 1V at start-up, then the prescribed start-up method will not meet the requirement. In this case, separate IRMs may be required or a separate power switch may be required on the 1V output.

Can capacitance be added to the intermediate bus output of the IRM?

This is not recommended for most applications. The IRM contains its own filter components, which have been designed to optimize the gain and phase margin of the IRM voltage control loop when loaded with one to three iPOLs.

What kind of regulation can be achieved with more than one K factor iPOLs being used with a single IRM?

With a single IRM and a single iPOL, output voltage regulation of $\pm 2.5\%$ over life is achievable. With a single IRM and two iPOLs of differing K factors, output voltage tolerances of $\pm 3.0\%$ over life is achievable. With a single IRM and three iPOLs of differing K factors, output voltage tolerances of $\pm 3.5\%$ over life is achievable.

What analyses are available to verify PDM performance and reliability?

A full set electrical worst case analysis, stress analysis, thermal analysis and reliability analysis are completed for each module type. For questions concerning your analyses requirements, contact info-ams@cobham.com.

Does Cobham provide schematics, bill of materials and IBIS models of the PDMs?

No, these products are proprietary and are not distributed with the modules. For questions concerning your program requirements, contact info-ams@cobham.com.

What are the responses of PDM modules to faults?

The PDM modules are designed to prevent the propagation of failures. This includes the failure of a PDM module. Both IRMs and iPOLs have input over voltage protection and output over current protection. Both module types also have input under voltage shut down capability. In the case of OV and UV detection, the modules shut down until the input voltage is back within the specified range. The current limit response results in both module types being shut off for approximately 200msec should the output current reach the current limit threshold. After 200msec, the module attempts to restart (**Note:** The modules may not restart after an OV, UV or overcurrent fault detection because the module soft start feature is not reset during the fault condition. In this case, the system would need to be shut down for approximately 500msec before commanding the restart).

Do PDM modules need to be derated?

No, the ratings specified in the datasheets already reflect the derated limits of the modules. Cobham uses its own internally generated derating guidelines to ensure maximum reliability. For questions concerning your derating criteria, contact info-ams@cobham.com

Can an IRM or iPOL module be used as a stand-alone product?

Yes, each module can be used as a standalone converter. Keep in mind that the IRM is designed to produce non-isolated 26V to 48V outputs and the iPOLs are design to operate with inputs from 26V to 48V. (**Note:** 613xxx iPOLs are designed to start in VC mode, which is a signal from an IRM. These types of iPOLs have no internal soft start feature. If these are started via the PC command feature, the maximum load capacitance needs to be greatly reduced. For questions on start-up of 613xxx type iPOLs in PC mode, contact info-ams@cobham.com).

Are there EMI filters available to allow the system to meet Mil-Std-461 requirements?

No, at this time Cobham does not provide packaged EMI filters as an option. See the PDM Module Design Guide for information on EMI filtering of PDMs.