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## DC-Link Capacitors for CISSOID SiC Intelligent Power Modules-Application Note

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Version: 1.1

### General description

CISSOID is collaborating with [Advanced Conversion Inc](#) and [NAC](#) to offer high performance DC-Link capacitors mechanically integrated with our [SiC Intelligent Power Modules](#) (IPMs). These capacitors offer low ESL and low ESR for fast switching SiC transistors and for high power density.

Three solutions are available:

- A **6-pack capacitor module** mechanically fitting to CISSOID IPMs through a low inductance busbar. A set of capacitor values and of voltage ratings is also available. This solution is best suited for integration inside an inverter housing.
- A **ring capacitor mounted on a busbar** offering low ESL. The busbar is designed to mechanically fit with CISSOID IPMs. A set of capacitor values and of voltage ratings is available. This solution is well suited for first validation tests.
- **Custom capacitors** can also be designed by Advanced Conversion.

### Key features

- Integrated capacitor/busbar solution
- Seamless mechanical integration with CISSOID Intelligent Power Modules
- Low ESL, typ. 6nH-8nH, for fast switching with SiC transistors
- Low ESR for high RMS current and high power density (high A/ $\mu$ F)
- Extreme current pulse survival
- Up to 125°C with PEN film
- Long lifetime: typ. 10.000 hours
- Cooling possible through busbar for enhanced thermal performance
- Large choice of capacitor values and voltage ratings with no NRE (standard parts in stock)
- Custom capacitors available



## 6-Pack Capacitor Module Test Kit

A 6-pack capacitor module test kit has been developed offering low inductance connection between the capacitor and the IPM through an optimized busbar. Here also, multiple capacitor values and voltage rating are available. High temperature film options are also available to increase the rating.

This capacitor module enables compact design inside inverter housing. The capacitor can also be flipped to allow cooling through the busbar for improved thermal performance, which can increase the capacitor rating by a factor of two or more.

These test kits allow for rapid prototyping of the topology without major investments in time and engineering resources.



**Figure 1. CISSOID SiC Intelligent Power Module (on its liquid collar) connected with Advanced Conversion 6-pack capacitor module**

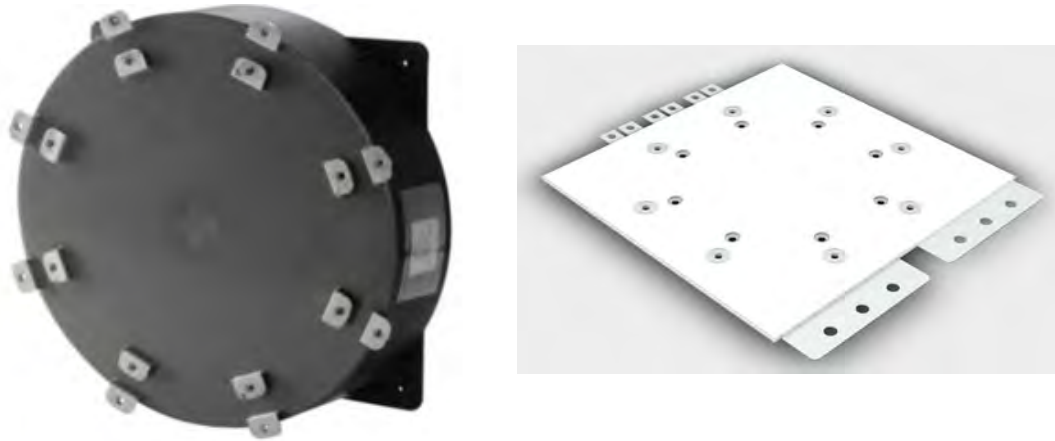
The table below shows the value and main characteristics available for the 6-pack capacitor module test kit:

DC VOLT. (VDC)	CAP. (μF)	TEST KIT #	VERTICAL OR HORIZONTAL	OPERATING TEMPERATURE (°C)
500	500	700A360	Horizontal	105°C
500	550	906A116	Horizontal	125°C
750	260	700A361	Horizontal	105°C
750	320	906A115	Horizontal	125°C
900	135	906A117	Horizontal	125°C

Custom version of these capacitors are also available with an embedded thermocouple. For more information, please, [contact CISSOID](#).

## Ring Capacitors mounted on dedicated busbar

For first validation tests, a busbar compatible with CISSOID SiC IPMs has been developed (Part number: Bus – 1207) to host 8.47 inches ring capacitors featuring low ESL/ESR, see table below, and facilitating the rapid testing of CISSOID SiC IPMs with high value capacitors. It also allows users to easily test with different capacitor values.



**Figure 2. Advanced Conversion 8.47” ring capacitor and dedicated busbar (Part number: Bus – 1207) compatible with CISSOID SiC IPM.**

The table below shows the value and main characteristics of 8.47 inches ring capacitors available with the busbar fitting to CISSOID modules.

DC VOLT (VDC)	CAP. (μF)	STANDARD PART #	NOMINAL CASE OUTSIDE DIAMETER	NOMINAL OVERALL HEIGHT	RMS CURRENT AT 85°C
450	1,600	700D601	8.47" (215.2 mm)	2.16" (54.9 mm)	400
600	1,000	700D348	8.47" (215.2 mm)	2.16" (54.9mm)	400
700	1,000	700D547	8.47" (215.2 mm)	2.16" (54.9mm)	300
900	425	700D407	8.47" (215.2 mm)	2.16" (54.9 mm)	285
1,200	225	700D409	8.47" (215.2 mm)	2.16" (54.9 mm)	265

## Contact & Ordering

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