

CCM Capacitor Charging Module Power Supply Technical Specification



Introduction:

Genvolt's CCM Series of high voltage modules provides users with a form, fit and function replacement for presently available commercially made units, while providing superior features and benefits at competitive pricing. Utilizing proprietary power conversion technology, unique high voltage packaging, these SMT based high voltage modules provide improved performance and easier system integration at a lower cost when compared to the competition.

Advanced Power Conversion Topology:

CCM has been designed for input voltage from 110Vac to 260Vac with integrated power factor correction circuits. The converter uses a proprietary resonant power conversion topology providing exceptional efficiency and inherent low noise and ripple outputs. Due to the fixed, high frequency conversion rate of the converter, the output capacitance is small resulting in minimal stored energy and fast rise times. Through the use of generously rated surge limiting resistors and a fast acting current loop, all units are fully arc and short circuit protected.

Control and Regulation:

The power supply is monitored by a micro-controller based circuits. The actual output voltage generated is sampled via a high impedance divider to create a voltage feedback signal. A current feedback signal is created via a current sense resistor being placed in the low end return of the high voltage output circuitry. These two accurate

ground referenced feedback signals are used to precisely regulate and control the units output.

The high-bandwidth operational amplifier and high-amplification loop parameters make the loop response very fast and the overcharge is very low.

- Output voltage adjustable from 0V to 40kV
- Up to 1000, 1500 or 2000J/s output power
- Capacitor charging frequency up to 100Hz
- High repeatability
- Voltage loop and current loop automatic control
- Output voltage and output current monitoring
- Discharge and short circuit protection
- With EOC signal output

User Interface:

The CCM power supply provides a standard DB15 user interface, which has the functions of output voltage and current setting, and output voltage and current monitoring. There is also EOC function, when the output voltage reaches the set value, EOC outputs a low-level pulse.

Mechanical Dimensions:

CCM is a sheet metal enclosed power supply with dimensions: 361mm*146mm*141mm. The CCM power supply is physically mounted via six threaded posts on the bottom.

Specification:

Average Capacitor Charging Power	1000, 1500 or 2000 Joules/sec ($\frac{1}{2}CV^2 \times \text{Rep Rate}$)
Peak Capacitor charging power	1100, 1650 and 2200 Joules/sec respectively ($\frac{1}{2}CV^2/t_{\text{charge}}$)
Average Continuous DC Power	1000, 1500 and 2000 Watts respectively
Output Voltage Range	1, 1.5, 2, 3, 4, 5, 6, 10, 15, 20, 30, 40kV, variable from 10-100% of rated fixed
Polarity	Positive or Negative.
HV Output	1-6kV Models - Air Insulated with RG58/U Coaxial cable and MHV connector 7-40kV Models - solid Insulated with XLPE cable & proprietary HV connector
AC Input Voltage	180VAC to 260VAC, 50-60Hz 1Ø
AC Input Current - Active PFC	20A to 10A with Active PFC for 1000W & 10A with Active PFC for 1500W or 2000W
AC Connector	UL/CSA approved terminal block.
Power Factor	0.98 at full load and nominal AC line
Efficiency	Better than 85% at full load
Stability	$\pm 0.2\%$ per hour after 1 hour warmup
Temperature Coefficient	100ppm per °C typical
Stored Energy	Less than 0.3J all models
Pulse to Pulse Repeatability	$\pm 0.2\%$ to 100Hz, consult factory for higher rep rates
Dimensions (mm)	146W x 141H x 361D
Weight (kg)	1-6kV Models: 5kg; 7-40kV modules: 6.5kg
Ambient Temperature	Storage: -40 to +85°C. Operating: -20 to +45°C
Altitude	Storage: 12,000m, Operating: 3,000m
Humidity	10-90%, non-condensing
Protection	Open/short circuits, Overloads, Arcs, Overtemp, Overvoltage
Agency Approvals	Compliant to the EMC Directive and the LVD Directive (approval pending)
Remote Control (all models)	Via 15-pin D-sub connector on rear of unit, Signals include, Vprogram (0-10V), HV Enable/Reset, Inhibit, Summary Fault, Load Fault, Vanalog, Vpeak
Accessories	Mating HV cable, control connector, operating manual, mounting brackets
Option	IL - Low Inhibit. Replaces standard high Inhibit EL - Low Enable. Replaces standard high enable 5V - 0-5V Analog programming. Replaces standard 0-10V programming PL - Latching Overload Protection, requires HV reset after overload fault DC - Continuous DC operation
Ordering Information	Model - Power-XXkV - POS (or NEG) - XX (options)
Model Option	CCMB for 1000W, CCMC for 1500W & CCMD for 2000W
Ordering Examples	CCMB-1000W-10kV-POS, CCMC-1500W-40kV-NEG-IL, CCMD-2000W-1kV- POS-DC

All specifications subject to change without notice

Interface

PIN	Signal name	Direction	Parameters
1	HV Enable/Reset	Input	High(10-15V) enable the high voltage output. Floating or connect to GND = Reset
3,6	System Fault	Output	Over voltage, Over temperature, Low input voltage. Open Collector, Low = Active
5	Voltage Program	Input	0-10Vdc = 0-100% rated voltage output
7	VPEAK	Output	A 0-10V signal with respect to ground proportional to the peak of the output charging voltage.
8	VANALOG	Output	0-10Vdc = 0-100% rated voltage output
10	HV Inhibit	Input	High(10-15V) inhibit the high voltage output. Floating or connect to GND = allow HV output
9, 11	+12Vdc Output	Output	+12Vdc @ 20mA, maximum
13	EOC	Output	End Of Charge Indication, Low = Active
14	GND	Output	Signal GND
15	Inhibit LED	Output	Inhibit state, Low = Active

How to use the EOC signal:

When the output voltage reaches the set value, it means that the capacitor is fully charged, and the EOC pin outputs a low-level pulse as fig. 1 at this moment. The EOC pulse is about 110us wide.

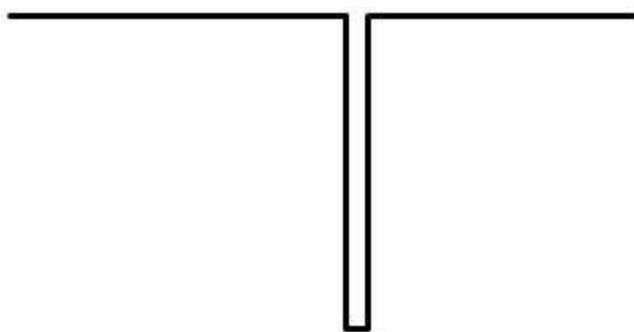


Fig 1

If it is not wide enough to directly drive the HV Switch to discharge the load capacitance, the following circuits diagram as an example can be used to drive the HV switch.

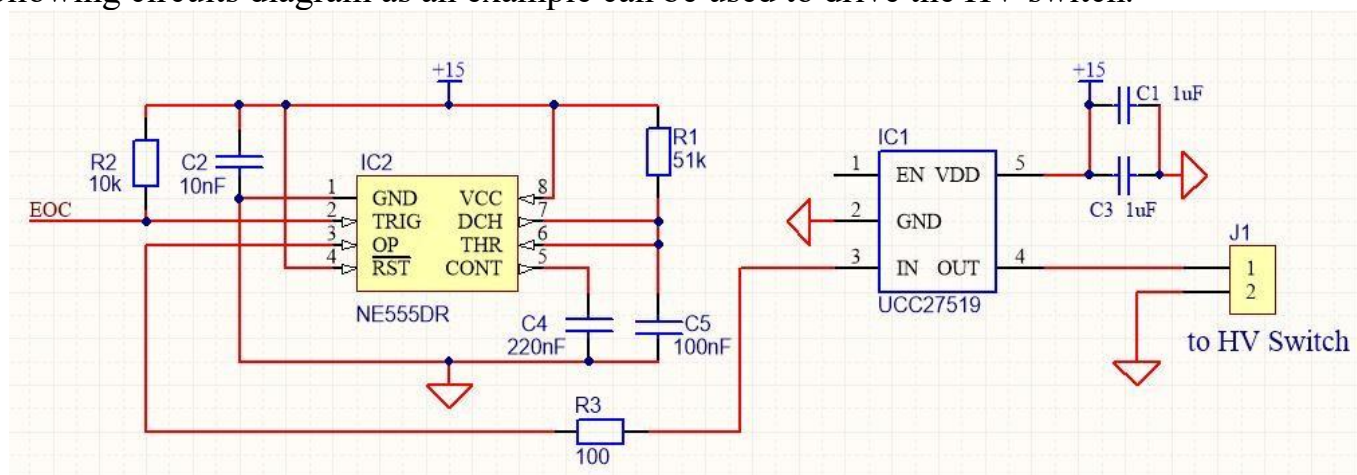


Fig 2 Recommended circuit for driver board

Power Wiring Diagram:

The figure below is the recommended wiring diagram of the capacitor charging power supply. When the capacitor voltage is charged to the set value, the power supply outputs a low-level pulse to the driver board through the EOC pin of DB15, and drives the high-voltage electronic switch to close to discharge the capacitor.

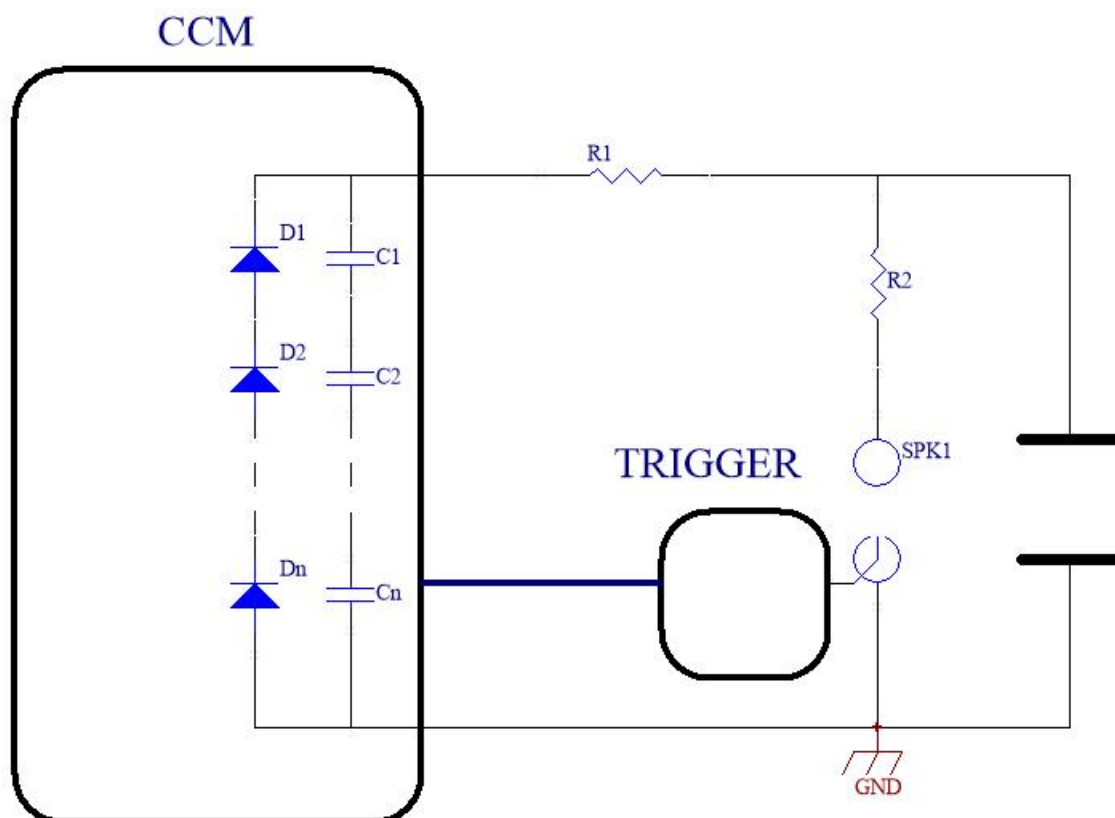
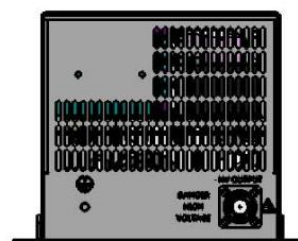
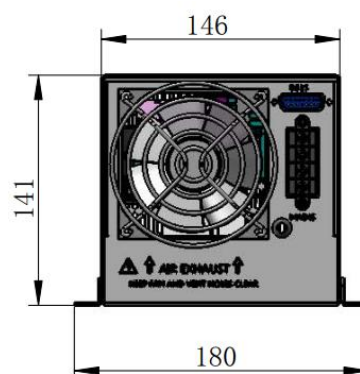
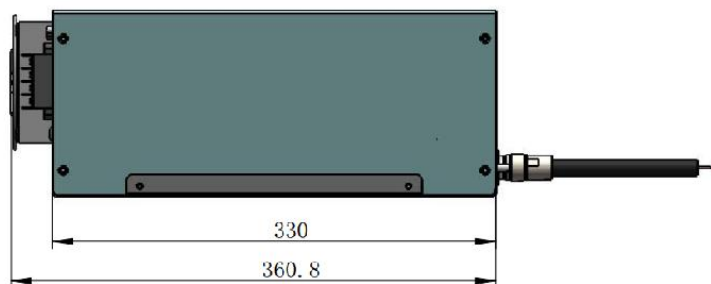


Fig 3 Power Wiring Diagram

Dimensions:

7-40kV



1-6kV

