TECHNICAL BULLETIN

CP-720 Microinverter DC Arc Fault Exemption
Date: 4/29/2019

Summary

Chilicon microinverters operate below 80V at the minimum arc fault test wattage and current of 300W and 7 Amps and are therefore exempted from DC arc fault testing.

Background

The purpose of DC arc fault protection is to eliminate arc-fault events that have sufficient energy to damage DC conductor and/or diode junction box insulation. Near the Voc of the PV modules, very little power can be generated by the PV modules and therefore a dangerous arc condition with current in excess of 7A and power in excess of 300W cannot form near PV module Voc. This is the minimum test level that UL considers for arc fault detection devices.

Since UL Testing for arc fault conditions starts with the voltage across the arc of at least 43V and current of at least 7 Amps, the operating input voltage of two series 60 cell or 72 cell modules will be below the operating 80V DC Arc Fault limit as the voltage drop due to the arc will be at most (2*Voc – 43) < 80Volts.

Additionally, a 43V drop to the input of a CP-720 microinverter will place the microinverter below its minimum operating voltage of 47 V even for a 90V Voc of two modules, and the microinverter will shutdown due to a low input voltage condition.

Furthermore, arc related issues due to DC connector type mismatch are not an issue because parasitic resistance due to connector damage or mismatch will only further lower the load side (inverter side) voltage and if an arc starts to develop the inverter will reach its input shutdown voltage even more rapidly than in the case when the connectors have perfect conductivity.

The UL Test Table for DC Arc fault is included below as Figure 1.

Table 14.3 Arcing Tests and Clearing Times

Current (Amps)	Arcing Volts (Volts)	Arcing (Watts)	Electrode Gap (Inches)	Clearing Time (Seconds)
7	43	300	1/16	2
7	71	500	3/16	1.5
14	46	650	1/8	1.2
14	64	900	¼	0.8

PV Array

Arc Generator

8

Figure 1http://www.solarabcs.org/about/publications/meeting_presentations_minutes/2012/09/pdfs/8-UL1699B_PV_AFCI-Zgonena-14Sept2012.pdf