



Design Guide

Determining Module Compatibility

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DETERMINING MODULE COMPATIBILITY

APsystems YC microinverters are generally electrically compatible with all 60-72 cell multicrystalline Si or singlecrystalline Si modules. However, it is best that system designers determine that the specifications of a PV module will not exceed the microinverter ratings under all expected environmental conditions for a given application. The module data sheet contains all necessary specifications to calculate this. This document details how this calculation and determination can be made.

Step 1: Calculate Open Circuit Voltage(VOC) at the highest expected cell temperature HT-Voc to verify that the Voc will accommodate the microinverter's start-up voltage.

$HT-Voc = (Voc) + (Voc) * (\text{Highest Expected Cell Temp.} - \text{STC}) * (\text{Temp. Coefficient} \% / 100) > \text{Startup V}$
Example: at STC, Voc=36, Voc thermal coefficient=-0.36%, highest cell Temp=75C, microinverter startup V=28V
 $HT-Voc = 36 + 36 * (75 - 25) * (-.36 / 100) = 29.52 > 28$. Pass

Step 2: Calculate the Voc at the lowest expected cell temperature LT-Voc to verify that the Voc will not exceed the maximum input voltage of the microinverter Max Vin.

$LT-Voc = (Voc) + (Voc) * (\text{Lowest Expected Cell Temp.} - \text{STC}) * (\text{Temp. Coefficient} \% / 100) < \text{Max Vin}$
Example: at STC, Voc=36, Voc thermal coefficient=-0.36%, highest cell Temp=-40C, Microinverter Max V=55V
 $LT-Voc = 36 + 36 * (-40 - 25) * (-.36 / 100) = 44.4 < 55$. Pass

Step 3: Calculate the Vmp at the highest expected cell temperature HT-Vmp to verify that the Vmp will meet the minimum MPP voltage of the microinverter Min Vmp.

$HT-Vmp = (Vmp) + (Vmp) * (\text{Highest Expected Cell Temp.} - \text{STC}) * (\text{Temp. Coefficient} \% / 100) > \text{Min Vmp}$
Example: at STC, Voc=29, Voc thermal coefficient=-0.36%, highest cell Temp=75C, microinverter Min Vmp=22V
 $HT-Vmp = 29 + 29 * (75 - 25) * (-.36 / 100) = 23.5 > 22$. Pass

Step 4: Calculate the Vmp at the lowest expected cell temperature LT-Vmp to verify that the Vmp will not exceed the maximum MPP voltage of the microinverter Max Vmp.

$LT-Vmp = (Vmp) + (Vmp) * (\text{Lowest Expected Cell Temp.} - \text{STC}) * (\text{Temp. Coefficient} \% / 100) < \text{Max Vmp}$
Example: at STC, Voc=29, Voc thermal coefficient=-0.36%, highest cell Temp=-25C, microinverter Min Vmp=45V
 $LT-Vmp = 29 + 29 * (-25 - 25) * (-.36 / 100) = 34.5 < 45$. Pass

Step 5: If the maximum fuse rating of the module is less than or equal to the microinverter's rated maximum short circuit current, it is acceptable. If the fuse rating is greater than the microinverter's maximum DC short circuit current rating, go to step 6.

Module series fuse rate < Microinverter Max Isc

Example: Module series fuse rate=15A, Microinverter Max Isc=12A

Module series fuse rate=15A > 12A. Go to Step 6.

Step 6: Calculate that Isc at the highest expected cell temperature HT-Isc to verify that the Isc will not exceed the maximum DC short circuit current of the microinverter Max Isc.

$HT-Isc = Isc + (Isc) * (Highest\ Expected\ Cell\ Temp. - STC) * (Isc\ Temp.\ Coefficient\ \% / 100) < Microinverter\ Max\ Isc$

Example: at STC, Isc=8.5, Isc Temp. coefficient=0.05%, highest cell Temp=75C, Microinverter Max Isc=12A

$HT-Isc = 8.5 + (8.5) * (75 - 25) * (.05 / 100) = 8.46 < 12A$. Pass

The system designer is responsible for determining the appropriate module to use for a specific installation in order to achieve the maximum energy harvest. The APsystems Module e-Decoder provided by APsystems helps verify that the module Voc and Isc will not exceed the microinverter's specs under all expected weather conditions. When the condition is met, E-decoder will show PASS in Green. Simply editing the module parameters, PASS in green indicates that the modules are compatible. Any FAIL in red indicates an incompatible module. If you need further verification, please contact APsystems Customer Support.