SolarEdge Systems and EMI Performance and Compliance

Electromagnetic signals are the result of electrical currents and voltages. Whenever electricity is used to drive equipment, an electromagnetic signal ensues as well. These signals can be used to transmit information from one point to the next, or they can simply be a byproduct of the operation of equipment or an unintended signal emission. Where the signals are unintended, this creates electromagnetic noise. It is this noise that can cause interference or performance degradation to equipment, and manufacturers must therefore take steps to reduce the effects of noise.

All SolarEdge products meet the established global standards for power quality and radio frequency emissions. The SolarEdge inverters and power optimizers are designed to be fully compliant with EN61000-6-2/EN-61000-6-3/ EN55022/EN55032 electromagnetic emissions (EMI) standards, and have been tested and verified according to these standards.

The following technical note provides further details on SolarEdge products standard compliance: Emissions Compliance of SolarEdge Products .

EMI is very common in various systems including solar installations. Such installations may have unintended noise emissions that may be amplified by the presence of a multitude of metal/conductive parts such as mounting rails, rooftop materials, grounding rods connected to the mounting rails, DC cabling, AC cabling and the PV solar panels themselves (which are also partly metallic).

In general, there are commonly known uncertainties that an actual installation may yield or face, as described in provisions made by the FCC, as an example:

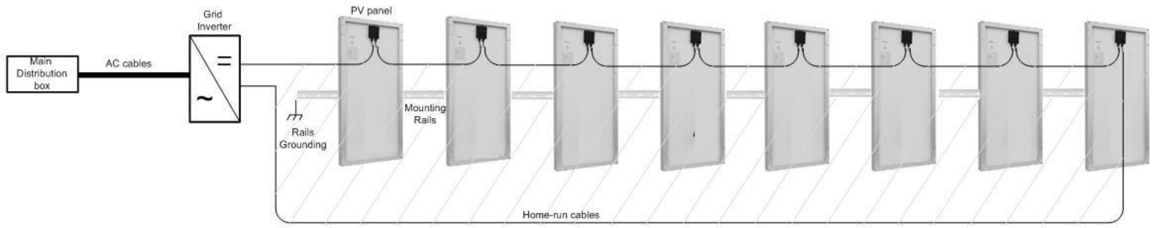
"This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- *Reorient or relocate the receiving antenna.*
- *Increase the separation between the equipment and the receiver.*
- *Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.*
- *Consult the dealer or an experienced radio/TV technician for help."*

Due to the aforementioned EMI considerations, SolarEdge recommends the following installation methodologies and best practices that are intended to reduce overall PV site EMI.

Installation Considerations

Following is a typical PV installation:



Two installations having the same PV panels and the same equipment (e.g. inverters, power optimizers, or micro-inverters) may have quite different radiated emissions. As such, various actions may need to be performed by the system installer in case an interference problem occurs (as was outlined above in the FCC example).

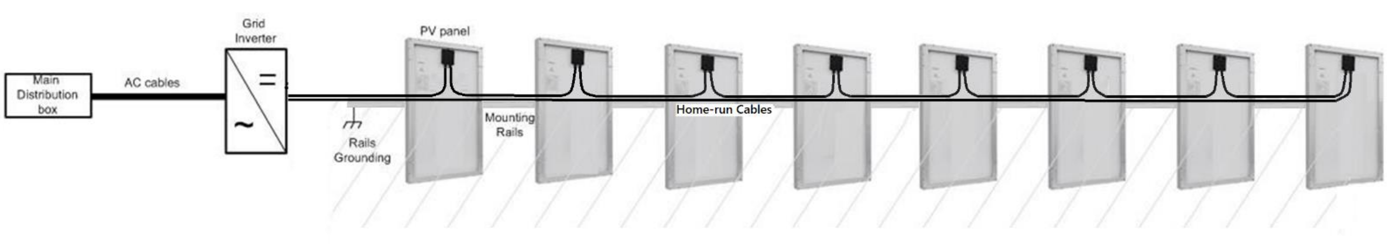
The first aspect that an installer should take into account is proper grounding of the PV panels. Grounding of the PV array is important both safety-wise and EMI-wise. Without proper grounding, an effective antenna can be formed between the metal parts of the PV panel and the ground plane. This effective antenna may emit noise, especially at low frequencies where the effective antenna has high gain.

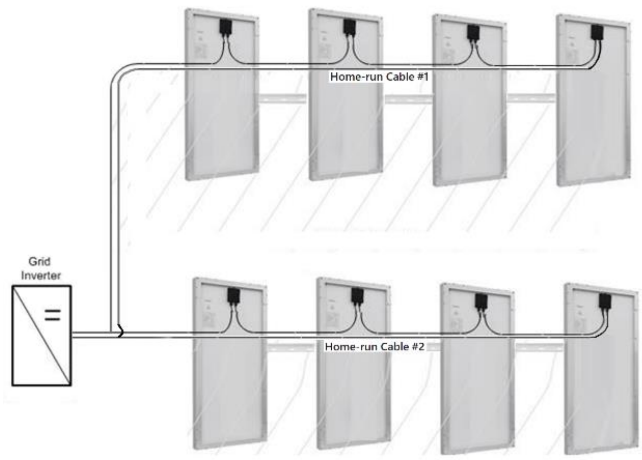
The next important aspect is the DC cabling between the PV panels. The DC cables in a solar PV installation carry the DC current between the panels in the same string and eventually serve as a potential loop antenna as shown in the above diagram by tilted lines.

The loop antenna amplifies and radiates the noise emissions of any electronic component in the solar installation, such as the grid inverter or panel-level converters (e.g. micro-inverters or DC/DC optimizers).

The loop antenna's geometrical shape dictates the antenna gain and also its frequency behavior. The bigger the loop, the better the antenna is at low frequencies (MHz level).

The suggested method to remove the loop antenna almost completely, is to route the home-run cable next to the cables between the PV panels (keeping the "plus" and "minus" cables as close to one another, and if possible twisting them together) as shown in the following diagram for either a single string installation or a multi-string installation:




Home-run Cable #1
Grid
Inverter
Home-run Cable #2