# TECHNICAL REFERENCE DOCUMENT: SAFETY

## Safety specifications

Flex Power Modules' DC/DC converters and DC/DC regulators are designed in accordance with the safety standards *IEC 62368-1, EN 62368-1* and *UL 62368-1 Audio/video, information and communication technology equipment - Part 1: Safety requirements*

IEC/EN/UL 62368-1 contains requirements to prevent injury or damage due to the following hazards:

- Electrical shock
- Electrically-caused fire
- Injury caused by hazardous substances
- Mechanically-caused injury
- Skin burn
- Radiation-caused injury

On-board DC/DC converters, Power Interface Modules and DC/DC regulators are defined as component power supplies. As components they cannot fully comply with the provisions of any safety requirements without "conditions of acceptability". Clearance between conductors and between conductive parts of the component power supply and conductors on the board in the final product must meet the applicable safety requirements. Certain conditions of acceptability apply for component power supplies with limited stand-off (please refer to *Technical Specification under Mechanical Information* for further information). It is the responsibility of the installer to ensure that the final product housing these components complies with the requirements of all applicable safety standards and regulations for the final product.

Component power supplies for general use shall comply with the requirements in *IEC/EN/UL 62368-1*. Product related standards, e.g. *IEEE 802.3af Power over Ethernet*, and *ETS-300132-2* Power interface at the input to telecom equipment, operated by direct current (dc) are based on *IEC/EN/UL* 62368 -1 with regards to safety.

All Flex Power Modules' DC/DC converters, Power Interface Modules and DC/DC regulators are UL 62368-1 recognized and certified in accordance with *EN 62368-1*. The flammability rating for all construction parts of the products meet requirements for V-0 class material according to *IEC* 62368 *-11-10*, Fire hazard testing, test flames – 50 W horizontal and vertical flame test methods.

## Isolated DC/DC converters

The product may provide basic or functional insulation between input and output according to IEC/EN/UL 62368-1 different conditiaons shall be met if the output of a basic or a functional insulated product shall be considered as safety extra low voltage (SELV).

For basic insulated products the output is considered as safety extra low voltage (SELV) if one of the following condition is met:

- The input source provides supplementary or double or reinforced insulation from the AC mains according to IEC/EN/UL 62368-1.
- The input source provides functional or basic insulation from the AC mains and the product's output is reliably connected to protective earth according to IEC/EN/UL 62368-1.

For functional insulate products the output is considered as safety exter low voltage (SELV) if one of the following conditions is met:

- The input source provides double or reinforced insulation from the AC mains according to IEC/EN/UL 62368-1.
- The input source provides basic or supplementary insulation from the AC mains and the product's output is reliably connected to protective earth according to IEC/EN/UL 62368 -1.
- The input source is reliably connected to protective earth and provides basic or supplementary insulation according to IEC/EN/UL 62368 -1 and the maximum input source voltage is 60 Vdc.

Galvanic isolation between input and output is verified in an electric strenght test and the isolation (VISO) meets the voltage strenght requirements for basic insulation according to IEC/EN/UL 62368-1.
It is recommende to use slow blow fues at the input of each DC/DC converter. If an input filter is used in the circuit the fuse should be placed infornt of the input filter. In the rare event of a component problem that imposes a short circuit on the input source, this fuse will provide the following functions:

- Isolate the fault from the input power source so as not to affect the operation of other parts of the system
- Protect the distribution wiring from excessive current and power loss thus preventing hazardous overheating