

## INID TN-160602

Under voltage protection on INID Smart Card and Proximity readers



### What is a brownout

A brownout is a drop in voltage of an electrical power supply system. The term is used for all kinds of power supply systems from the electrical power grid to power supply systems in electrical devices. A brownout can be created intentional to create a load reduction or occur unintentional due to a increased load or disruption in the power supply system.

### What are the effects of power supply ripple

Power supply ripple is an AC voltage, typical a residue of the AC input voltage, superimposed on the DC output voltage. The power supply ripple is no requirement for a brownout situation, it may however create a periodical drop of the supply voltage below a certain minimum level.

### What are the effects of a brownout for digital devices

The effects of a brownout condition for digital devices range from unpredictable behavior to actual damage of the device. Digital devices operate on the basis of logical states represented by voltage levels. When the supply voltage of a digital component drops below a certain level the circuit is no longer capable of reliable detecting the corresponding logical state of a voltage level. This results in reading and writing of unpredictable data (possible memory corruption), execution of unpredictable machine code (possible device crash), logical operations on unpredictable data with unpredictable results and erratic access to memory locations. To avoid these situations manufacturers of CPU's, memory chips and other logical components list the minimal power supply voltage at which the component reliable operates. This voltage level is also know as brownout voltage.

### Brownout prevention measures

Brownout prevention can have two forms: prevention of the brown out situation and protection against the brownout effects. Prevention measures of the brownout situation are focused on keeping a reliable power supply available for the connected systems and devices. Brownout prevention systems are: emergency power supply units, battery backup systems and UPS systems. Protection against brownout effects are typically measures that prevent the device from operating under brownout conditions.

### Where should protection for brownout effects be installed

Most effective brownout effect prevention is internal in the device that needs protection, second direct at the connection terminals of the device and last at the terminals of the system that connect to the device. The last option requires to take external influences into account that may be overseen.

### INID readers and brownout protection

All INID Smart Card and Proximity readers are protected against brownout effects. All readers are equipped with local brownout prevention circuits. All readers contain an internal Under Voltage Lock Out (UVLO) protection circuit that brings and keeps the readers circuits in reset until (all) regulated voltages reach their designated outputs.