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CN Level: Minor

Subject: Guidelines for RTAX-S/SL devices at power down

Dear Customer,

Actel's RTAX-S/SL devices are designed to be tolerant of any power-up or power-down sequence. This notification is to provide you with information regarding the behavior of Actel's RTAX-S/SL devices during a specific situation at power down. Extensive characterization of power up and power down of these devices has shown that in a specific scenario a high transient core current ICCA is observed when VCCDA powers down while VCCA remains powered up or is greater than 0.7 V. No high current spike is observed during any power-up sequence.

Device Level Considerations

Data analysis indicates that the amplitude and duration of this ICCA transient depends on power supply ramp down rates, junction temperature and the specific RTAX-S/SL device type. Thorough analysis of this scenario indicated that the transient current is within the design specification of the RTAX-S/SL devices, and no reliability issues exist due to the distributed nature of this current. Electromigration calculations show the amplitude of the current transient is not large enough to shorten the device lifetime. A copy of the application note that describes this scenario, analysis and conclusions in detail is available at http://www.actel.com/documents/RTAXS_Powerup_AN.pdf

Board Level Considerations

Actel recommends that one of the following guidelines be used:

- EITHER the power supply used on a board be able to provide the appropriate drive current to sustain this ICCA transient
- OR to prevent this condition always power down VCCA before VCCDA
- OR for instances where VCCDA needs to power down before VCCA ensure one of the following conditions are met:
 - $VCCA < 0.7V$
 - $VCCDA > 0.5 * VCCA + 150 \text{ mV}$ (where $VCCA \geq 0.7 V$)
 - $VCCDA < 0.5 * VCCA - 150 \text{ mV}$ (where $VCCA \geq 0.7 V$)



As a result of this investigation we have concluded there are no changes to the FPGA functionality or reliability. The RTAX-S/SL datasheet is being updated to reflect this information. We encourage our customers to follow the guidelines above when designing with RTAX-S/SL devices.

If you have any additional questions, please do not hesitate to contact Actel's ITAR Technical support at <http://www.actel.com/mycases> or tech_itar@actel.com.

Yours Sincerely,

Actel Corporation