

# Design Tools

## Loadline & Current Sensing



### 3. Loadline & Current Sensing

Current Sensing and Loadline NTC

This tool is used to set the desirable current sense method and model. Users can also set the desired loadline resistance and temperature coefficient offset. Remember to press and **Apply** and **Ok** to program the settings.

Enter the **Current Sense Mode** that is used in the power stages

The desired **Loadline BW** and **Loadline resistance** can be entered.

Temperature compensated phase current coefficient.

In **DCR sensing**, a suitable resistor-capacitor network ( $R_{sen}$  and  $C_{sen}$ ) is connected across the inductor in each phase and should be optimized that the voltage across the capacitor is equal to the voltage across the inductor DCR.

Follow the equation to calculate the appropriate  $R_{sen}$  value to prevent undershooting of the output voltage during load transients. It is recommended to use a 220nF NPO type dielectric for  $C_{sen}$  and a thick film resistor for  $R_{sen}$ .

$$R_{sen} = \frac{1.05 * L_{out}}{C_{sen} * DCR}$$

Current sense circuit model based on the **Current Sense Mode** choice. Follow the circuit model to build the **DCR current sense circuit**.

Select the loop the current sense configuration is for.

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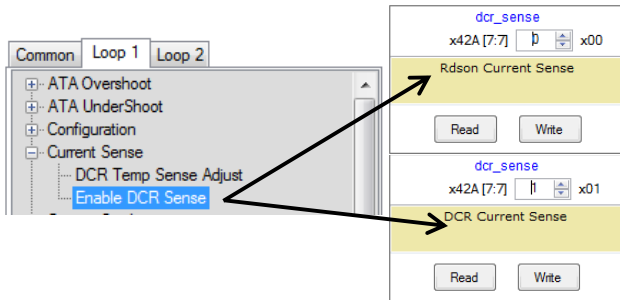
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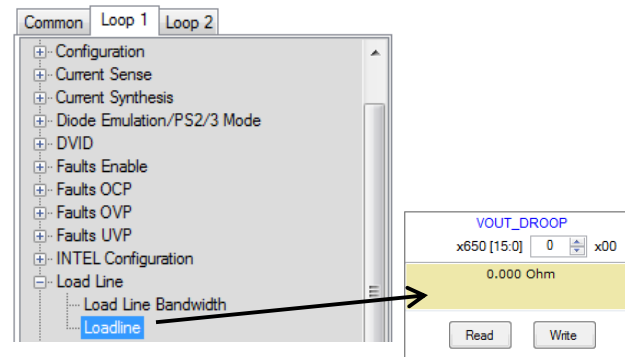
Loadline and Current sensing tool can also be programmed using **I2C Register Map** using tree view commands window. Remember to click **Write** to program the settings



In Loop1 or Loop2 section under **Current Sense**

**Enable DCR Sense** – control current sense mode Rdson(0) or DCR(1).

**DCR Temp Sense Adjust** - Control the temperature coefficient offset.



In Loop 1 or Loop 2 Section under **Loadline**.

**Loadline** – Sets the value of loadline resistance for desired Vout droop.

**Load Line Bandwidth** – sets the bandwidth for the digital loadline from 30kHz to 1MHz.

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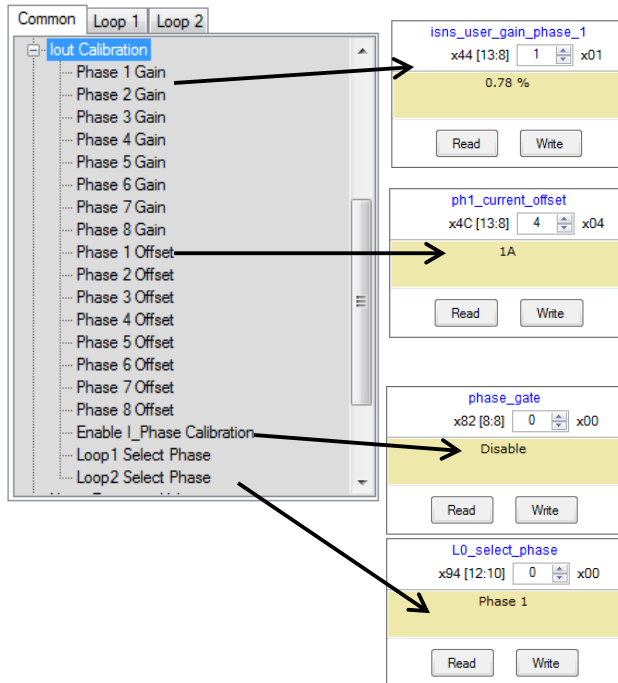
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Acadia also has the function to calibrate individual phase currents and total output current. Each phase can be turned on individually, so users can adjust the corresponding **phase gain and offset**.



In Common Section under **Iout Calibration**.

**Phase # Gain(mV/A)** – Calibrate the gain for each phase. Range is -25% to +24.2% with 0.78% resolution.

**Phase # Offset(A)** – Calibrate the current offset of each phase. Range is -8A to +7.75A with 0.25A resolution.

In Common Section under **Iout Calibration**.

**Enable I\_Phase Calibration** – allows users to select only 1 phase to operate per loop. Used for current sense trimming of each phase

**Loop # Select Phase** – select which one phase to operate in this loop.