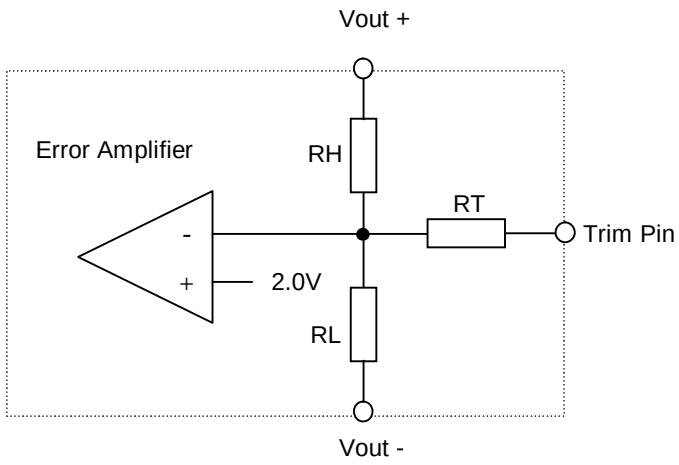
WDE Analog Trim

Scope

This document describes how to adjust the output voltage of the WDE series converters with the analog Trim pin. [It should be noted that it is also possible to adjust the output voltage via digital I2C commands to the secondary side SCL & SDA pins. Details of I2C commands are available on request. The digital trim option offers higher trim accuracy as it is digitally calibrated; Approximately +/- 0.3% Vout. Digital trim may also be performed dynamically while the unit is operating and achieves a controlled slew rate of output voltage change].

Trim Circuit Model



The combination of the resistors RH & RL establish an input impedance of 4.75k into the inverting input of the error amplifier (when the Trim pin is open circuit).
RT is 10 times the value of the input impedance of the error amplifier (i.e. 47.5k).
Connecting the Trim pin to Vout – therefore causes an increase in the output voltage of 10%.
Connecting the Trim pin to a voltage of 6V causes a decrease in output voltage of 20%.

The maximum trim limits of the WDE series are +10% and -20% of Vout.

Where an external voltage is not used on the trim pin the output can be changed according to the Trim resistor formulas below.

Trim Up Resistor Calculation (Resistor connected to Vout -)

$$\textbf{RTrimUp (kOhm)} = \frac{4.75 \times 100}{\%\ \text{TrimUp}} - 47.5$$

Trim Down Resistor Calculation (Resistor connected to Vout +)

$$\textbf{RTrimDown (KOhm)} = \frac{(\text{VoutNom} \times (1 - \%\text{TrimDown} / 100) - 2) \times 100}{\%\ \text{TrimDown} \times 0.421} - 47.5$$

Note that the maximum trim down with a resistor on a 5Vout Model is 12% due to the relatively low output voltage in comparison with the trim input impedance. Connection of a resistor to a higher stable system voltage (instead of VoutNom above) will allow the output voltage to be trimmed down further to 20% maximum.

The formulas above give a good approximation of the Trim resistor values, however in practice some final adjustment may be required to achieve the correct precision. The precision then achieved is repeatable from unit to unit with a tolerance of approximately +/-1% Vout.

Note that increasing the output voltage also increases the minimum operating input voltage at which the unit will maintain full regulation by the same proportion (duty cycle limit of the converter). i.e. a 10% increase in output voltage increases the minimum input voltage for maintaining regulation by 10%.

Digital trim and analog trim should never be used at the same time. i.e. the digital output voltage set-point should be at the nominal (factory) Vout specification before using analog trim.