Button Descriptions

1. EVM Power Control

Default state: OFF
Description: This button controls the +3.3V power supply on the SM-USB-DIG platform. When it is in the OFF state, no power is provided to the TMP006EVM board by the SM-USB-DIG. When it is in the ON state, the +3.3V power supply rail is provided to the TMP006EVM board by the SM-USB-DIG.

2. Read Temperature Data Continuously

Default state: OFF
Description: This button controls the continuous temperature measurement functionality of the TMP006EVM software. When it is in the OFF state, the EVM software only reports a temperature measurement result when the "Read All Reg" button is clicked by the user. When it is in the ON state, the EVM software will report a temperature measurement result each time the $\overline{DRDY}$ pin of the TMP006 goes low. Turning this button ON will automatically turn "EVM Power Control" ON.

3. Transient Correction

Default state: OFF
Description: This button controls the transient correction functionality of the TMP006EVM software. When it is in the OFF state, the EVM software does not include a transient correction algorithm in its temperature calculations. When it is in the ON state, the EVM software performs a transient correction algorithm in its temperature calculations as described below.

a. Transient Correction Algorithm

When the TMP006EVM printed circuit board (PCB) experiences large transients in local temperature, the thermopile inside the TMP006 also experiences a large change in temperature. However, the hot junction and cold junction within the thermopile do not change temperature at the same rate, which results in increased temperature measurement error seen as overshoot or undershoot.

This unwanted behavior can be corrected through the addition of a transient correction algorithm. This algorithm measures the slope of the local temperature over a time interval consisting of four samples. This slope, along with a known thermal time constant of the TMP006 thermopile, is then used to correct the measured object voltage and, by extension, the measured object temperature. Since the transient correction algorithm requires four samples of local temperature information before making any calculations, a four-sample delay is observed when this feature is enabled in the software GUI.

b. Transient Correction Equations

$$T_{SLOPE} = -(0.3 \times T_{LOCAL1}) - (0.1 \times T_{LOCAL2}) + (0.1 \times T_{LOCAL3}) + (0.3 \times T_{LOCAL4}) \quad \textbf{(1) Local Temperature Slope Equation}$$

$$V_{OBJ\_CORRECTED} = V_{OBJ} + T_{SLOPE} \times 2.96 \times 10^{-4} \quad \textbf{(2) Corrected Object Voltage Equation}$$