Introduction to Simulation Model

TLE4978-R060W5-O-S0010

Targeted simulator: SIMetrix

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TLE4978-R060W5-O-S0010 current sensor model specifications

1. General considerations

The TLE4978-R060W5-O-S0010 simulation model is written in PSpice and is compatible with OrCAD PSpice, Tina Industrial and SIMetrix. The model development has been performed according to the datasheet.

2. Functionality

Model performances:

- Static Electrical Characteristics and Dynamic Electrical Characteristics are modelled with the typical values from the datasheet.

Implemented features:

- Power-on delay time
- Overcurrent detection
- Undervoltage
- Output saturation voltage
- Zero cross detection

3. Descriptions of ports/pins

Port name	Port function
VDD	Supply voltage
GND	Ground
VREF	Reference voltage input or output
AOUT	Analog signal output
OCD	Over-current detection output (open drain output)
IPN	Negative current terminal pin (current-out)
IPP	Positive current terminal pin (current-in)
OCD_THR	Over-current detection threshold selection
ZCD	Zero crossing detection

4. Model parameters

The configuration registers are **modeled** through **parameters**. Below you can find the list of model parameters and the values that could be used.

Parameter name	Description	Parameter Value	Comments
OP_MODE	Device operation mode	0	Semi-differential bidirectional mode.
		4	Single-ended mode AOUT only bidirectional mode. **This is the standard setting**
OCD_deglitch	Deglitch time for OCD	0	**0** s deglitch time. **This is the standard setting**
		1	**300 ns** deglitch time
		2	**600 ns** deglitch time
		3	**900 ns** deglitch time
		4	**1200 ns** deglitch time
		5	**1500 ns** deglitch time
		6	**1800 ns** deglitch time
		7	**2100 ns** deglitch time
OCD_DIS	The over-current detection enable	0	The OCD will not indicate an internal failure or an over-current event
		1	The OCD will indicate an internal failure or an over-current event. **This is the standard setting**
OCD_HYS	OCD hysteresis cycle value	0	0 hysteresis cycle
		1	0.0625 * **FS A** hysteresis cycle
		2	0.125 * **FS A** hysteresis cycle
		3	0.25 * **FS A** hysteresis cycle. **This is the standard setting**
OCD_THRSH	Threshold level of OCD	0 - 255	**OCD_THRSH** is used to calculate OCD threshold according to the formula: **OCD_crt_val = OCD_THRSH / 1.755**. The default value is **148** for 84.375A OCD threshold.
OCD_THR_PRIO	Decides who sets OCD threshold between **OCD_THRSH** param and **OCD_THR** pin	0	**OCD_THR** pin sets the value of the OCD threshold
		1	**OCD_THRSH** param sets the value of OCD threshold
ZCD_THRSH	ZCD threshold level	0 - 255	Sets the value of the ZCD threshold according to the following formula: ***ZCD_THR = 127 – 86 * I_ZCD_THR / 10*** ***I_ZCD_THR = (1270 – 10 * ZCD_THR) / 86*** The default value is **128**.
ZCD_HOLD_TIME	ZCD minimum hold time	0 – 255	Sets the value of the ZCD minimum hold time according to the formula: (4+ ZCD_HOLD_TIME *4)*100ns. **Please note that the minimum hold time should not be set to be greater than half of the switching period,** otherwise the ZCD signal would not be correctly displayed.

VDD_5V_EN	Maximum operating voltage	0	The maximum operating voltage is 3.3V
		1	The maximum operating voltage is 5V