

### FEATURES

**Dual supervisory circuits**  
**Supply voltage range of 2.7 V to 5.5 V**  
**Pretrimmed threshold options: 1.8 V, 2.5 V, 3.3 V, and 5 V**  
**Adjustable 0.6 V voltage reference**  
**Maximum supply current of 40  $\mu$ A**  
**140 ms (minimum) reset timeout**  
**Watchdog timer with 1.6 sec (typical) timeout**  
**RESET valid from  $V_{DD} \geq 1.1$  V**  
**Push-pull RESET and  $\overline{\text{RESET}}$  outputs**  
**8-lead, narrow body SOIC package**  
**Temperature range:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$**

### APPLICATIONS

**Supervising DSPs/microcontrollers**  
**Industrial and portable equipment**  
**Wireless systems**  
**Notebook/desktop computers**

### GENERAL DESCRIPTION

The ADM13305 is a dual voltage supervisor designed to monitor two supplies and provide a reset signal to DSP and microprocessor-based systems.

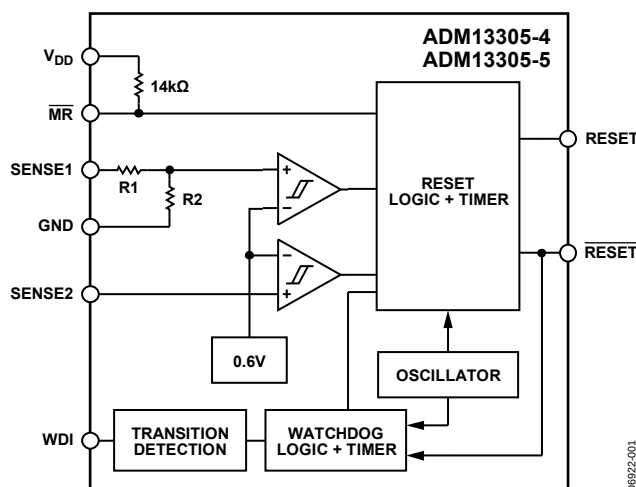
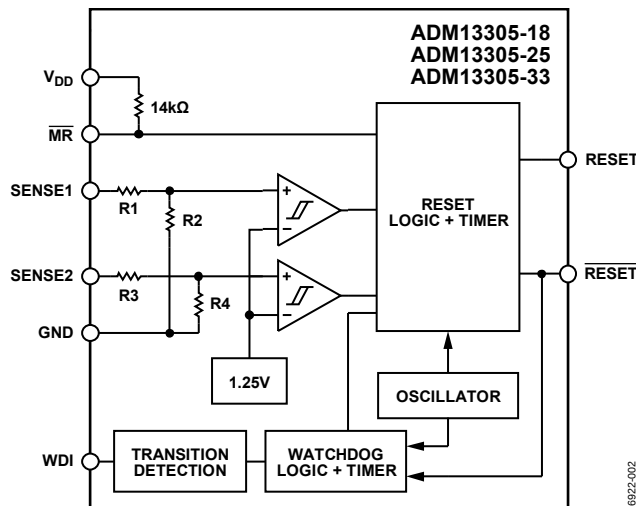
There are five models available, all of which feature a combination of internally pretrimmed undervoltage threshold options for monitoring 1.8 V, 2.5 V, 3.3 V, and 5 V supplies. There is also an adjustable input option with an undervoltage threshold voltage of 0.6 V.

The ADM13305-18, ADM13305-25, and ADM13305-33 models have two internally fixed thresholds. The ADM13305-4 and ADM13305-5 offer one internally fixed threshold and one externally programmable threshold via a resistor string. See the Ordering Guide for a list of all available options.

During power-up,  $\overline{\text{RESET}}$  is asserted when the supply voltage exceeds 1.1 V. The device then monitors the SENSEv input pins and holds the  $\overline{\text{RESET}}$  output low as long as either of the SENSEv inputs remains below the rising threshold voltage,  $V_{IT+}$ .

Once the supplies monitored at the SENSEv inputs rise above their associated thresholds, the reset signal remains low for the reset timeout period before deasserting. Subsequently, if a voltage monitored by the SENSEv pins falls below its associated falling threshold,  $V_{IT-}$ , the  $\overline{\text{RESET}}$  output asserts. The ADM13305 features both an active high RESET and an active low  $\overline{\text{RESET}}$  output.

### FUNCTIONAL BLOCK DIAGRAMS



As well as providing power-on reset signals, an on-chip watchdog timer can reset the microprocessor if it fails to strobe within the preset timeout period. A reset signal can also be asserted by an external push button through the manual reset input pin.

The ADM13305 is available in an 8-lead, narrow body SOIC package. The device operates over the extended industrial temperature range of  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ .

#### Rev. 0

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REVISION HISTORY

8/07—Revision 0: Initial Version

## SPECIFICATIONS

$V_{DD} = 2.7\text{ V to }5.5\text{ V}$ ,  $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ , unless otherwise noted.

**Table 1. ADM13305-18, ADM13305-25, and ADM13305-33**

| Parameter                                                     | Min                 | Typ  | Max                 | Unit          | Test Conditions/Comments                                             |
|---------------------------------------------------------------|---------------------|------|---------------------|---------------|----------------------------------------------------------------------|
| OPERATING VOLTAGE RANGE, $V_{DD}$                             | 2.7                 |      | 5.5                 | V             |                                                                      |
| SUPPLY CURRENT, $I_{DD}$                                      |                     |      | 40                  | $\mu\text{A}$ |                                                                      |
| INPUT CAPACITANCE, $C_I$                                      |                     | 10   |                     | pF            | $V_I = 0\text{ V to }V_{DD}$                                         |
| RESET, $\overline{\text{RESET}}$ OUTPUT                       |                     |      |                     |               |                                                                      |
| High Level Output Voltage, $V_{OH}$                           | $V_{DD} - 0.2$      |      |                     | V             | $I_{OH} = -20\text{ }\mu\text{A}$                                    |
|                                                               | $V_{DD} - 0.4$      |      |                     | V             | $I_{OH} = -2\text{ mA}$ , $V_{DD} = 3.3\text{ V}$                    |
|                                                               | $V_{DD} - 0.4$      |      |                     | V             | $I_{OH} = -3\text{ mA}$ , $V_{DD} = 5.5\text{ V}$                    |
| Low Level Output Voltage, $V_{OL}$                            |                     | 0.2  |                     | V             | $I_{OL} = 20\text{ }\mu\text{A}$                                     |
|                                                               |                     | 0.4  |                     | V             | $I_{OL} = 2\text{ mA}$ , $V_{DD} = 3.3\text{ V}$                     |
|                                                               |                     | 0.4  |                     | V             | $I_{OL} = 3\text{ mA}$ , $V_{DD} = 5.5\text{ V}$                     |
| Power-Up Reset Voltage <sup>1</sup>                           |                     | 0.4  |                     | V             | $I_{OL} = 20\text{ }\mu\text{A}$ , $V_{DD} \geq 1.1\text{ V}$        |
| SENSE INPUTS                                                  |                     |      |                     |               |                                                                      |
| Falling Threshold Voltage, $V_{IT-}$                          | 1.64                | 1.68 | 1.72                | V             | $T_A = 0^{\circ}\text{C to }85^{\circ}\text{C}$                      |
|                                                               | 2.20                | 2.25 | 2.30                | V             | $T_A = 0^{\circ}\text{C to }85^{\circ}\text{C}$                      |
|                                                               | 2.86                | 2.93 | 3.00                | V             | $T_A = 0^{\circ}\text{C to }85^{\circ}\text{C}$                      |
|                                                               | 4.46                | 4.55 | 4.64                | V             | $T_A = 0^{\circ}\text{C to }85^{\circ}\text{C}$                      |
|                                                               | 1.64                | 1.68 | 1.73                | V             | $T_A = -40^{\circ}\text{C to }+85^{\circ}\text{C}$                   |
|                                                               | 2.20                | 2.25 | 2.32                | V             | $T_A = -40^{\circ}\text{C to }+85^{\circ}\text{C}$                   |
|                                                               | 2.86                | 2.93 | 3.02                | V             | $T_A = -40^{\circ}\text{C to }+85^{\circ}\text{C}$                   |
|                                                               | 4.46                | 4.55 | 4.67                | V             | $T_A = -40^{\circ}\text{C to }+85^{\circ}\text{C}$                   |
| Hysteresis at SENSEv Inputs, $V_{HYS}$                        |                     | 15   |                     | mV            | $V_{IT-} = 1.68\text{ V}$                                            |
|                                                               |                     | 20   |                     | mV            | $V_{IT-} = 2.25\text{ V}$                                            |
|                                                               |                     | 30   |                     | mV            | $V_{IT-} = 2.93\text{ V}$                                            |
|                                                               |                     | 40   |                     | mV            | $V_{IT-} = 4.55\text{ V}$                                            |
| WDI                                                           |                     |      |                     |               |                                                                      |
| Average High Level Input Current, $I_{H(AV)}$                 |                     | 100  | 150                 | $\mu\text{A}$ | $\text{WDI} = V_{DD} = 5.5\text{ V}$                                 |
| Average Low Level Input Current, $I_{L(AV)}$                  |                     | -15  | -20                 | $\mu\text{A}$ | $\text{WDI} = 0\text{ V}$ , $V_{DD} = 5.5\text{ V}$                  |
| INPUT VOLTAGE AT $\overline{\text{MR}}$ AND WDI               |                     |      |                     |               |                                                                      |
| High Level, $V_{IH}$                                          | $0.7 \times V_{DD}$ |      |                     | V             |                                                                      |
| Low Level, $V_{IL}$                                           |                     |      | $0.3 \times V_{DD}$ | V             |                                                                      |
| INPUT TRANSITION RISE AND FALL RATE AT $\overline{\text{MR}}$ |                     |      | 50                  | ns/V          |                                                                      |
| HIGH LEVEL INPUT CURRENT, $I_H$                               |                     |      |                     |               |                                                                      |
| WDI                                                           |                     | 120  | 170                 | $\mu\text{A}$ | $\text{WDI} = V_{DD} = 5.5\text{ V}$                                 |
| $\overline{\text{MR}}$                                        |                     | -130 | -180                | $\mu\text{A}$ | $\overline{\text{MR}} = 0.7 \times V_{DD}$ , $V_{DD} = 5.5\text{ V}$ |
| SENSE1                                                        |                     | 5    | 8                   | $\mu\text{A}$ | $\text{SENSE1} = V_{DD} = 5.5\text{ V}$                              |
| SENSE2                                                        |                     | 6    | 9                   | $\mu\text{A}$ | $\text{SENSE2} = V_{DD} = 5.5\text{ V}$                              |
| LOW LEVEL INPUT CURRENT, $I_L$                                |                     |      |                     |               |                                                                      |
| WDI                                                           |                     | -120 | -170                | $\mu\text{A}$ | $\text{WDI} = 0\text{ V}$ , $V_{DD} = 5.5\text{ V}$                  |
| $\overline{\text{MR}}$                                        |                     | -430 | -600                | $\mu\text{A}$ | $\overline{\text{MR}} = 0\text{ V}$ , $V_{DD} = 5.5\text{ V}$        |
| SENSEv                                                        | -1                  |      | +1                  | $\mu\text{A}$ | $\text{SENSE1, SENSE2} = 0\text{ V}$                                 |

<sup>1</sup> The lowest supply voltage at which  $\overline{\text{RESET}}$  becomes active.  $t_r$ ,  $V_{DD} \geq 15\text{ }\mu\text{s/V}$ .

# ADM13305

$V_{DD} = 2.7 \text{ V to } 5.5 \text{ V}$ ,  $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$ , unless otherwise noted.

**Table 2. ADM13305-4 and ADM13305-5**

| Parameter                                                 | Min                 | Typ  | Max                 | Unit          | Test Conditions/Comments                                              |
|-----------------------------------------------------------|---------------------|------|---------------------|---------------|-----------------------------------------------------------------------|
| OPERATING VOLTAGE RANGE, $V_{DD}$                         | 2.7                 |      | 5.5                 | V             |                                                                       |
| SUPPLY CURRENT, $I_{DD}$                                  |                     |      | 40                  | $\mu\text{A}$ |                                                                       |
| INPUT CAPACITANCE, $C_I$                                  |                     | 10   |                     | pF            | $V_I = 0 \text{ V to } V_{DD}$                                        |
| <b>RESET, <math>\overline{\text{RESET}}</math> OUTPUT</b> |                     |      |                     |               |                                                                       |
| High-Level Output Voltage, $V_{OH}$                       | $V_{DD} - 0.2$      |      |                     | V             | $I_{OH} = -20 \mu\text{A}$                                            |
|                                                           | $V_{DD} - 0.4$      |      |                     | V             | $I_{OH} = -2 \text{ mA}$ , $V_{DD} = 3.3 \text{ V}$                   |
|                                                           | $V_{DD} - 0.4$      |      |                     | V             | $I_{OH} = -3 \text{ mA}$ , $V_{DD} = 5.5 \text{ V}$                   |
| Low-Level Output Voltage, $V_{OL}$                        |                     | 0.2  |                     | V             | $I_{OH} = 20 \mu\text{A}$                                             |
|                                                           |                     | 0.4  |                     | V             | $I_{OH} = 2 \text{ mA}$ , $V_{DD} = 3.3 \text{ V}$                    |
|                                                           |                     | 0.4  |                     | V             | $I_{OH} = 3 \text{ mA}$ , $V_{DD} = 5.5 \text{ V}$                    |
| Power-Up Reset Voltage <sup>1</sup>                       |                     |      | 0.4                 | V             | $I_{OH} = 20 \mu\text{A}$ , $V_{DD} \geq 1.1 \text{ V}$               |
| <b>SENSEv INPUTS</b>                                      |                     |      |                     |               |                                                                       |
| Falling Input Threshold Voltage, $V_{IT-}$                | 0.5952              | 0.6  | 0.6048              | V             | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$                   |
|                                                           | 2.23                | 2.25 | 2.29                | V             | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$                   |
|                                                           | 2.90                | 2.93 | 2.98                | V             | $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$                   |
| Hysteresis at SENSEv Inputs, $V_{HYS}$                    |                     | 0    |                     | mV            | $V_{IT-} = 0.6 \text{ V}$                                             |
|                                                           |                     | 20   |                     | mV            | $V_{IT-} = 2.25 \text{ V}$                                            |
|                                                           |                     | 30   |                     | mV            | $V_{IT-} = 2.93 \text{ V}$                                            |
| <b>WDI</b>                                                |                     |      |                     |               |                                                                       |
| Average High Level Input Current, $I_{H(AV)}$             |                     | 100  | 150                 | $\mu\text{A}$ | $\text{WDI} = V_{DD} = 5.5 \text{ V}$                                 |
| Average Low Level Input Current, $I_{L(AV)}$              |                     | -15  | -20                 | $\mu\text{A}$ | $\text{WDI} = 0 \text{ V}$ , $V_{DD} = 5.5 \text{ V}$                 |
| <b>INPUT VOLTAGE AT MR AND WDI</b>                        |                     |      |                     |               |                                                                       |
| High Level, $V_{IH}$                                      | $0.7 \times V_{DD}$ |      |                     | V             |                                                                       |
| Low Level, $V_{IL}$                                       |                     |      | $0.3 \times V_{DD}$ | V             |                                                                       |
| INPUT TRANSITION RISE AND FALL RATE AT MR                 |                     |      |                     | 50            | ns/V                                                                  |
| <b>HIGH LEVEL INPUT CURRENT, <math>I_H</math></b>         |                     |      |                     |               |                                                                       |
| WDI                                                       |                     | 120  | 170                 | $\mu\text{A}$ | $\text{WDI} = V_{DD} = 5.5 \text{ V}$                                 |
| MR                                                        |                     | -130 | -180                | $\mu\text{A}$ | $\overline{\text{MR}} = 0.7 \times V_{DD}$ , $V_{DD} = 5.5 \text{ V}$ |
| SENSE1                                                    |                     | 5    | 8                   | $\mu\text{A}$ | $\text{SENSE1} = V_{DD} = 5.5 \text{ V}$                              |
| SENSE2                                                    | -50                 |      | +50                 | nA            | $\text{SENSE2} = V_{DD} = 5.5 \text{ V}$                              |
| <b>LOW LEVEL INPUT CURRENT, <math>I_L</math></b>          |                     |      |                     |               |                                                                       |
| WDI                                                       |                     | -120 | -170                | $\mu\text{A}$ | $\text{WDI} = 0 \text{ V}$ , $V_{DD} = 5.5 \text{ V}$                 |
| MR                                                        |                     | -430 | -600                | $\mu\text{A}$ | $\overline{\text{MR}} = 0 \text{ V}$ , $V_{DD} = 5.5 \text{ V}$       |
| SENSEv                                                    | -1                  |      | +1                  | $\mu\text{A}$ | $\text{SENSE1, SENSE2} = 0 \text{ V}$                                 |

<sup>1</sup> The lowest supply voltage at which  $\overline{\text{RESET}}$  becomes active.  $t_r$ ,  $V_{DD} \geq 15 \mu\text{s/V}$ .

## TIMING REQUIREMENTS

$V_{DD} = 2.7\text{ V to }5.5\text{ V}$ ,  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$ .

Table 3. ADM13305-18, ADM13305-25 and ADM13305-33

| Parameter              | Min | Typ | Max | Unit          | Test Conditions/Comments                                                                                    |
|------------------------|-----|-----|-----|---------------|-------------------------------------------------------------------------------------------------------------|
| PULSE WIDTH ( $t_w$ )  |     |     |     |               |                                                                                                             |
| SENSEv                 | 6   |     |     | $\mu\text{s}$ | $V_{\text{SENSEvL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $V_{\text{SENSEvH}} = V_{\text{IT+}} + 0.3\text{ V}$ |
| $\overline{\text{MR}}$ | 100 |     |     | ns            | $V_{\text{IH}} = 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} = 0.3 \times V_{\text{DD}}$                     |
| WDI                    | 100 |     |     | ns            | $V_{\text{IH}} = 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} = 0.3 \times V_{\text{DD}}$                     |

Table 4. ADM13305-4 and ADM13305-5

| Parameter              | Min | Typ | Max | Unit          | Test Conditions/Comments                                                                                    |
|------------------------|-----|-----|-----|---------------|-------------------------------------------------------------------------------------------------------------|
| PULSE WIDTH ( $t_w$ )  |     |     |     |               |                                                                                                             |
| SENSEv                 |     | 30  |     | $\mu\text{s}$ | $V_{\text{SENSEvL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $V_{\text{SENSEvH}} = V_{\text{IT+}} + 0.3\text{ V}$ |
| $\overline{\text{MR}}$ | 100 |     |     | ns            | $V_{\text{IH}} = 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} = 0.3 \times V_{\text{DD}}$                     |
| WDI                    | 100 |     |     | ns            | $V_{\text{IH}} = 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} = 0.3 \times V_{\text{DD}}$                     |

## SWITCHING CHARACTERISTICS

$V_{DD} = 2.7\text{ V to }5.5\text{ V}$ ,  $R_L = 1\text{ M}\Omega$ ,  $C_L = 50\text{ pF}$ ,  $T_A = 25^\circ\text{C}$ .

Table 5. ADM13305-18, ADM13305-25 and ADM13305-33

| Parameter                                                                                                                     | Min | Typ | Max | Unit          | Test Conditions/Comments                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Watchdog Timeout ( $t_{\text{t(OUT)}}$ )                                                                                      | 1.1 | 1.6 | 2.3 | sec           | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$                                          |
| Delay Time ( $t_d$ )                                                                                                          | 140 | 200 | 280 | ms            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$                                          |
| Propagation Delay, High-to-Low, $\overline{\text{MR}}$ to RESET <sup>1</sup> / $\overline{\text{RESET}}$ ( $t_{\text{PHL}}$ ) |     | 200 | 500 | ns            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $V_{\text{IH}} \geq 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} \geq 0.3 \times V_{\text{DD}}$ |
| Propagation Delay, Low-to-High, $\overline{\text{MR}}$ to RESET/ $\overline{\text{RESET}}$ <sup>1</sup> ( $t_{\text{PLH}}$ )  |     | 200 | 500 | ns            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $V_{\text{IH}} \geq 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} \geq 0.3 \times V_{\text{DD}}$ |
| Propagation Delay, High-to-Low, SENSEv to RESET <sup>1</sup> / $\overline{\text{RESET}}$ ( $t_{\text{PHL}}$ )                 |     | 1   | 5   | $\mu\text{s}$ | $V_{\text{IH}} = V_{\text{IT+}} + 0.3\text{ V}$ , $V_{\text{IL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$  |
| Propagation Delay, Low-to-High, SENSEv to RESET/ $\overline{\text{RESET}}$ <sup>1</sup> ( $t_{\text{PLH}}$ )                  |     | 1   | 5   | $\mu\text{s}$ | $V_{\text{IH}} = V_{\text{IT+}} + 0.3\text{ V}$ , $V_{\text{IL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$  |

<sup>1</sup> The reset timeout delay of 200 ms masks the propagation delay.

Table 6. ADM13305-4 and ADM13305-5

| Parameter                                                                                                                     | Min | Typ | Max | Unit          | Test Conditions/Comments                                                                                                                                  |
|-------------------------------------------------------------------------------------------------------------------------------|-----|-----|-----|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|
| Watchdog Timeout ( $t_{\text{t(OUT)}}$ )                                                                                      | 1.1 | 1.6 | 2.3 | sec           | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$                                          |
| Delay Time ( $t_d$ )                                                                                                          | 140 | 200 | 280 | ms            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$                                          |
| Propagation Delay, High-to-Low, $\overline{\text{MR}}$ to RESET <sup>1</sup> / $\overline{\text{RESET}}$ ( $t_{\text{PHL}}$ ) |     | 200 | 500 | ns            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $V_{\text{IH}} \geq 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} \geq 0.3 \times V_{\text{DD}}$ |
| Propagation Delay, Low-to-High, $\overline{\text{MR}}$ to RESET/ $\overline{\text{RESET}}$ <sup>1</sup> ( $t_{\text{PLH}}$ )  |     | 200 | 500 | ns            | $V_{\text{I(SENSEv)}} \geq V_{\text{IT+}} + 0.2\text{ V}$ , $V_{\text{IH}} \geq 0.7 \times V_{\text{DD}}$ , $V_{\text{IL}} \geq 0.3 \times V_{\text{DD}}$ |
| Propagation Delay, High-to-Low, SENSEv to RESET <sup>1</sup> / $\overline{\text{RESET}}$ ( $t_{\text{PHL}}$ )                 |     | 30  |     | $\mu\text{s}$ | $V_{\text{IH}} = V_{\text{IT+}} + 0.3\text{ V}$ , $V_{\text{IL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$  |
| Propagation Delay, Low-to-High, SENSEv to RESET/ $\overline{\text{RESET}}$ <sup>1</sup> ( $t_{\text{PLH}}$ )                  |     | 30  |     | $\mu\text{s}$ | $V_{\text{IH}} = V_{\text{IT+}} + 0.3\text{ V}$ , $V_{\text{IL}} = V_{\text{IT-}} - 0.3\text{ V}$ , $\overline{\text{MR}} \geq 0.7 \times V_{\text{DD}}$  |

<sup>1</sup> The reset timeout delay of 200 ms masks the propagation delay.

## FUNCTIONAL TRUTH TABLE

Table 7.

| MR | SENSE1 > V <sub>IT1</sub> | SENSE2 > V <sub>IT2</sub> | $\overline{\text{RESET}}$ | RESET |
|----|---------------------------|---------------------------|---------------------------|-------|
| L  | X <sup>1</sup>            | X <sup>1</sup>            | L                         | H     |
| H  | 0                         | 0                         | L                         | H     |
| H  | 0                         | 1                         | L                         | H     |
| H  | 1                         | 0                         | L                         | H     |
| H  | 1                         | 1                         | H                         | L     |

<sup>1</sup> X = don't care.

## ABSOLUTE MAXIMUM RATINGS

Table 8.

| Parameter                                                     | Rating                                   |
|---------------------------------------------------------------|------------------------------------------|
| Supply Voltage Range, $V_{DD}$                                | −0.3 V to +6 V                           |
| $\overline{MR}$ , $\overline{WDI}$                            | −0.3 V to $V_{DD} + 0.3$ V               |
| SENSE1, SENSE2                                                | $(V_{DD} + 0.3 \text{ V})V_{IT}/V_{REF}$ |
| RESET, $\overline{RESET}$                                     | −0.3 V to +6 V                           |
| Maximum Low Output Current                                    | 5 mA                                     |
| Maximum High Output Current                                   | −5 mA                                    |
| Input Clamp Current ( $V_I < 0 \text{ V}$ , $V_I > V_{DD}$ )  | ±20 mA                                   |
| Output Clamp Current ( $V_O < 0 \text{ V}$ , $V_O > V_{DD}$ ) | ±20 mA                                   |
| Operating Temperature Range                                   | −40°C to +85°C                           |
| Storage Temperature Range                                     | −65°C to +150°C                          |
| Lead Temperature                                              |                                          |
| Soldering (10 sec)                                            | 300°C                                    |
| Vapor Phase (60 sec)                                          | 215°C                                    |
| Infrared (15 sec)                                             | 220°C                                    |

Stresses above those listed under Absolute Maximum Ratings may cause permanent damage to the device. This is a stress rating only; functional operation of the device at these or any other conditions above those indicated in the operational section of this specification is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

## THERMAL RESISTANCE

Table 9.

| Package Type        | $\theta_{JA}$ | Unit |
|---------------------|---------------|------|
| 8-Lead SOIC_N (R-8) | 206           | °C/W |

## ESD CAUTION



**ESD (electrostatic discharge) sensitive device.** Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

PIN CONFIGURATION AND FUNCTION DESCRIPTIONS

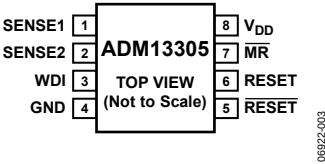


Figure 3. Pin Configuration

Table 10. Pin Function Descriptions

| Pin No. | Mnemonic                  | Description               |
|---------|---------------------------|---------------------------|
| 1       | SENSE1                    | Sense Input Voltage 1.    |
| 2       | SENSE2                    | Sense Input Voltage 2.    |
| 3       | WDI                       | Watchdog Timer Input.     |
| 4       | GND                       | Ground.                   |
| 5       | $\overline{\text{RESET}}$ | Active-Low Reset Output.  |
| 6       | RESET                     | Active-High Reset Output. |
| 7       | MR                        | Manual Reset Input.       |
| 8       | V <sub>DD</sub>           | Supply Voltage.           |

## TYPICAL PERFORMANCE CHARACTERISTICS

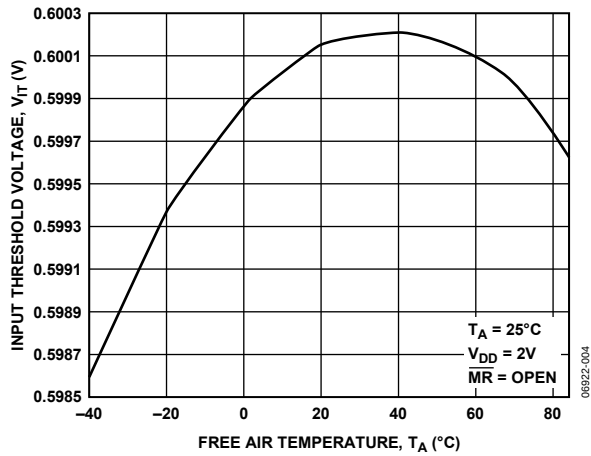


Figure 4. Sense Threshold Voltage vs. Free Air Temperature at  $V_{DD}$

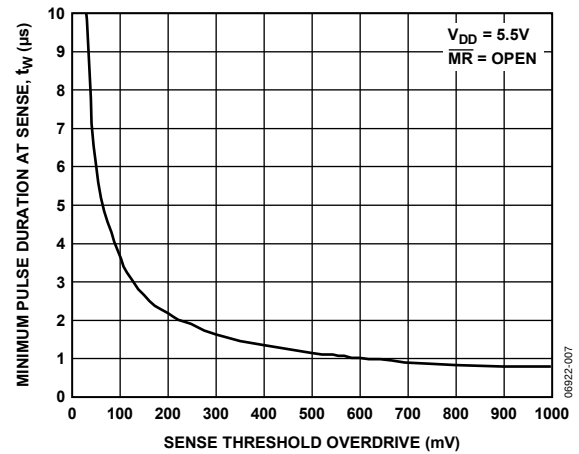


Figure 7. ADM13305-18, ADM13305-25 and ADM13305-33 Minimum Pulse Duration at SENSE vs. Sense Threshold Overdrive

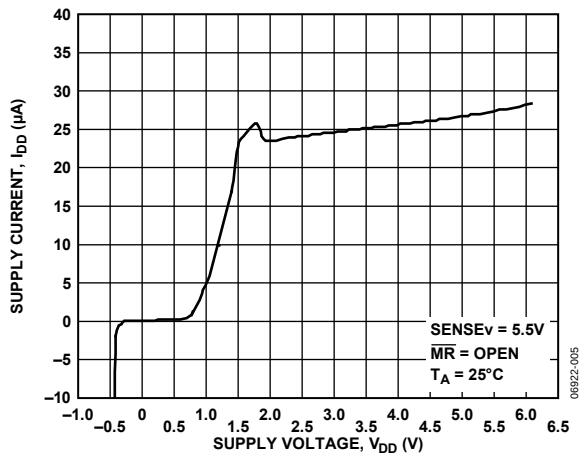


Figure 5. Supply Current vs. Supply Voltage

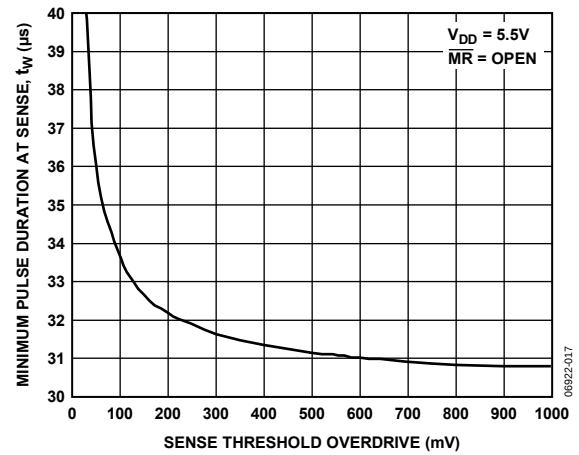


Figure 8. ADM13305-4 and ADM13305-5 Minimum Pulse Duration at SENSE vs. Sense Threshold Overdrive

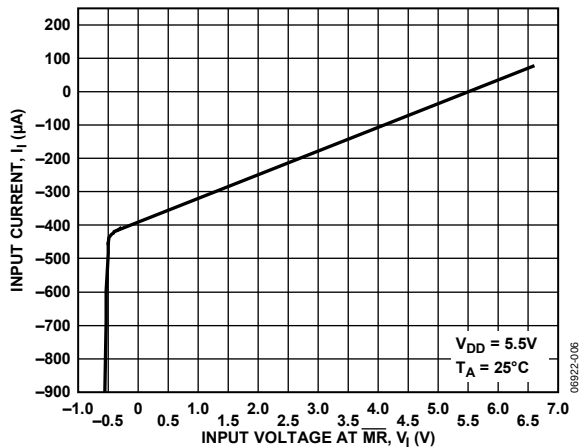


Figure 6. Input Current vs. Input Voltage at  $\overline{\text{MR}}$

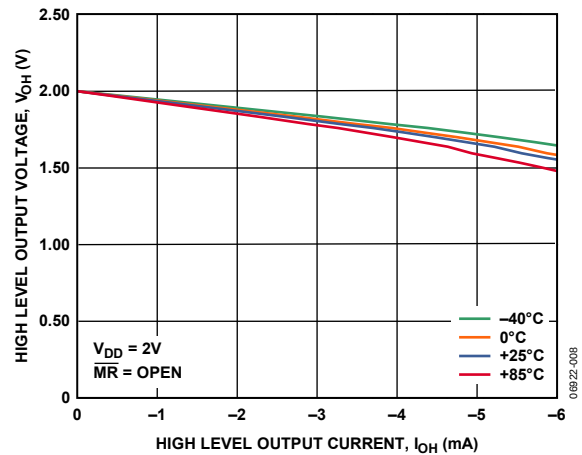


Figure 9. High Level Output Voltage vs. High Level Output Current

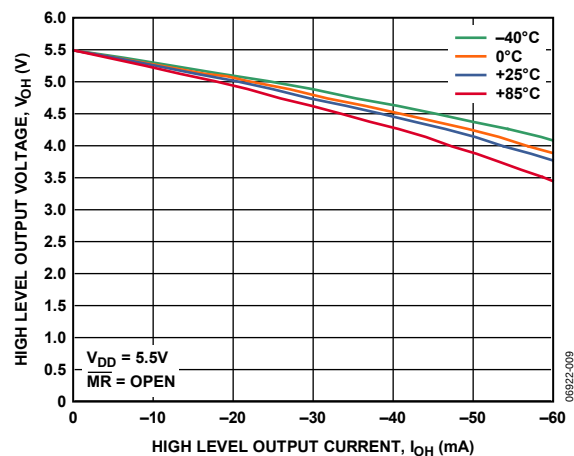


Figure 10. High Level Output Voltage vs. High Level Output Current

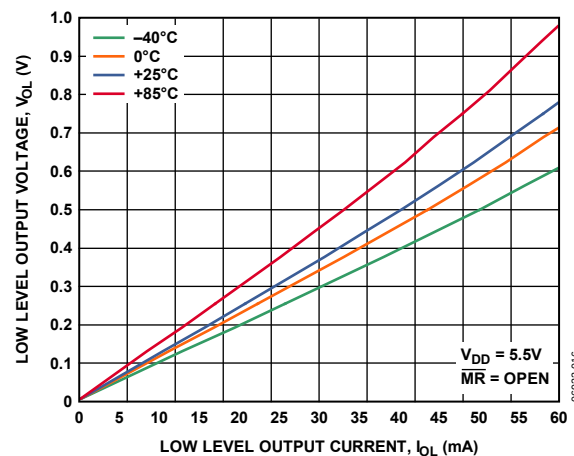


Figure 12. Low Level Output Voltage vs. Low Level Output Current

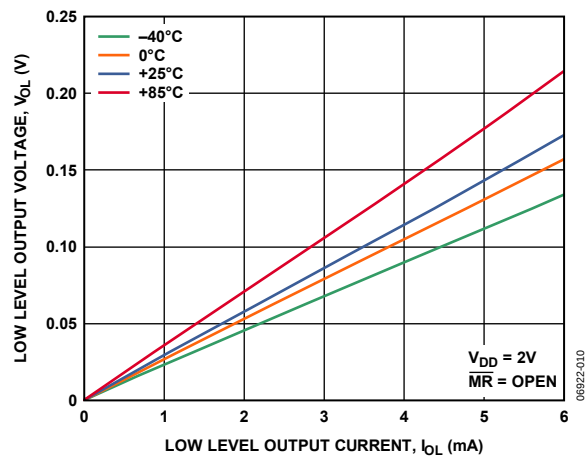


Figure 11. Low Level Output Voltage vs. Low Level Output Current

## THEORY OF OPERATION

The ADM13305 is a dual voltage supervisor designed to monitor two supplies and provide a reset signal to DSP and microprocessor-based systems.

There are five models available, all of which feature a combination of internally pretrimmed undervoltage threshold options for monitoring 1.8 V, 2.5 V, 3.3 V, and 5 V supplies. There is also an adjustable input option with an undervoltage threshold of 0.6 V.

The ADM13305-18, ADM13305-25, and ADM13305-33 have two internally fixed thresholds, while the ADM13305-4 and ADM13305-5 offer one internally fixed threshold and one externally programmable threshold via a resistor string. See the Ordering Guide for a list of all available options.

### INPUT CONFIGURATION

The ADM13305 is powered through  $V_{DD}$ . To increase noise immunity in noisy applications, place a 0.1  $\mu\text{F}$  capacitor between the  $V_{DD}$  input and ground.

The SENSEv inputs are resistant to short power supply glitches. Do not allow an unused SENSEv input to float or to be grounded, instead connect it to a supply voltage greater than its specified threshold voltage.

Typically, the threshold voltage at each adjustable SENSEv input is 0.6 V. To monitor a voltage greater than 0.6 V, connect a resistor divider network to the device as depicted in Figure 13, where,

$$V_{\text{MONITERED}} = 0.6 \text{ V} \left( \frac{R1 + R2}{R2} \right)$$

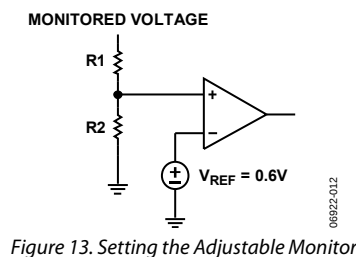


Figure 13. Setting the Adjustable Monitor

### RESET OUTPUT

The reset outputs are guaranteed to be in the correct state for  $V_{DD}$  down to 1.1 V. During power-up,  $\overline{\text{RESET}}$  is asserted when the supply voltage becomes greater than 1.1 V.

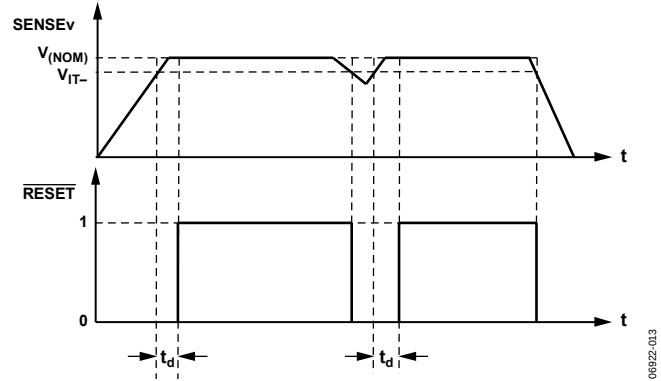


Figure 14. Reset Timing Diagram

Once the supplies monitored at the SENSEv pins rise above their associated threshold level, the  $\overline{\text{RESET}}$  signal remains low for the reset timeout period before deasserting. Subsequently, if either of the supplies monitored by the SENSEv pins falls below its associated threshold the  $\overline{\text{RESET}}$  output reasserts.

The ADM13305 features both an active-low, push-pull  $\overline{\text{RESET}}$  output and an active-high, push-pull RESET output.

### WATCHDOG TIMER

The ADM13305 features a watchdog timer that monitors microprocessor activity. A timer circuit is cleared with every low-to-high or high-to-low logic transition on the watchdog input pin (WDI). If the timer counts through the preset watchdog timeout period of 1.6 sec,  $\overline{\text{RESET}}$  is asserted, as shown in Figure 15.

The microprocessor is required to toggle the WDI pin to avoid being reset. Therefore, failure of the microprocessor to toggle WDI within the timeout period indicates a code execution error and the reset pulse generated restarts the microprocessor in a known state. The watchdog timer can be disabled by leaving WDI floating.

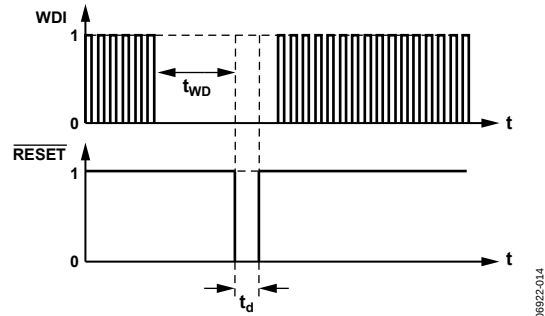


Figure 15. Watchdog Timing Diagram

**MANUAL RESET ( $\overline{\text{MR}}$ )**

The ADM13305 features a manual reset input, which when driven low, asserts the reset output, as shown in Figure 16. When  $\overline{\text{MR}}$  transitions from low to high, reset remains asserted for the duration of the reset active timeout period before deasserting. An external push-button switch can be connected between  $\overline{\text{MR}}$  and ground to allow the user to generate a reset.

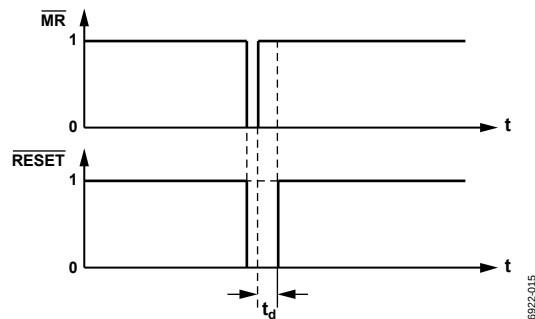
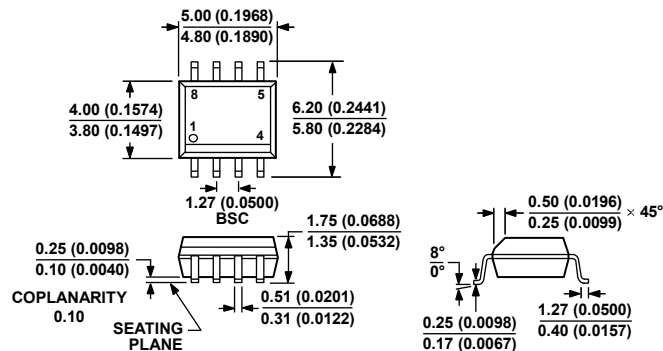


Figure 16. Manual Reset Timing Diagram

## OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MS-012-AA  
CONTROLLING DIMENSIONS ARE IN MILLIMETERS; INCH DIMENSIONS  
(IN PARENTHESES) ARE ROUNDED-OFF MILLIMETER EQUIVALENTS FOR  
REFERENCE ONLY AND ARE NOT APPROPRIATE FOR USE IN DESIGN.

Figure 17. 8-Lead Standard Small Outline Package [SOIC\_N]  
Narrow Body  
(R-8)

Dimensions shown in millimeters and (inches)

## ORDERING GUIDE

| Model                           | Nominal Supervised Voltage |                         | Threshold Voltage (Typical) |        | Temperature Range | Package Description | Package Option |
|---------------------------------|----------------------------|-------------------------|-----------------------------|--------|-------------------|---------------------|----------------|
|                                 | SENSE1                     | SENSE2                  | SENSE1                      | SENSE2 |                   |                     |                |
| ADM13305-18ARZ <sup>1</sup>     | 3.3 V                      | 1.8 V                   | 2.93 V                      | 1.68 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-18ARZ-RL7 <sup>1</sup> | 3.3 V                      | 1.8 V                   | 2.93 V                      | 1.68 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-25ARZ <sup>1</sup>     | 3.3 V                      | 2.5 V                   | 2.93 V                      | 2.25 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-25ARZ-RL7 <sup>1</sup> | 3.3 V                      | 2.5 V                   | 2.93 V                      | 2.25 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-33ARZ <sup>1</sup>     | 5 V                        | 3.3 V                   | 4.55 V                      | 2.93 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-33ARZ-RL7 <sup>1</sup> | 5 V                        | 3.3 V                   | 4.55 V                      | 2.93 V | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-4ARZ <sup>1</sup>      | 3.3 V                      | Adjustable <sup>2</sup> | 2.93 V                      | 0.6 V  | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-4ARZ-RL7 <sup>1</sup>  | 3.3 V                      | Adjustable <sup>2</sup> | 2.93 V                      | 0.6 V  | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-5ARZ <sup>1</sup>      | 2.5 V                      | Adjustable <sup>2</sup> | 2.25 V                      | 0.6 V  | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |
| ADM13305-5ARZ-RL7 <sup>1</sup>  | 2.5 V                      | Adjustable <sup>2</sup> | 2.25 V                      | 0.6 V  | −40°C to +85°C    | 8-Lead SOIC_N       | R-8            |

<sup>1</sup> Z = RoHS Compliant Part.

<sup>2</sup> 0.6 V adjustable. External resistor divider determines the actual sense voltage.