Data Sheet

AEIC-3700

Voltage Monitor IC with Internal Reference for Overvoltage and Undervoltage Monitoring

Overview

The Broadcom® AEIC-3700 voltage monitor IC operates at the 2.8V to 6.5V supply voltage range. This device has two main input pads (IN_A and IN_B) that are used independently for voltage monitoring. IN_A and IN_B will take in external reference voltages in comparison with the IC internal reference signal.

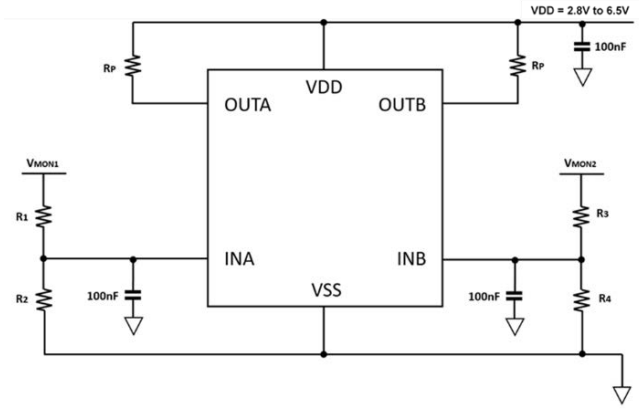
This device has high accuracy comparators which are suitable for overvoltage (OV) and undervoltage (UV) monitoring.

Modes of operation:

If $IN_A < V_{ref}$, OUT_A = L, else OUT_A = H.

If $IN_B > V_{ref}$, OUT_B = L, else OUT_B = H.

Reference Circuit



Features

- Supply voltage range is from 2.8V to 6.5V
- Low quiescent current: 550 µA (typical)
- Internal hysteresis: 5 mV (typical)
- Wide operating temperature range: –40°C to 125°C
- Two main inputs and outputs (IN_A/IN_B and OUT_A/OUT_B)
- Package: SOT-23-6 (3.0 mm × 1.60 mm nominal)

Applications

- Control system especially for industrial automation
- FPGA applications
- ASIC applications
- Microcontroller applications system

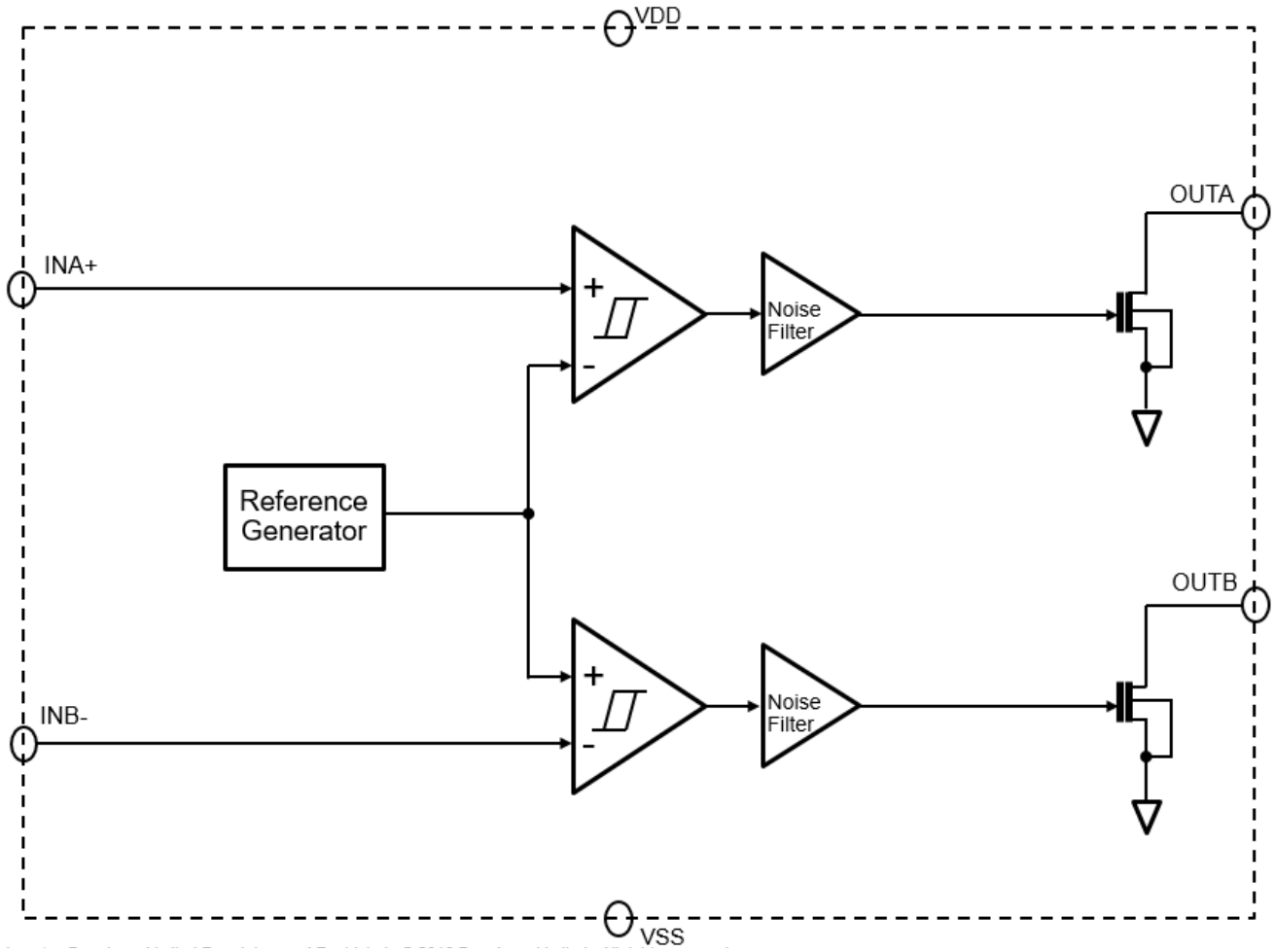
NOTE: This product is not specifically designed or manufactured for use in any specific device. Customers are solely responsible for determining the suitability of this product for its intended application and solely liable for all loss, damage, expense, or liability in connection with such use.

Packing Information

Device Part Number	Quantity
AEIC-3700-S01	100 pieces (tape and reel)
AEIC-3700-S30	3000 pieces (tape and reel)

Functional Description

Figure 1: AEIC-3700 Block Diagram



Device Information

Figure 2: Pin Configurations (Top View)

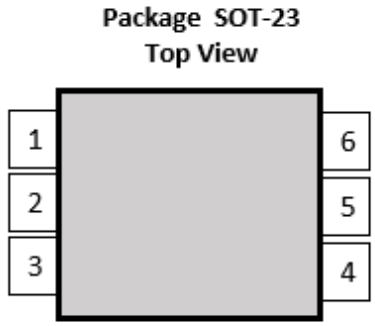
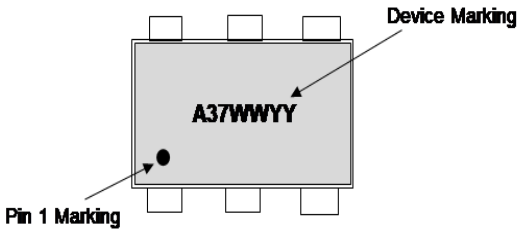


Figure 3: Device Marking Information



Pinout Description

Pin	Pin Name	Pin Type	Description
3	IN_A	I	This pin is linked to the voltage to be monitored through an external resistor divider. OUT_A is driven low when the voltage at this terminal falls below the threshold voltage.
2	V_{SS}	—	Ground.
1	OUT_A	O	IN_A comparator output, open drain. When the voltage at this comparator is lower, OUT_A is driven low. When the sense voltage returns over the appropriate threshold, the output becomes high.
6	OUT_B	O	IN_B comparator output, open drain. When the voltage at this comparator is exceeded, OUT_A is driven low. When the sense voltage drops below the appropriate threshold, the output becomes high.
5	V_{DD}	I	Supply voltage input.
4	IN_B	I	This pin is linked to the voltage to be monitored through an external resistor divider. OUT_B is driven low when the voltage at this terminal exceeds the threshold voltage.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Units
Voltage	V_{DD}	2.8	7.0	V
	OUT_A, OUT_B	2.8	7.0	V
	IN_A, IN_B	0	3.0	V
Current (output terminal current)	—	—	40	mA
Operating junction temperature	T_A	–40	125	°C
Storage temperature	T_{stg}	–40	150	°C
Thermal resistance	$R_{\theta JA}$	184.5		°C/W
Electrostatic discharge (HBM)	ESD	–2	2	kV
Moisture sensitive level	MSL	1		—

CAUTION!

- Subjecting the product to stresses beyond those listed in this section might cause permanent damage to the devices. These are stress ratings only and do not imply that the devices will function beyond these ratings. Exposure to the extremes of these conditions for extended periods might affect product reliability.
- At 125°C, worst case junction temperature to ambient is 126°C at 6.5V.

Electrical Characteristics

Over the operating temperature range of T_A = –40°C to 125°C, and 2.8V <V_{DD} <6.5V unless otherwise noted. Typical values are at T_A = 25°C and V_{DD} = 5V

Parameter	Test Conditions	Min.	Typical	Max.	Unit
Supply voltage range (V_{DD})[a, b]	—	2.8	—	6.5	V
Positive-going input threshold voltage (V_{IT+})	V_{DD} = 2.8V to 6.5V	392	400	408	mV
Negative-going input threshold voltage (V_{IT-})	V_{DD} = 2.8V to 6.5V	387	395	403	mV
Hysteresis voltage (V_{HYS}= V_{IT+} - V_{IT-})	—	—	5	12	mV
Input current at the INA+ terminal (I_{INA+})	V_{DD} = 2.8V and 6.5V, V_i = V_{DD}	–25	1	25	nA
Input current at the INB- terminal ($I_{INB–}$)	V_{DD} = 2.8V and 6.5V, V_i = 0.1V	–15	1	15	nA
Open-drain output leakage current (I_{Leak_OD})	V_{DD} = 2.8V and 6.5V, V_o = V_{DD}	—	—	300	nA
Low-level output voltage (V_{OL})	V_{DD} = 2.5V, I_o = 0.4 mA	—	—	250	mV
	V_{DD} = 4.3V, I_o = 3 mA	—	—	250	mV
	V_{DD} = 5.5V, I_o = 5 mA	—	—	250	mV
Supply current (I_{DD})	V_{DD} = 2.8V and 6.5V	420	550	840	µA
Start-up delay	—	—	300	450	µs
Undervoltage lockout (UVLO)[c]	V_{DD} falling	1.0	—	2.7	V

a. During power on, V_{DD} must exceed 2.8V for 450 µs (max.) before output is in a correct state.

b. The outputs are often tied to V_{DD} through a resistor. However, the outputs might be pulled up by the resistor to a lower voltage than V_{DD} to interface with the input terminals of other devices.

c. When V_{DD} falls below the UVLO region <2.7V, OUT_A is asserted L, while OUT_B is high impedance.

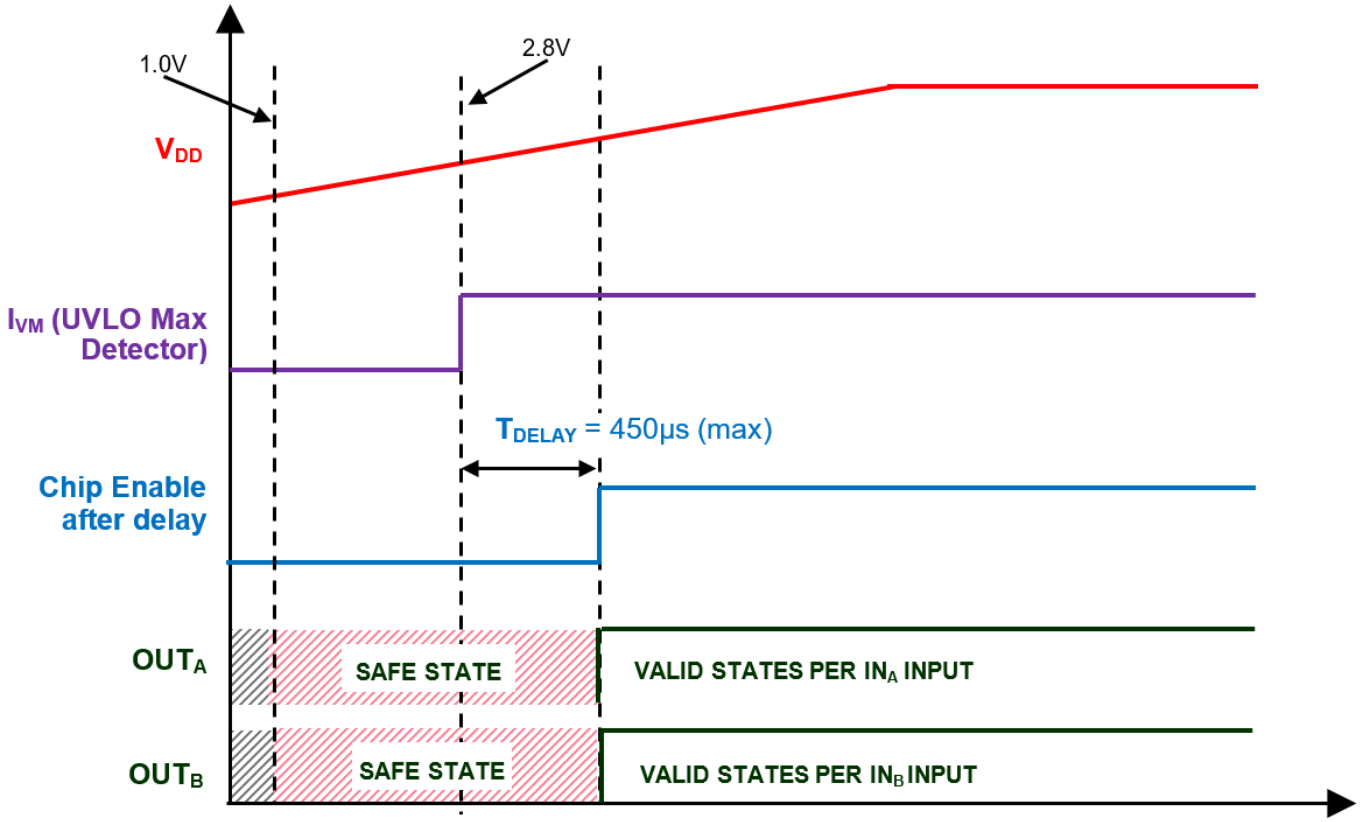
Switching Characteristics

Over operating temperature range of T_A = –40°C to 125°C, and 2.8V <V_{DD} <6.5V unless otherwise noted. Typical values are at T_A = 25°C and V_{DD} = 5V.

Parameter	Test Conditions	Min.	Typical	Max.	Unit
High-to-low propagation delay (t_{PHL})[a]	V_{DD} = 2.8V to 6.5V	—	24	—	µs
Low-to-high propagation delay (t_{PLH})[a]	V_{DD} = 2.8V to 6.5V	—	24	—	µs
Output rise time (T_r)	V_{DD} = 2.8V to 6.5V	—	3.0	—	µs
Output fall time (T_f)	V_{DD} = 2.8V to 6.5V	—	0.3	—	µs

a. High-to-low and low-to-high refers to transition at the input terminals (IN_A and IN_B)

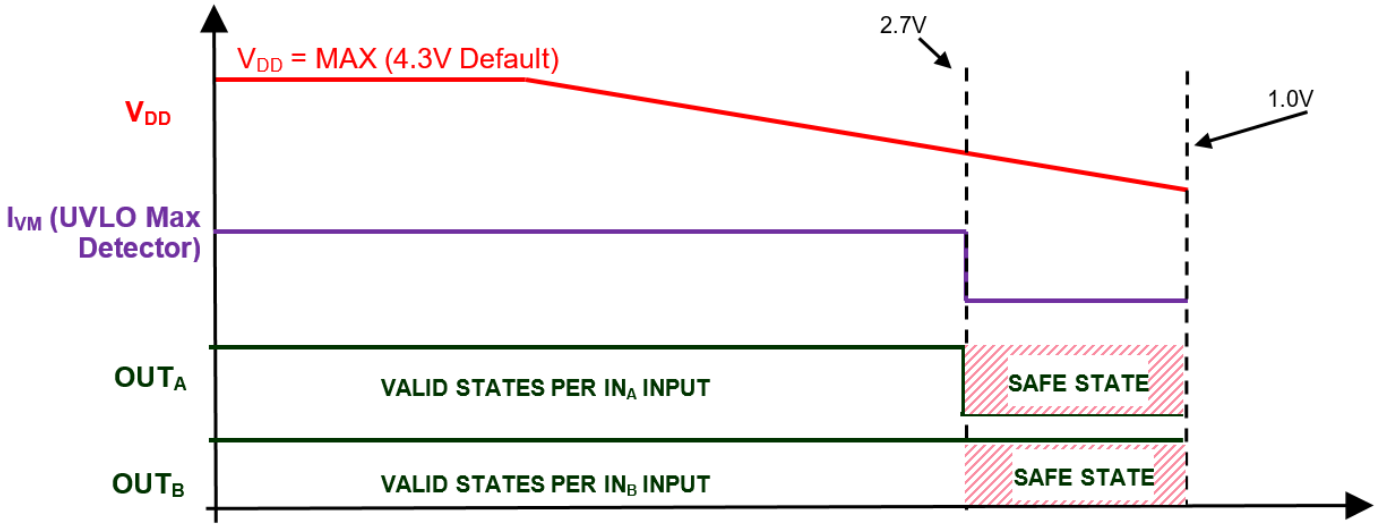
Figure 4: Device Power-Up Sequence



NOTE:

- Safe State is a state in which V_{DD} asserted is <2.8V and V_{DD} is held at a lower voltage than the intended operating region (~1V typical to ~2.8V).
- During Safe State, OUT_A will be asserted (pulled L) while OUT_B is high impedance.
- To exit Safe State, V_{DD} must be asserted ≥2.8V for 450 µs max.

Figure 5: Device Power-Down Sequence



NOTE:

- Safe State is a state in which V_{DD} drops below 2.7V
- During Safe State, OUT_A will be asserted (pulled L) while OUT_B is high impedance.

Figure 6: Comparator Hysteresis Behavior

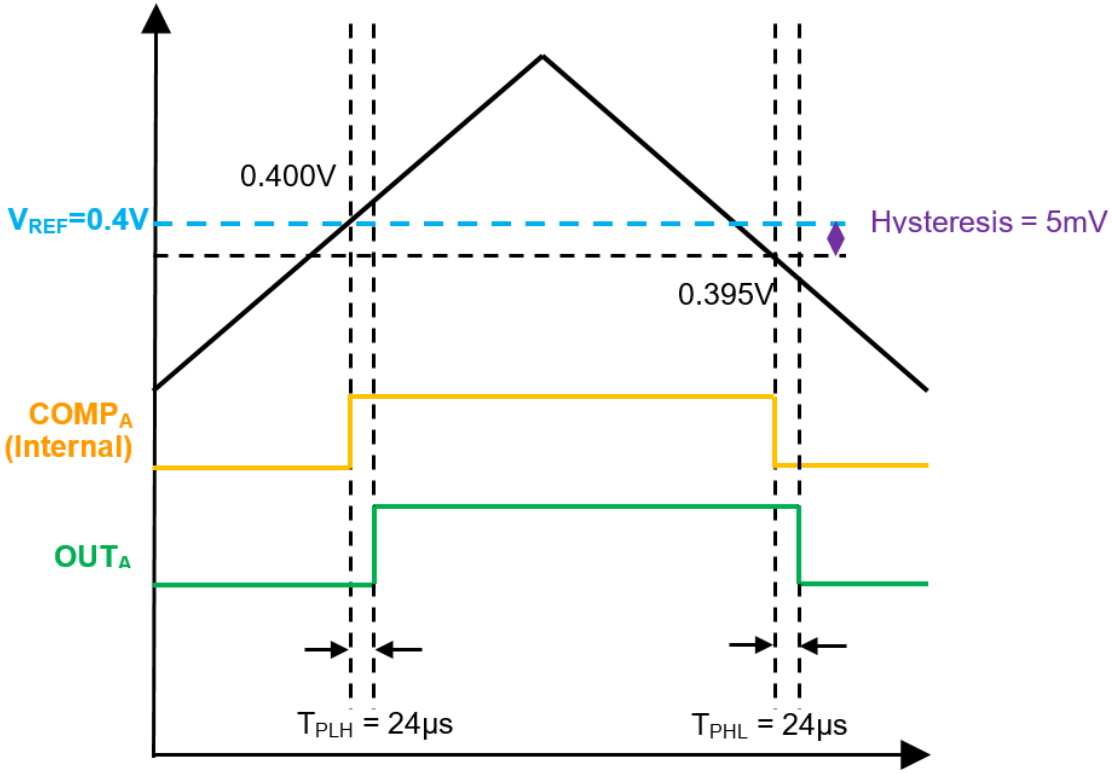
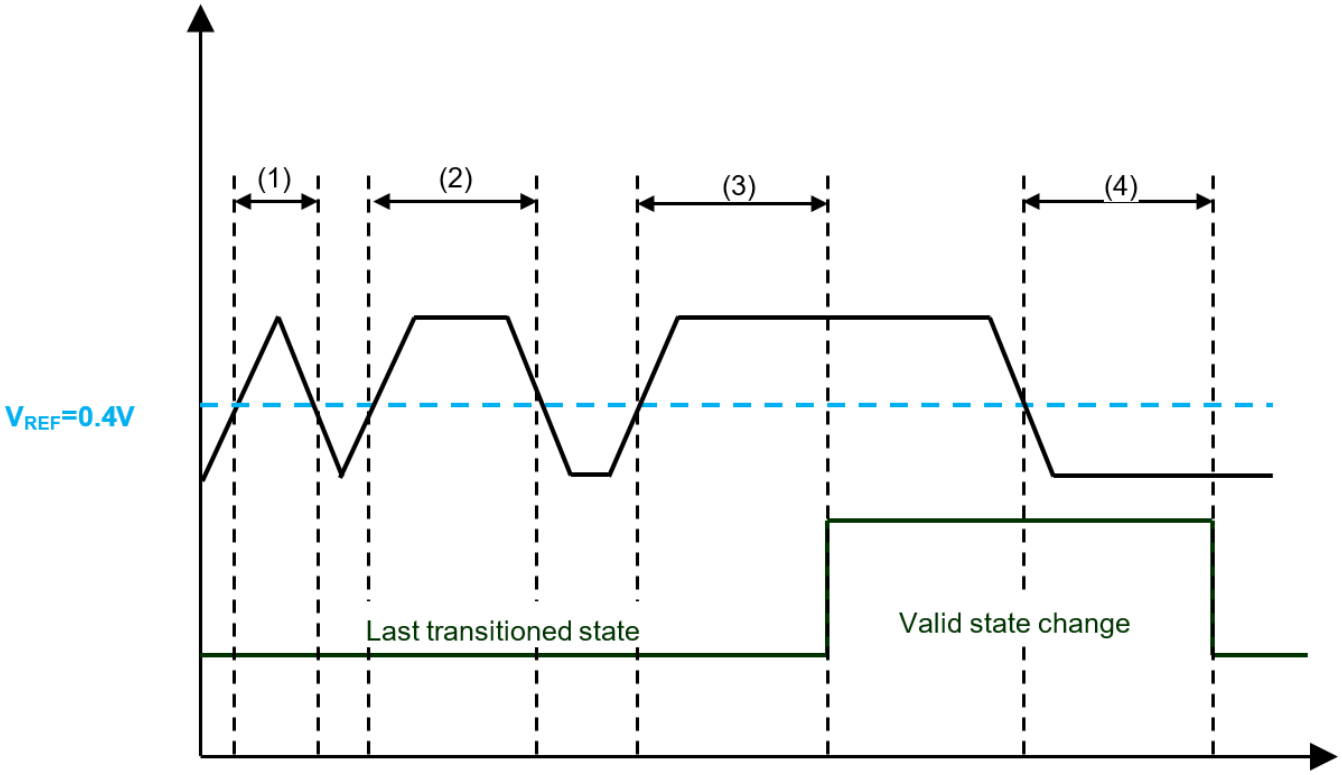


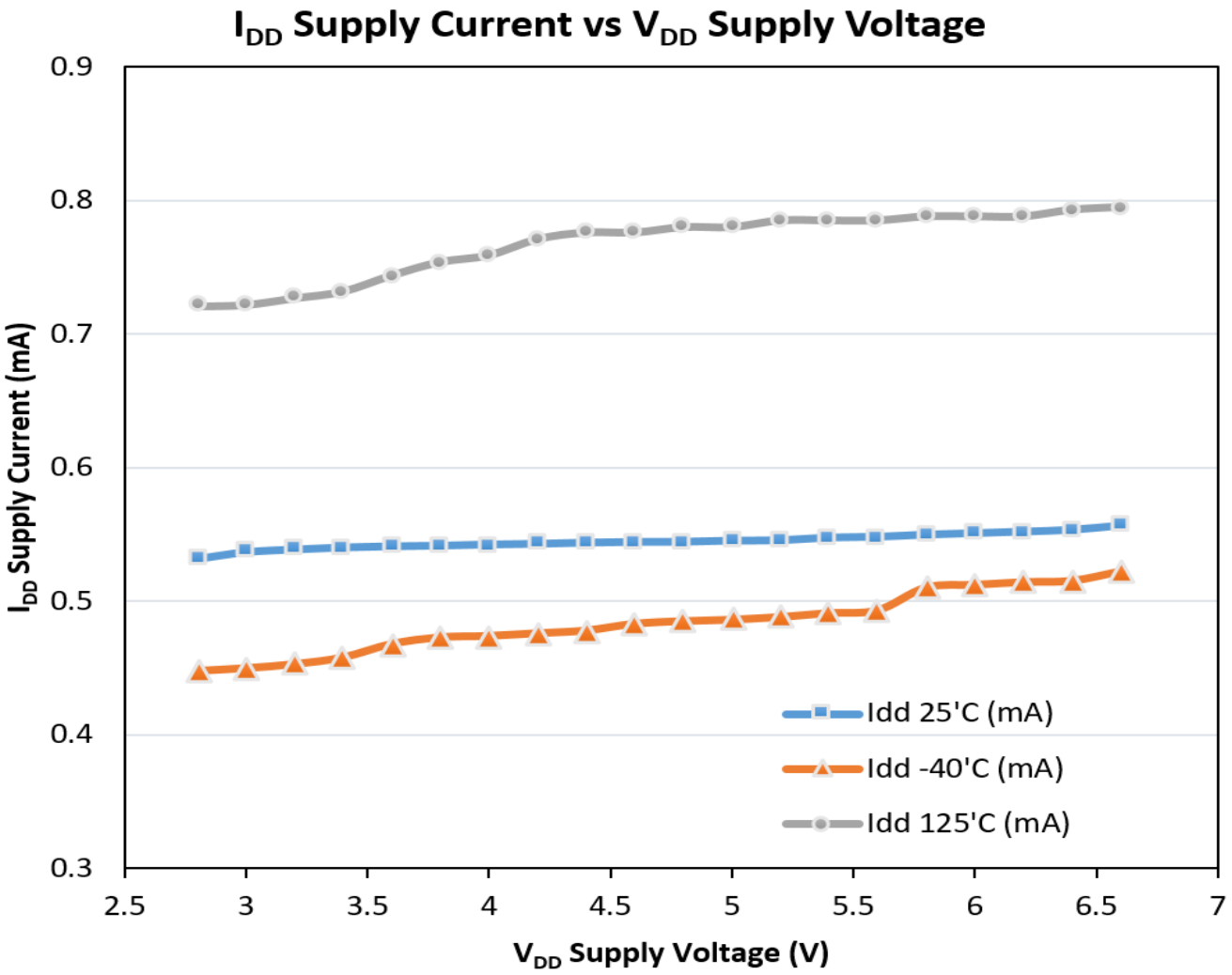
Figure 7: Comparator Noise Filtration System



NOTE:

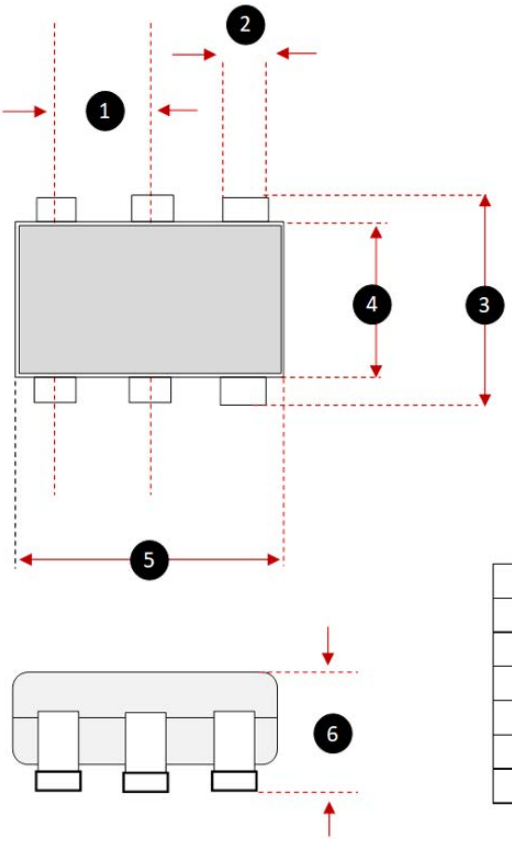
1. Input pulse duration T = 10 µs (<24 µs) unable to trigger a valid state change.
2. Input pulse duration T = 20 µs (<24 µs) unable to trigger a valid state change.
3. Input pulse duration T = 28 µs (>24 µs) able to trigger state change (low to high).
4. Input pulse duration T = 28 µs (>24 µs) able to trigger state change (high to low).

Figure 8: Supply Current



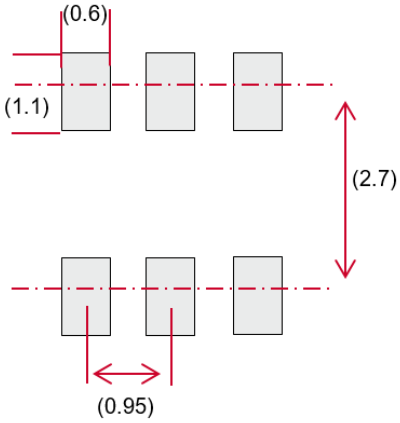
Mechanical Dimension

Figure 9: Package Dimensional Information



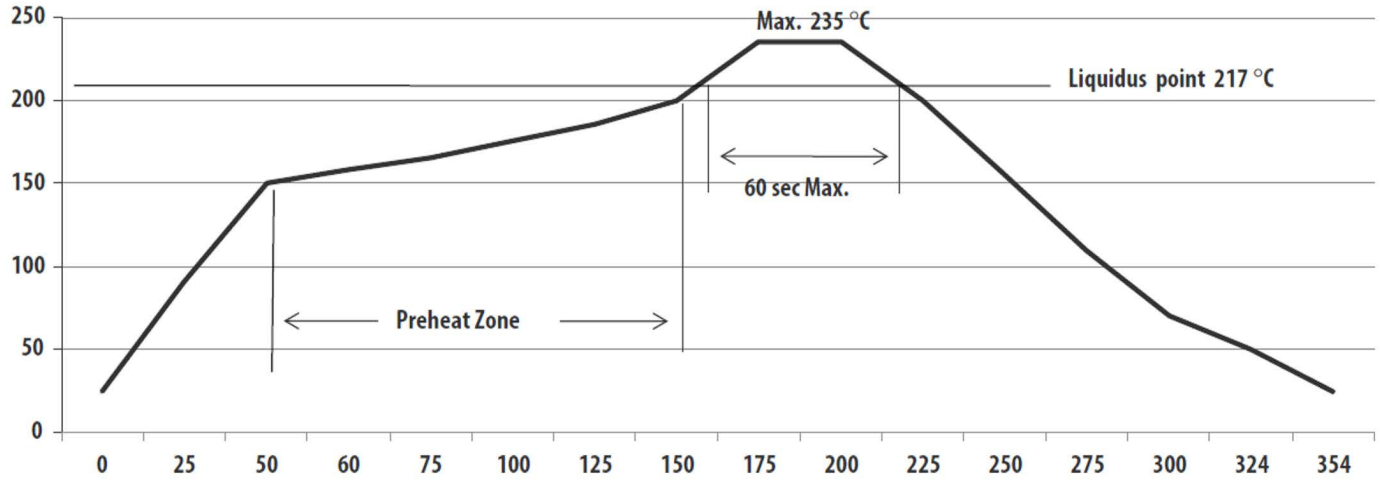
No	Specification		
	Minimum	Nominal	Maximum
1	-	0.95	-
2	0.3	-	0.5
3	2.55	-	3.05
4	1.45	-	1.75
5	2.75	-	3.05
6	-	-	1.1

Figure 10: Recommended Land Pattern for PCB Layout



Recommended Lead-free Reflow Soldering Temperature Profile

Figure 11: Recommended Soldering Profile



NOTE:

- Average ramp up rate = 3°C/s
- Average ramp down rate = 6°C/s
- Preheat temperature = 150°C to 200°C
- Preheat time = 60 seconds to 100 seconds
- Time maintain above 217°C = 40 seconds to 60 seconds
- Peak temperature = 235°C
- Time within 5°C of peak temperature = 20 seconds to 30 seconds

Moisture Sensitivity Level

The AEIC-3700 is specified to MSL 1.

CAUTION!

- Keep the components in the original packaging to protect them from dust and contaminants.
- Store the components in temperature and humidity-controlled environments.

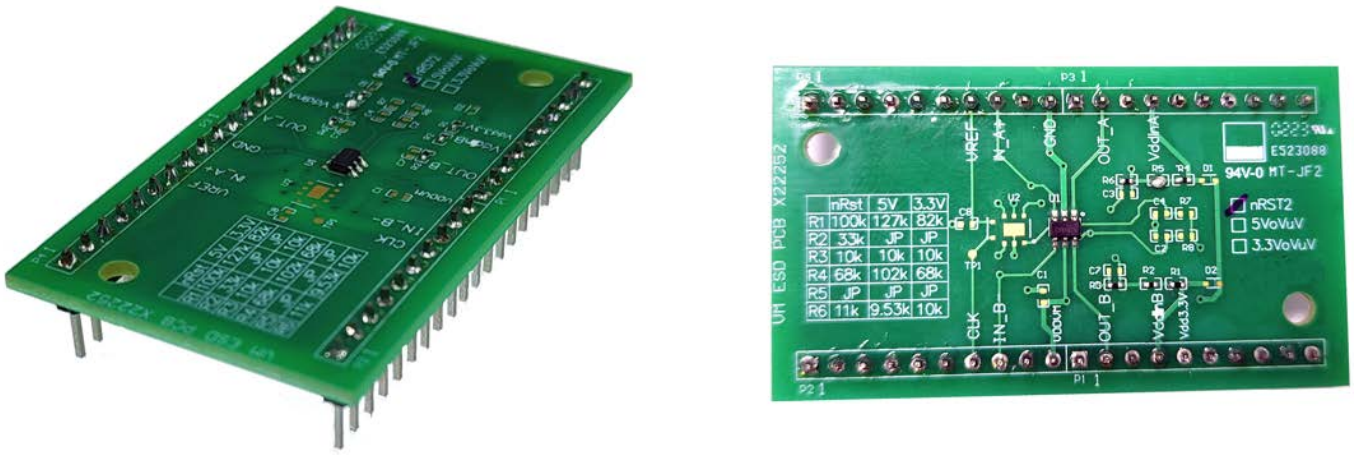
Evaluation Set Information

An evaluation set is available for the evaluation of the AEIC-3700. The board is populated based on three examples of typical use for the voltage monitor IC. The following three examples are available:

1. nReset function to trigger an external reset circuit
2. 5V OV and UV detection
3. 3.3V OV and UV detection

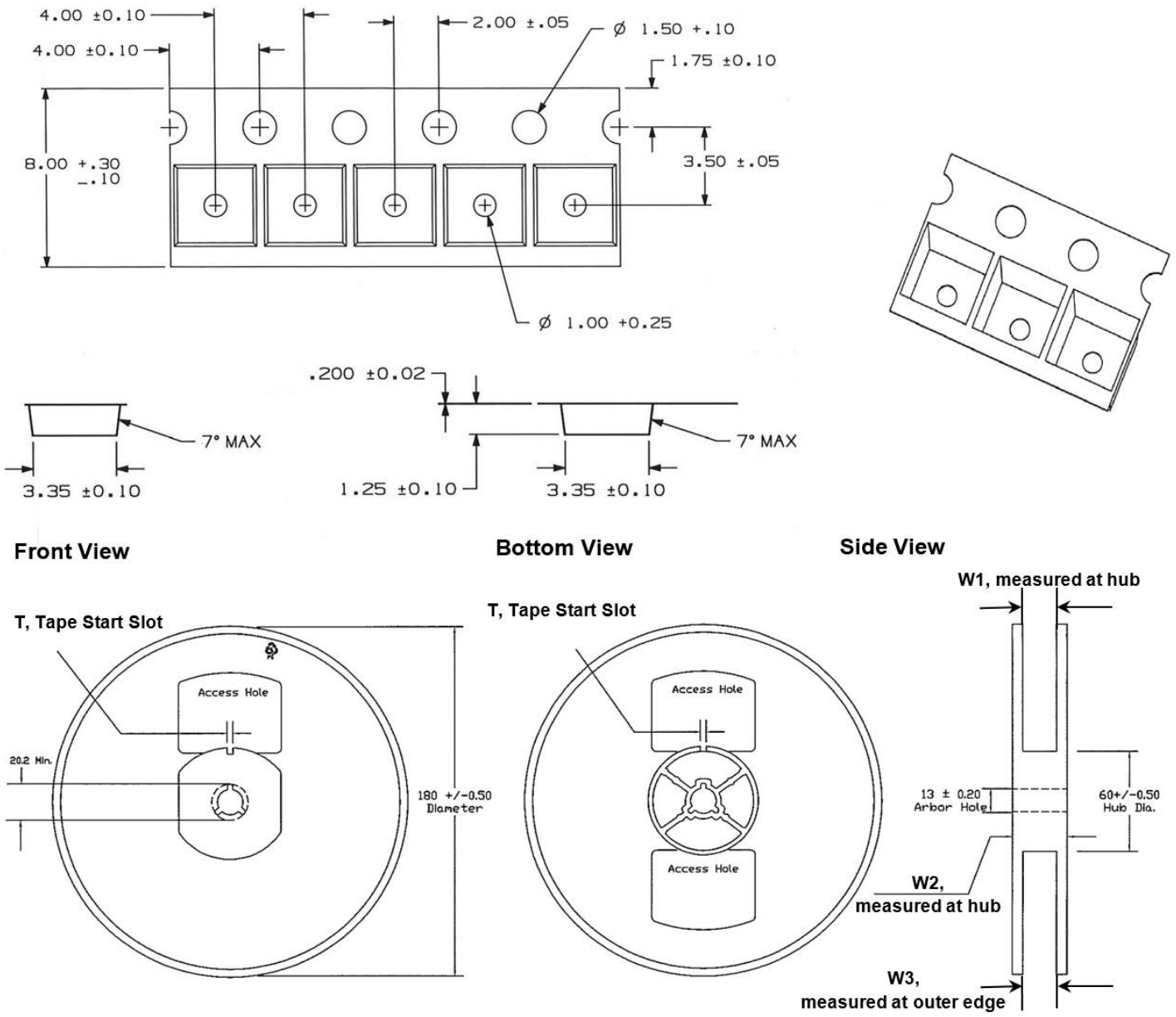
In addition, four pieces of the loose units of the AEIC-3700 are included as part of the package in the evaluation set.

Figure 12: Example of an Evaluation Board that is Prepopulated Based on Each of the Reference Circuits



Tape and Reel Information

Figure 13: Carrier Tape and Reel Dimension



NOTE: Reel material: Polystyrene, surface resistivity <10^{12} Ω/sq. at 50% RH (ASTM D-257, *Standard Test Methods for DC Resistance or Conductance of Insulating Materials*), static decay <2 seconds at 50% RH

Ordering Information

AEIC – 3700 – ☐☐☐

Device Shipping Units & Packaging
S01: 100 pieces tape & reel **S30**: 3000 pieces tape & reel 

Evaluation Set Descriptions
EVB: 1 piece of nReset Evaluation Board, 1 piece of 5V OV/UV Evaluation Board, 1 piece of 3.3V OV/UV Evaluation Board, and 4 pieces of AEIC-3700 IC.