*Allegro* ™
MicroSystems, LLC

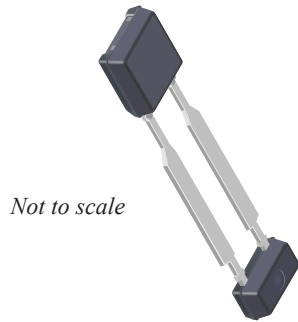# *Two-Wire, Differential, Vibration-Resistant Sensor IC with Speed and Direction Output*

## Package: 2-Pin SIP (Suffix UB)
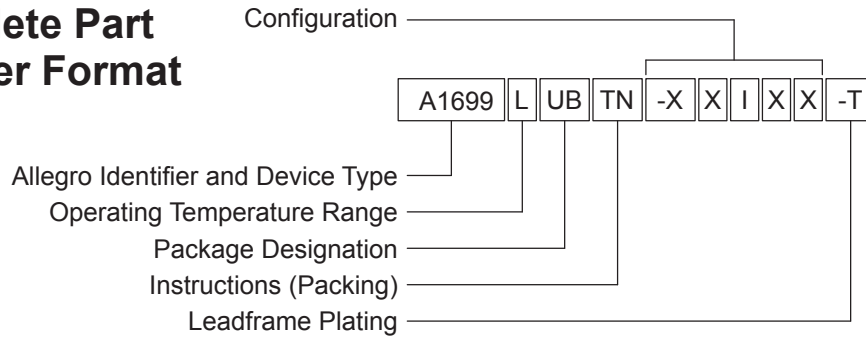
*Not to scale*

# Datasheet Addendum

## DESCRIPTION

This addendum adds an alternate output pulse width (Intermediate "I") and protocol variant to the existing datasheet.

For parameters not listed within this addendum, refer to the A1699 datasheet. In the event of a conflict between this addendum and the main datasheet, this addendum takes precedence.

## Complete Part Number Format

Configuration

A1699 | L | UB | TN | -X | X | I | X | X | -T

Allegro Identifier and Device Type
Operating Temperature Range
Package Designation
Instructions (Packing)
Leadframe Plating

| Allegro Identifier and Device Type | | [A1699] |
|---|---|---|
| Operating Temperature Range | | [L] |
| Package Designation | | [UB] 2-pin plastic SIP |
| Instructions (Packing) | | [TN] Tape and reel |
| Configuration | Rotation Direction | [-F] pin 1-to-2 forward or [-R] pin 2-to-1 forward |
| | Number of Pulses | [S] single, one pulse per magnetic pole pair or [D] dual, one pulse for each north and south pole |
| | Pulse Widths (typ) | [I] (Intermediate) Forward = 60 µs, Reverse = 120 µs, Speed = 30 µs |
| | Running Mode SPD Pulses (low frequency) | [B] Blanked, no low-frequency SPD pulses [P] Pulses permitted during running mode |
| | Vibration Immunity / Direction Change | [L] Low vibration immunity with immediate direction change detection or [H] High vibration immunity |
| Leadframe Plating | | [T] Lead (Pb) free |

For example: A1699LUBTN-RSIPL-T

Where a configuration character is unspecified, "x" will be used. For example, -xSIPL applies to both Rotation Direction configuration variants.

## SELECTION GUIDE

| Part Number | Packing* |
|---|---|
| A1699LUBTN-FSIBH-T | 4000 pieces per 13-in. reel |
| A1699LUBTN-RSIBH-T | |

*Not all combinations are available. Contact Allegro sales for availability and pricing of custom programming options.

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**OPERATING CHARACTERISTICS:** Valid throughout full operating and temperature ranges, unless otherwise noted

| Characteristic | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| **ELECTRICAL CHARACTERISTICS** | | | | | | |
| Supply Current | $I_{CC(LOW)}$ | Low-current state (running mode) | 5.9 | – | 8.4 | mA |
| | $I_{CC(HIGH)}$ | High-current state | 11.8 | – | 16.8 | mA |
| | $I_{CC(SU)(LOW)}$ | Low-current level (calibration) and Power-on mode | 5.9 | – | 8.5 | mA |
| Supply Current Ratio | $I_{CC(HIGH)}/I_{CC(LOW)}$ | Low-current state (running mode) | 1.9 | – | – | – |
| **OUTPUT PULSE CHARACTERISTICS** | | | | | | |
| Pulse Width, Forward Rotation | $t_{w(FWD)}$ | -xxIxx variant | 51 | 60 | 69 | µs |
| Pulse Width, Reverse Rotation | $t_{w(REV)}$ | -xxIxx variant | 102 | 120 | 138 | µs |
| Pulse Width, Speed Only | $t_{w(SPD)}$ | -xxIxx variant | 25 | 30 | 35 | µs |
| Pulse Pre-Low Length | $t_{w(PRE)}$ | -xxIxx variant | 25 | 30 | 35 | µs |
| **OPERATING CHARACTERISTICS** | | | | | | |
| Transition Frequency Between Direction Pulses and Speed Pulses | $f_{DIR}$ | Detection point, increasing frequency | – | 1100 | – | Hz |
| | | Detection point, decreasing frequency | – | 1000 | – | Hz |

## Output Pulse Timing

With an -xxIxx variant, each output pulse begins with a defined time duration of $I_{CC(LOW)}$ of $t_{W(PRE)}$ (typical 30 µs).

## Direction Validation

For the -xxxxL variant, following a direction change in running mode, direction changes are immediately transmitted to the output.

For the -xxxPH variant, following a direction change in running mode, output pulses have a width of $t_{w(SPD)}$ until direction information is validated. Using the -xxxBH variant suppresses running-mode SPD pulses below $f_{SPD}$.
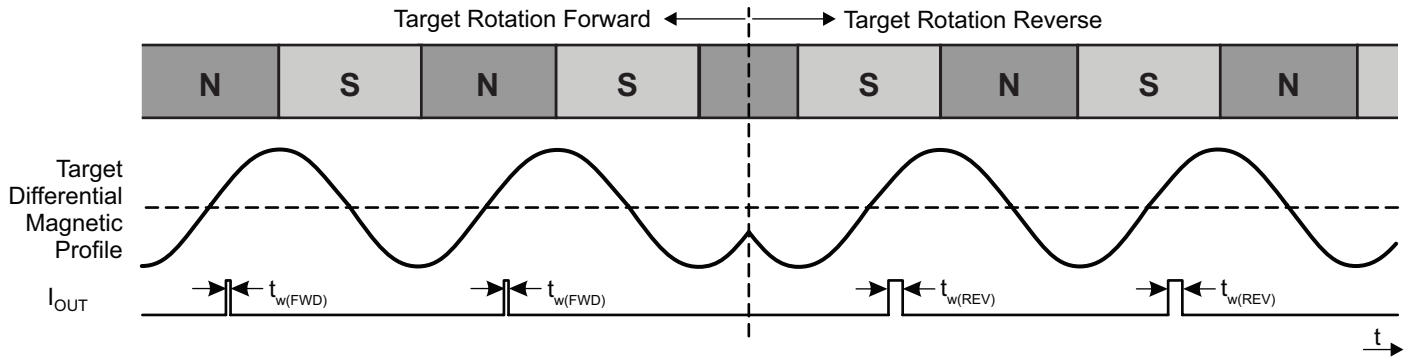
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**Figure 1: Example Running Mode Direction Change (-FSxxL variant)**
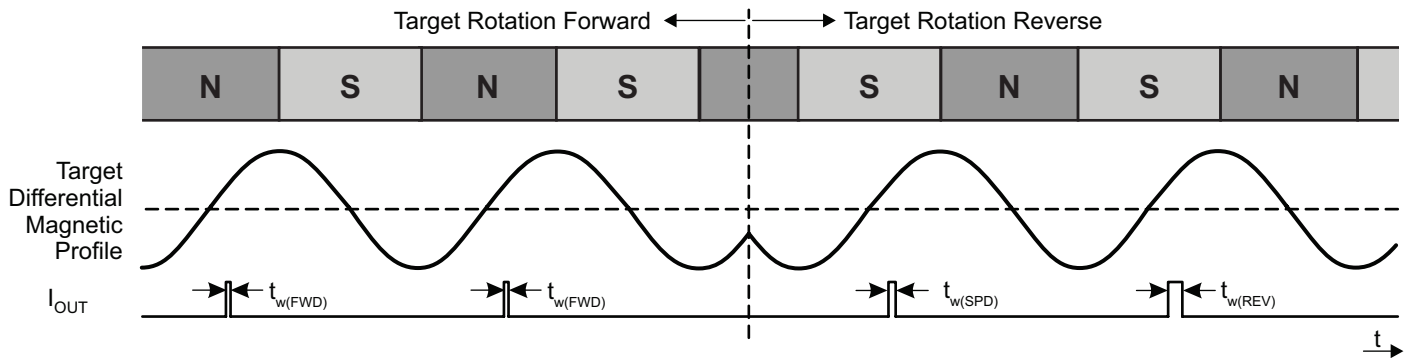


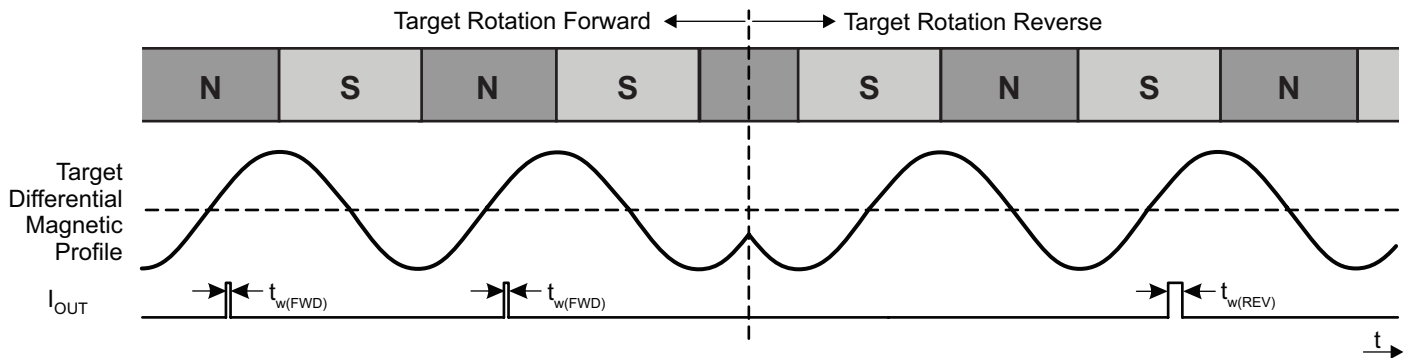**Figure 2: Example Running Mode Direction Change (-FSxPH variant)**



**Figure 3: Example Running Mode Direction Change (-FSxBH variant)**

## Startup Detection/Calibration

When power is applied to the A1699, the sensor IC internally detects the profile of the target. The gain and offset of the detected signals are adjusted during the calibration period, normalizing the internal signal amplitude for the air gap range of the device.

Direction information is available after calibration is complete.

For the -xxIxx variant, output pulses of $t_{w(SPD)}$ are supplied during calibration. Figure 4 shows where the first output edges may occur for various starting target phases.
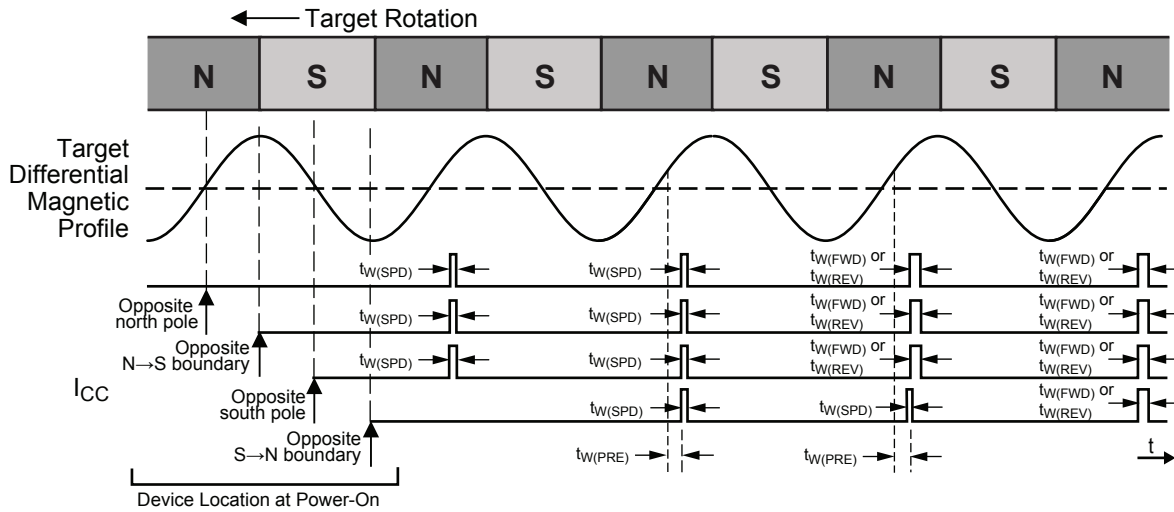


**Figure 4: Startup Position Effect on First Device Output Switching (-xxIxx variant)**

## Vibration Detection

Algorithms embedded in the IC's digital controller detect the presence of target vibration through analysis of the two magnetic input channels.

For the -xxxxL variant, the first direction change is immediately transmitted to the output. During any subsequent vibration, the output is blanked and no output pulses will occur for vibrations less than the specified vibration immunity. Output pulses containing the proper direction information will resume when direction information is validated on constant target rotation.

For the -xxxPH variant, in the presence of vibration, output pulses of $t_{w(SPD)}$ may occur or no pulses may occur, depending on the amplitude and phase of the vibration. Output pulses have a width of $t_{w(SPD)}$ until direction information is validated on constant target rotation.

## Speed Pulses

Above $f_{DIR}$, output pulses will be of $t_{w(SPD)}$ duration only.
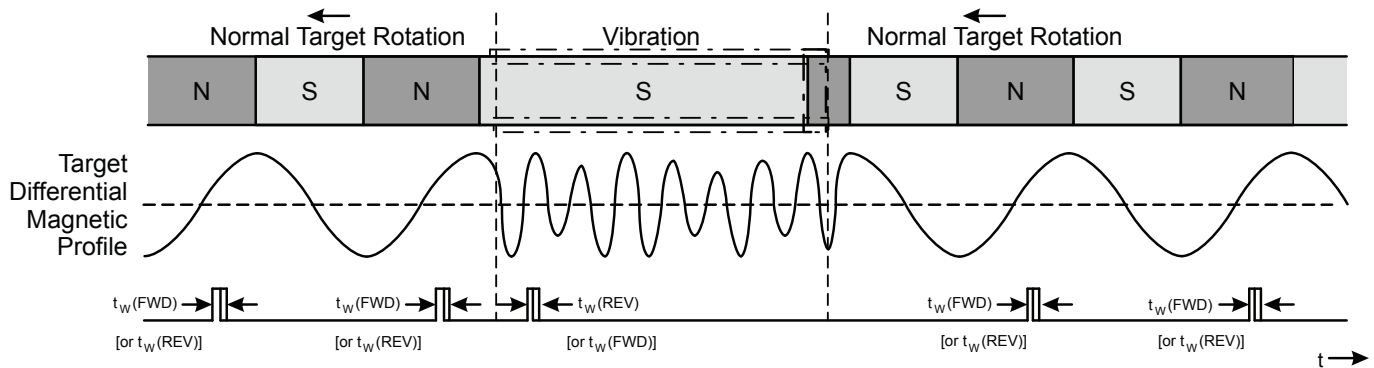


**Figure 5: Output Functionality in the Presence of Running Mode Target Vibration (-xxxxL variant)**
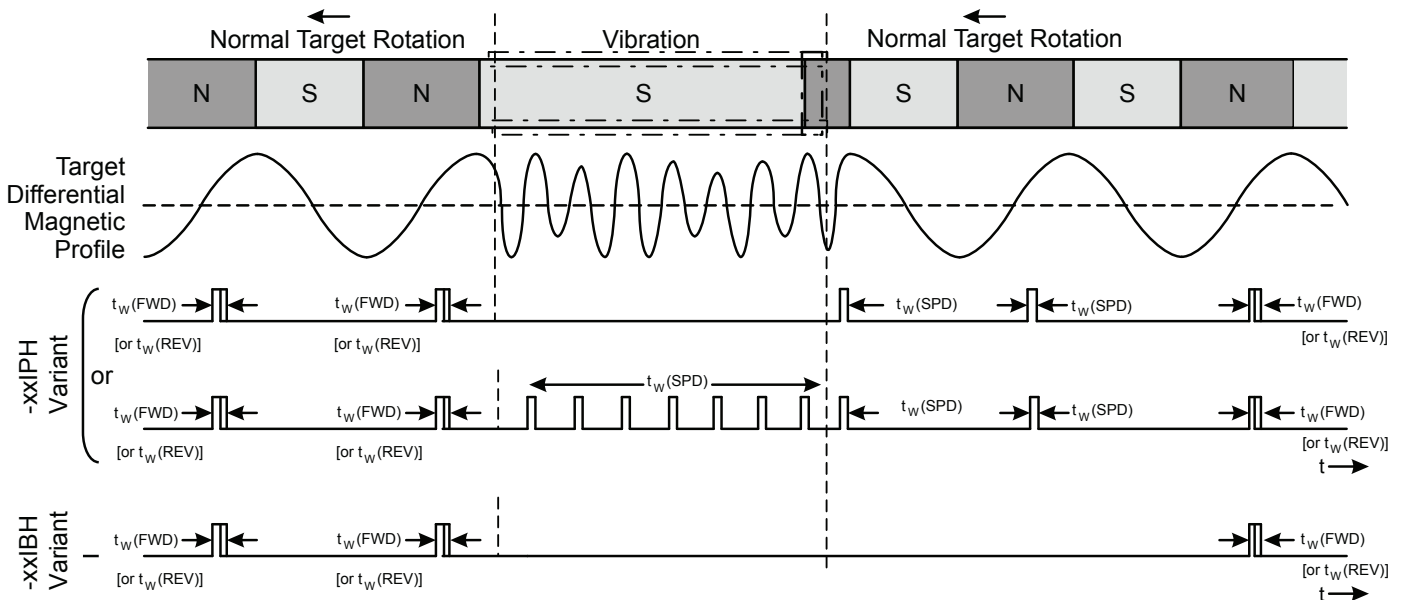


**Figure 6: Output Functionality in the Presence of Running Mode Target Vibration (-xxxxH variants)**

**Revision History**

| Number | Date | Description |
|---|---|---|
| – | February 17, 2017 | Initial release |

For the latest version of this document, visit our website:

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