

## FEATURES

**0.5  $\Omega$  typical on resistance**  
**0.8  $\Omega$  maximum on resistance at 125°C**  
**1.65 V to 3.6 V operation**  
**Operating temperature range: -40°C to +125°C**  
**Guaranteed leakage specifications up to 125°C**  
**High current carrying capability: 300 mA continuous**  
**Rail-to-rail switching operation**  
**Fast switching times: <20 ns**  
**Typical power consumption: <0.1  $\mu$ W**

## APPLICATIONS

Cellular phones  
 PDAs  
 MP3 players  
 Power routing  
 Battery-powered systems  
 PCMCIA cards  
 Modems  
 Audio and video signal routing  
 Communication systems

## GENERAL DESCRIPTION

The **ADG836L** is a low voltage CMOS device containing two independently selectable single-pole, double-throw (SPDT) switches. This device offers ultralow on resistance of less than 0.8  $\Omega$  over the full temperature range. The **ADG836L** is fully specified for 3.3 V, 2.5 V, and 1.8 V supply operation.

Each switch conducts equally well in both directions when on and has an input signal range that extends to the supplies. The **ADG836L** exhibits break-before-make switching action.

The **ADG836L** is available in a 10-lead package.

## FUNCTIONAL BLOCK DIAGRAM

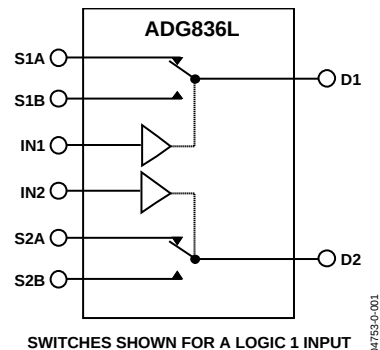


Figure 1.

## PRODUCT HIGHLIGHTS

1. Less than 0.8  $\Omega$  over full temperature range of -40°C to +125°C.
2. Single 1.65 V to 3.6 V operation.
3. Compatible with 1.8 V CMOS logic.
4. High current handling capability (300 mA continuous current at 3.3 V).
5. Low THD + N (0.02% typical).
6. Small 10-lead MSOP package.

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REVISION HISTORY

|                                                                    |           |
|--------------------------------------------------------------------|-----------|
| <b>6/2016—Rev. A to Rev. B</b>                                     |           |
| Updated Format.....                                                | Universal |
| Change to On Resistance Match Between Channels ( $\Delta R_{ON}$ ) |           |
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| <br><b>5/2004—Rev. 0 to Rev. A</b>                                 |           |
| Updated Ordering Guide.....                                        | 14        |
| <br><b>4/2004—Revision 0: Initial Version</b>                      |           |

## SPECIFICATIONS

$V_{DD} = 2.7\text{ V}$  to  $3.6\text{ V}$ ,  $GND = 0\text{ V}$ , unless otherwise noted. Temperature range for Y version is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

Table 1.

| Parameter                                                | +25°C | −40°C to +85°C | −40°C to +125°C        | Unit    | Test Conditions/Comments                                                                         |
|----------------------------------------------------------|-------|----------------|------------------------|---------|--------------------------------------------------------------------------------------------------|
| ANALOG SWITCH                                            |       |                |                        |         |                                                                                                  |
| Analog Signal Range                                      |       |                | 0 V to V <sub>DD</sub> | V       | V <sub>DD</sub> = 2.7 V                                                                          |
| On Resistance (R <sub>ON</sub> )                         | 0.5   |                |                        | Ω typ   | V <sub>DD</sub> = 2.7 V, V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = 10 mA        |
|                                                          | 0.65  | 0.75           | 0.8                    | Ω max   | See Figure 18                                                                                    |
| On Resistance Match Between Channels (ΔR <sub>ON</sub> ) | 0.04  | 0.075          | 0.08                   | Ω typ   | V <sub>DD</sub> = 2.7 V, V <sub>S</sub> = 0.65 V, I <sub>S</sub> = 10 mA                         |
| On Resistance Flatness (R <sub>FLAT (ON)</sub> )         | 0.1   |                |                        | Ω typ   | V <sub>DD</sub> = 2.7 V, V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = 10 mA        |
|                                                          |       | 0.15           | 0.16                   | Ω max   |                                                                                                  |
| LEAKAGE CURRENTS                                         |       |                |                        |         |                                                                                                  |
| Source Off Leakage I <sub>S</sub> (Off)                  | ±0.2  |                |                        | nA typ  | V <sub>DD</sub> = 3.6 V                                                                          |
|                                                          | ±1    | ±10            | ±100                   | nA max  | V <sub>S</sub> = 0.6 V/3.3 V, V <sub>D</sub> = 3.3 V/0.6 V                                       |
| Channel On Leakage I <sub>D</sub> , I <sub>S</sub> (On)  | ±0.2  |                |                        | nA typ  | See Figure 19                                                                                    |
|                                                          | ±1    | ±15            | ±120                   | nA max  | V <sub>S</sub> = V <sub>D</sub> = 0.6 V or 3.3 V (see Figure 20)                                 |
| DIGITAL INPUTS                                           |       |                |                        |         |                                                                                                  |
| Input High Voltage, V <sub>INH</sub>                     |       |                | 2                      | V min   | V <sub>IN</sub> = V <sub>INL</sub> or V <sub>INH</sub>                                           |
| Input Low Voltage, V <sub>INL</sub>                      |       |                | 0.8                    | V max   |                                                                                                  |
| Input Current, I <sub>INL</sub> or I <sub>INH</sub>      | 0.005 |                |                        | μA typ  |                                                                                                  |
|                                                          |       |                | ±0.1                   | μA max  |                                                                                                  |
| C <sub>IN</sub> , Digital Input Capacitance              | 4     |                |                        | pF typ  |                                                                                                  |
| DYNAMIC CHARACTERISTICS <sup>1</sup>                     |       |                |                        |         |                                                                                                  |
| t <sub>ON</sub>                                          | 21    |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF                                                    |
|                                                          | 26    | 28             | 29                     | ns max  | V <sub>S</sub> = 1.5 V/0 V (see Figure 21)                                                       |
| t <sub>OFF</sub>                                         | 4     |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF                                                    |
|                                                          | 7     | 8              | 9                      | ns max  | V <sub>S</sub> = 1.5 V (see Figure 21)                                                           |
| Break-Before-Make Time Delay (t <sub>BBM</sub> )         | 17    |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF                                                    |
|                                                          |       |                | 5                      | ns min  | V <sub>S1</sub> = V <sub>S2</sub> = 1.5 V (see Figure 22)                                        |
| Charge Injection                                         | 40    |                |                        | pC typ  | V <sub>S</sub> = 1.5 V, R <sub>S</sub> = 0 Ω, C <sub>L</sub> = 1 nF (see Figure 23)              |
| Off Isolation                                            | −67   |                |                        | dB typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 100 kHz (see Figure 24)                        |
| Channel-to-Channel Crosstalk                             | −90   |                |                        | dB typ  | S1A to S2A/S1B to S2B (see Figure 27), R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 100 kHz |
|                                                          | −67   |                |                        | dB typ  | S1A to S1B/S2A to S2B (see Figure 26), R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF, f = 100 kHz |
| Total Harmonic Distortion (THD + N)                      | 0.02  |                |                        | %       | R <sub>L</sub> = 32 Ω, f = 20 Hz to 20 kHz, V <sub>S</sub> = 2 V p-p                             |
| Insertion Loss                                           | −0.05 |                |                        | dB typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF (see Figure 25)                                     |
| −3 dB Bandwidth                                          | 57    |                |                        | MHz typ | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF (see Figure 25)                                     |
| C <sub>S</sub> (Off)                                     | 25    |                |                        | pF typ  |                                                                                                  |
| C <sub>D</sub> , C <sub>S</sub> (On)                     | 75    |                |                        | pF typ  |                                                                                                  |
| POWER REQUIREMENTS                                       |       |                |                        |         |                                                                                                  |
| I <sub>DD</sub>                                          | 0.003 |                |                        | μA typ  | V <sub>DD</sub> = 3.6 V                                                                          |
|                                                          |       | 1              | 4                      | μA max  | Digital inputs = 0 V or 3.6 V                                                                    |

<sup>1</sup> Guaranteed by design, not subject to production test.

$V_{DD} = 2.5 \text{ V} \pm 0.2 \text{ V}$ ,  $GND = 0 \text{ V}$ , unless otherwise noted. Temperature range for Y version is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

Table 2.

| Parameter                                                | +25°C     | −40°C to +85°C | −40°C to +125°C | Unit              | Test Conditions/Comments                                                                                |
|----------------------------------------------------------|-----------|----------------|-----------------|-------------------|---------------------------------------------------------------------------------------------------------|
| <b>ANALOG SWITCH</b>                                     |           |                |                 |                   |                                                                                                         |
| Analog Signal Range                                      |           |                | 0 V to $V_{DD}$ | V                 |                                                                                                         |
| On Resistance ( $R_{ON}$ )                               | 0.65      |                |                 | $\Omega$ typ      | $V_{DD} = 2.3 \text{ V}$ , $V_S = 0 \text{ V}$ to $V_{DD}$ , $I_S = 10 \text{ mA}$                      |
|                                                          | 0.72      | 0.8            | 0.88            | $\Omega$ max      | See Figure 18                                                                                           |
| On Resistance Match Between Channels ( $\Delta R_{ON}$ ) | 0.04      |                |                 | $\Omega$ typ      | $V_{DD} = 2.3 \text{ V}$ , $V_S = 0.7 \text{ V}$ , $I_S = 10 \text{ mA}$                                |
|                                                          |           | 0.08           | 0.085           | $\Omega$ max      |                                                                                                         |
| On Resistance Flatness ( $R_{FLAT(ON)}$ )                | 0.16      |                |                 | $\Omega$ typ      | $V_{DD} = 2.3 \text{ V}$ , $V_S = 0 \text{ V}$ to $V_{DD}$ , $I_S = 10 \text{ mA}$                      |
|                                                          |           | 0.23           | 0.24            | $\Omega$ max      |                                                                                                         |
| <b>LEAKAGE CURRENTS</b>                                  |           |                |                 |                   |                                                                                                         |
| Source Off Leakage $I_S$ (Off)                           | $\pm 0.2$ |                |                 | nA typ            | $V_{DD} = 2.7 \text{ V}$                                                                                |
|                                                          | $\pm 0.4$ | $\pm 4$        | $\pm 45$        | nA max            | $V_S = 0.6 \text{ V}/2.4 \text{ V}$ , $V_D = 2.4 \text{ V}/0.6 \text{ V}$                               |
| Channel On Leakage $I_D$ , $I_S$ (On)                    | $\pm 0.2$ |                |                 | nA typ            | See Figure 19                                                                                           |
|                                                          | $\pm 0.6$ | $\pm 12$       | $\pm 90$        | nA max            | $V_S = V_D = 0.6 \text{ V}$ or $2.4 \text{ V}$ (see Figure 20)                                          |
| <b>DIGITAL INPUTS</b>                                    |           |                |                 |                   |                                                                                                         |
| Input High Voltage, $V_{INH}$                            |           |                | 1.7             | V min             |                                                                                                         |
| Input Low Voltage, $V_{INL}$                             |           |                | 0.7             | V max             |                                                                                                         |
| Input Current                                            |           |                |                 |                   |                                                                                                         |
| $I_{INL}$ or $I_{INH}$                                   | 0.005     |                |                 | $\mu\text{A}$ typ | $V_{IN} = V_{INL}$ or $V_{INH}$                                                                         |
|                                                          |           |                | $\pm 0.1$       | $\mu\text{A}$ max |                                                                                                         |
| $C_{IN}$ Digital Input Capacitance                       | 4         |                |                 | pF typ            |                                                                                                         |
| <b>DYNAMIC CHARACTERISTICS<sup>1</sup></b>               |           |                |                 |                   |                                                                                                         |
| $t_{ON}$                                                 | 23        |                |                 | ns typ            | $R_L = 50 \Omega$ , $C_L = 35 \text{ pF}$                                                               |
|                                                          | 29        | 30             | 31              | ns max            | $V_S = 1.5 \text{ V}/0 \text{ V}$ (see Figure 21)                                                       |
| $t_{OFF}$                                                | 5         |                |                 | ns typ            | $R_L = 50 \Omega$ , $C_L = 35 \text{ pF}$                                                               |
|                                                          | 7         | 8              | 9               | ns max            | $V_S = 1.5 \text{ V}$ (see Figure 21)                                                                   |
| Break-Before-Make Time Delay ( $t_{BBM}$ )               | 17        |                |                 | ns typ            | $R_L = 50 \Omega$ , $C_L = 35 \text{ pF}$                                                               |
|                                                          |           |                | 5               | ns min            | $V_{S1} = V_{S2} = 1.5 \text{ V}$ (see Figure 22)                                                       |
| Charge Injection                                         | 30        |                |                 | pC typ            | $V_S = 1.25 \text{ V}$ , $R_S = 0 \Omega$ , $C_L = 1 \text{ nF}$ (see Figure 23)                        |
| Off Isolation                                            | −67       |                |                 | dB typ            | $R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 100 \text{ kHz}$ (see Figure 24)                        |
| Channel-to-Channel Crosstalk                             | −90       |                |                 | dB typ            | S1A to S2A/S1B to S2B; $R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 100 \text{ kHz}$ (see Figure 27) |
|                                                          | −67       |                |                 | dB typ            | S1A to S1B/S2A to S2B; $R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ , $f = 100 \text{ kHz}$ (see Figure 26) |
| Total Harmonic Distortion (THD + N)                      | 0.022     |                |                 | %                 | $R_L = 32 \Omega$ , $f = 20 \text{ Hz}$ to $20 \text{ kHz}$ , $V_S = 1.5 \text{ V p-p}$                 |
| Insertion Loss                                           | −0.06     |                |                 | dB typ            | $R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ (see Figure 25)                                                |
| −3 dB Bandwidth                                          | 57        |                |                 | MHz typ           | $R_L = 50 \Omega$ , $C_L = 5 \text{ pF}$ (see Figure 25)                                                |
| $C_S$ (Off)                                              | 25        |                |                 | pF typ            |                                                                                                         |
| $C_D$ , $C_S$ (On)                                       | 75        |                |                 | pF typ            |                                                                                                         |
| <b>POWER REQUIREMENTS</b>                                |           |                |                 |                   |                                                                                                         |
| $I_{DD}$                                                 | 0.003     |                |                 | $\mu\text{A}$ typ | $V_{DD} = 2.7 \text{ V}$                                                                                |
|                                                          |           | 1              | 4               | $\mu\text{A}$ max | Digital inputs = 0 V or 2.7 V                                                                           |

<sup>1</sup> Guaranteed by design, not subject to production test.

$V_{DD} = 1.65 \text{ V} \pm 1.95 \text{ V}$ , GND = 0 V, unless otherwise noted. Temperature range for Y version is  $-40^{\circ}\text{C}$  to  $+125^{\circ}\text{C}$ .

Table 3.

| Parameter                                                | +25°C | −40°C to +85°C | −40°C to +125°C        | Unit    | Test Conditions/Comments                                                                                                                                               |
|----------------------------------------------------------|-------|----------------|------------------------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ANALOG SWITCH                                            |       |                |                        |         |                                                                                                                                                                        |
| Analog Signal Range                                      |       |                | 0 V to V <sub>DD</sub> | V       | V <sub>DD</sub> = 1.8 V, V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = 10 mA<br>See Figure 18                                                             |
| On Resistance (R <sub>ON</sub> )                         | 1     |                |                        | Ω typ   |                                                                                                                                                                        |
|                                                          | 1.4   | 2.2            | 2.2                    | Ω max   |                                                                                                                                                                        |
|                                                          | 2     | 4              | 4                      | Ω typ   |                                                                                                                                                                        |
| On Resistance Match Between Channels (ΔR <sub>ON</sub> ) | 0.1   |                |                        | Ω typ   | V <sub>DD</sub> = 1.65 V, V <sub>S</sub> = 0 V to V <sub>DD</sub> , I <sub>S</sub> = 10 mA<br>V <sub>DD</sub> = 1.65 V, V <sub>S</sub> = 0.7 V, I <sub>S</sub> = 10 mA |
| LEAKAGE CURRENTS                                         |       |                |                        |         |                                                                                                                                                                        |
| Source Off Leakage I <sub>S</sub> (Off)                  | ±0.2  |                |                        | nA typ  | V <sub>DD</sub> = 1.95 V<br>V <sub>S</sub> = 0.6 V/1.65 V, V <sub>D</sub> = 1.65 V/0.6 V<br>See Figure 19                                                              |
|                                                          | ±0.4  | ±4             | ±25                    | nA max  |                                                                                                                                                                        |
| Channel On Leakage I <sub>D</sub> , I <sub>S</sub> (On)  | ±0.2  |                |                        | nA typ  | V <sub>S</sub> = V <sub>D</sub> = 0.6 V or 1.65 V (see Figure 20)                                                                                                      |
|                                                          | ±0.6  | ±10            | ±75                    | nA max  |                                                                                                                                                                        |
| DIGITAL INPUTS                                           |       |                |                        |         |                                                                                                                                                                        |
| Input High Voltage, V <sub>INH</sub>                     |       |                | 0.65 V <sub>DD</sub>   | V min   | V <sub>IN</sub> = V <sub>INL</sub> or V <sub>INH</sub>                                                                                                                 |
| Input Low Voltage, V <sub>INL</sub>                      |       |                | 0.35 V <sub>DD</sub>   | V max   |                                                                                                                                                                        |
| Input Current                                            |       |                |                        |         |                                                                                                                                                                        |
| I <sub>INL</sub> or I <sub>INH</sub>                     | 0.005 |                | ±0.1                   | μA typ  |                                                                                                                                                                        |
|                                                          |       |                |                        | μA max  |                                                                                                                                                                        |
| C <sub>IN</sub> , Digital Input Capacitance              | 4     |                |                        | pF typ  |                                                                                                                                                                        |
| DYNAMIC CHARACTERISTICS <sup>1</sup>                     |       |                |                        |         |                                                                                                                                                                        |
| t <sub>ON</sub>                                          | 28    |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF<br>V <sub>S</sub> = 1.5 Ω/0 V (see Figure 21)                                                                            |
|                                                          | 37    | 38             | 39                     | ns max  |                                                                                                                                                                        |
| t <sub>OFF</sub>                                         | 7     |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF<br>V <sub>S</sub> = 1.5 V (see Figure 21)                                                                                |
|                                                          | 9     | 10             | 11                     | ns max  |                                                                                                                                                                        |
| Break-before-Make Time Delay (t <sub>BBM</sub> )         | 21    |                |                        | ns typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 35 pF<br>V <sub>S1</sub> = V <sub>S2</sub> = 1 V (see Figure 22)                                                               |
|                                                          |       |                | 5                      | ns min  |                                                                                                                                                                        |
| Charge Injection                                         | 20    |                |                        | pC typ  | V <sub>S</sub> = 1 V, R <sub>S</sub> = 0 V, C <sub>L</sub> = 1 nF (see Figure 23)                                                                                      |
| Off Isolation                                            | −67   |                |                        | dB typ  |                                                                                                                                                                        |
| Channel-to-Channel Crosstalk                             | −90   |                |                        | dB typ  | S1A to S2A/S1B to S2B; R <sub>L</sub> = 50 Ω,<br>C <sub>L</sub> = 5 pF, f = 100 kHz (see Figure 27)                                                                    |
|                                                          | −67   |                |                        | dB typ  |                                                                                                                                                                        |
| Total Harmonic Distortion (THD + N)                      | 0.14  |                |                        | %       | S1A to S1B/S2A to S2B; R <sub>L</sub> = 50 Ω,<br>C <sub>L</sub> = 5 pF, f = 100 kHz (see Figure 26)                                                                    |
|                                                          |       |                |                        |         |                                                                                                                                                                        |
| Insertion Loss                                           | −0.08 |                |                        | dB typ  | R <sub>L</sub> = 32 Ω, f = 20 Hz to 20 kHz,<br>V <sub>S</sub> = 1.2 V p-p                                                                                              |
| −3 dB Bandwidth                                          | 57    |                |                        | MHz typ |                                                                                                                                                                        |
| C <sub>S</sub> (OFF)                                     | 25    |                |                        | pF typ  | R <sub>L</sub> = 50 Ω, C <sub>L</sub> = 5 pF (see Figure 25)                                                                                                           |
| C <sub>D</sub> , C <sub>S</sub> (On)                     | 75    |                |                        | pF typ  |                                                                                                                                                                        |
| POWER REQUIREMENTS                                       |       |                |                        |         |                                                                                                                                                                        |
| I <sub>DD</sub>                                          | 0.003 |                |                        | μA typ  | V <sub>DD</sub> = 1.95 V<br>Digital inputs = 0 V or 1.95 V                                                                                                             |
|                                                          |       | 1.0            | 4                      | μA max  |                                                                                                                                                                        |

<sup>1</sup> Guaranteed by design, not subject to production test.

## ABSOLUTE MAXIMUM RATINGS

$T_A = 25^\circ\text{C}$ , unless otherwise noted.

Table 4.

| Parameter                           | Rating                                                                     |
|-------------------------------------|----------------------------------------------------------------------------|
| $V_{DD}$ to GND                     | $-0.3\text{ V to }+4.6\text{ V}$                                           |
| Analog Inputs <sup>1</sup>          | $-0.3\text{ V to }V_{DD} + 0.3\text{ V}$                                   |
| Digital Inputs <sup>1</sup>         | $-0.3\text{ V to }4.6\text{ V or }10\text{ mA,}$<br>whichever occurs first |
| Peak Current, S or D                |                                                                            |
| 3.3 V Operation                     | 500 mA                                                                     |
| 2.5 V Operation                     | 460 mA                                                                     |
| 1.8 V Operation                     | 420 mA (pulsed at 1 ms,<br>10% duty cycle maximum)                         |
| Continuous Current, Sxx or Dx       |                                                                            |
| 3.3 V Operation                     | 300 mA                                                                     |
| 2.5 V Operation                     | 275 mA                                                                     |
| 1.8 V Operation                     | 250 mA                                                                     |
| Operating Temperature Range         | $-40^\circ\text{C to }+125^\circ\text{C}$                                  |
| Storage Temperature Range           | $-65^\circ\text{C to }+150^\circ\text{C}$                                  |
| Junction Temperature                | $150^\circ\text{C}$                                                        |
| MSOP Package                        |                                                                            |
| $\theta_{JA}$ Thermal Impedance     | $206^\circ\text{C/W}$                                                      |
| $\theta_{JC}$ Thermal Impedance     | $44^\circ\text{C/W}$                                                       |
| IR Reflow, Peak Temperature <20 sec | $235^\circ\text{C}$                                                        |

<sup>1</sup> Overvoltages at INx, Sxx, or Dx are clamped by internal diodes. Current must be limited to the maximum ratings given.

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

### TRUTH TABLE

Table 5.

| Logic | Switch A | Switch B |
|-------|----------|----------|
| 0     | Off      | On       |
| 1     | On       | Off      |

### 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

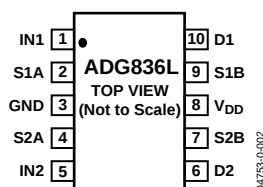
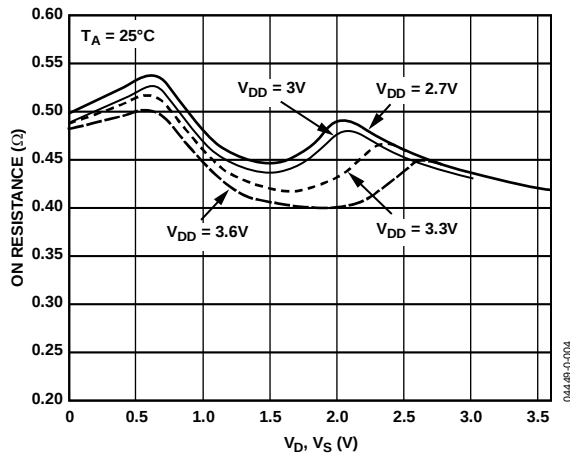
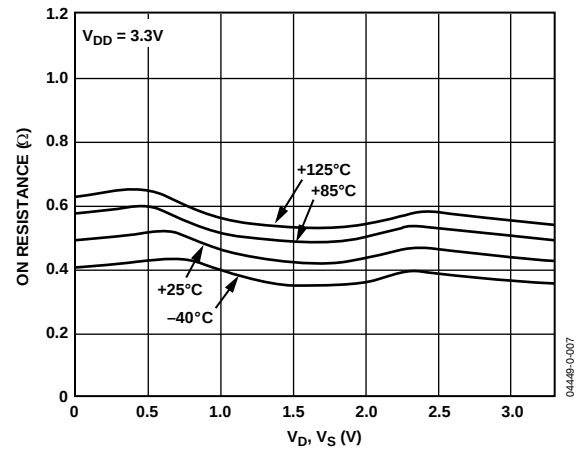
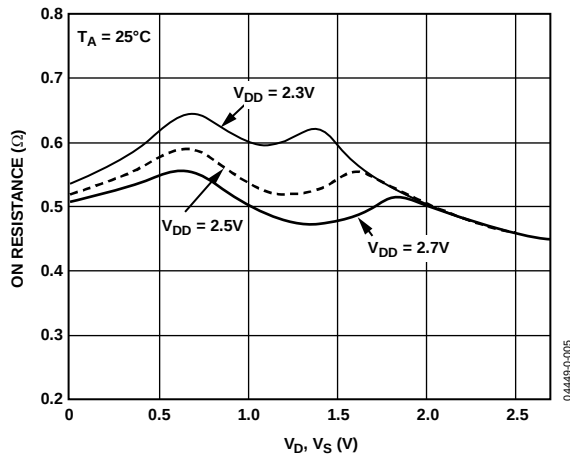
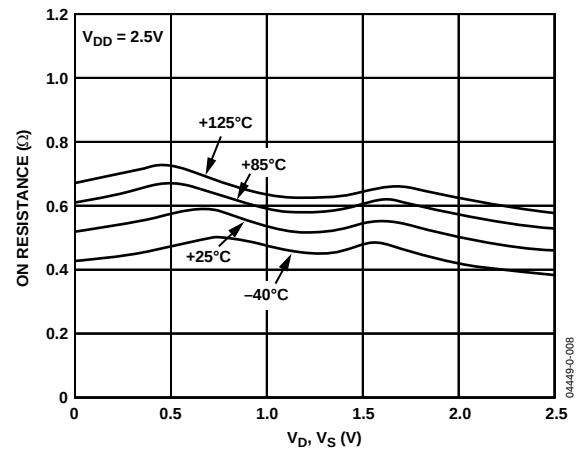
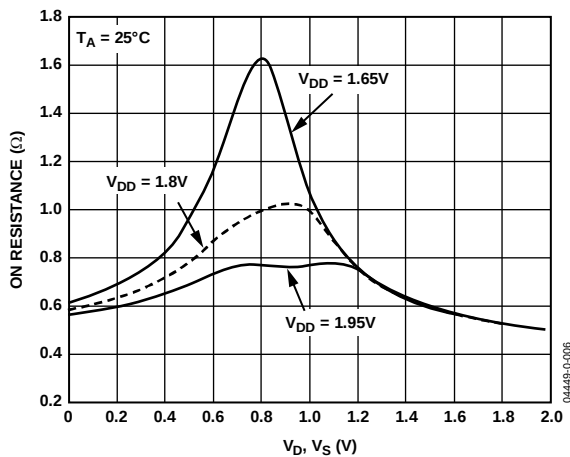
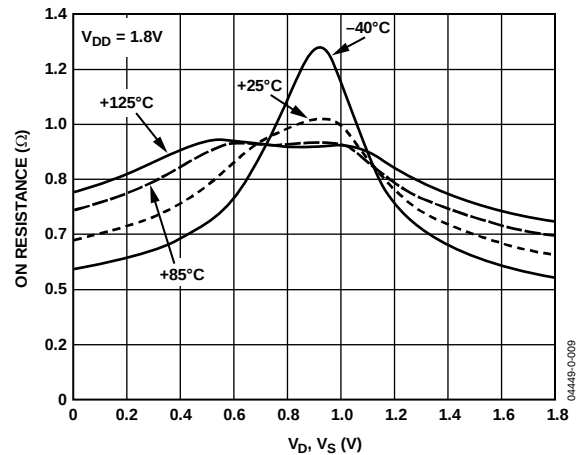


Figure 2. Pin Configuration

Table 6. Pin Function Descriptions

| Pin No.    | Mnemonic           | Description                                             |
|------------|--------------------|---------------------------------------------------------|
| 1, 5       | IN1, IN2           | Logic Control Inputs.                                   |
| 2, 4, 7, 9 | S1A, S2A, S2B, S1B | Source Terminals. These pins may be an input or output. |
| 3          | GND                | Ground (0 V) Reference.                                 |
| 6, 10      | D2, D1             | Drain Terminals. These pins may be an input or output.  |
| 8          | V <sub>DD</sub>    | Most Positive Power Supply Potential.                   |

## TYPICAL PERFORMANCE CHARACTERISTICS

Figure 3. On Resistance vs.  $V_D$  ( $V_S$ ),  $V_{DD} = 2.7\text{ V to }3.6\text{ V}$ Figure 6. On Resistance vs.  $V_D$  ( $V_S$ ) for Different Temperatures,  $V_{DD} = 3.3\text{ V}$ Figure 4. On Resistance vs.  $V_D$  ( $V_S$ ),  $V_{DD} = 2.5\text{ V} \pm 0.2\text{ V}$ Figure 7. On Resistance vs.  $V_D$  ( $V_S$ ) for Different Temperatures,  $V_{DD} = 2.5\text{ V}$ Figure 5. On Resistance vs.  $V_D$  ( $V_S$ ),  $V_{DD} = 1.8\text{ V} \pm 0.15\text{ V}$ Figure 8. On Resistance vs.  $V_D$  ( $V_S$ ) for Different Temperatures,  $V_{DD} = 1.8\text{ V}$

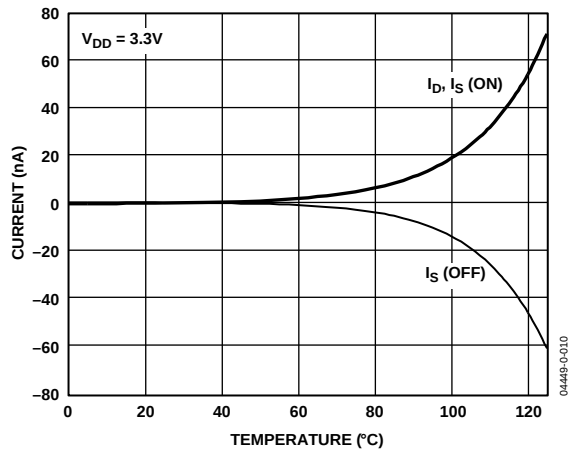
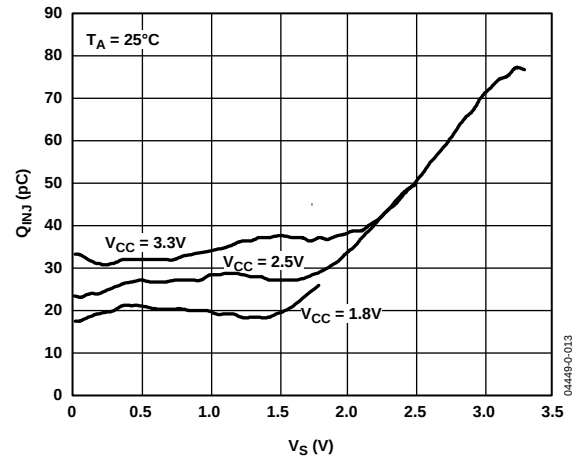
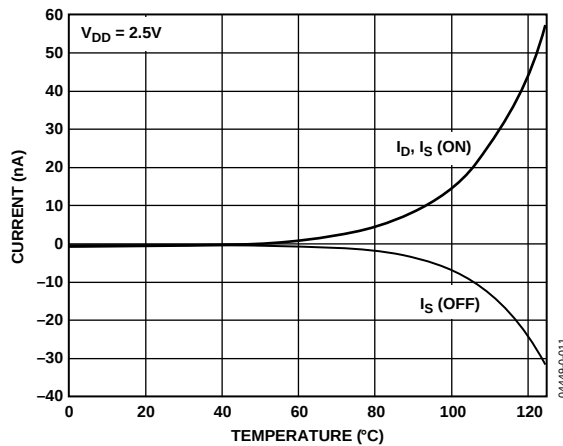
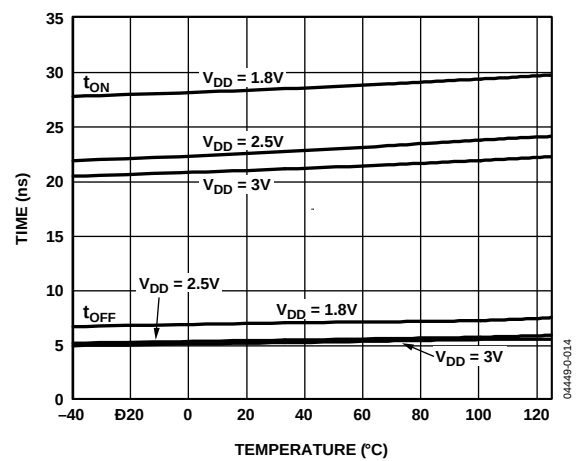
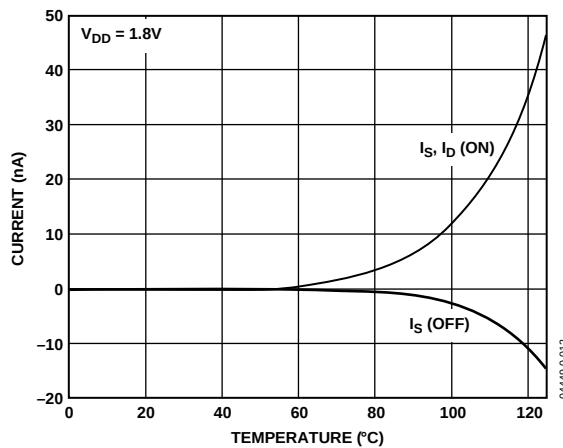
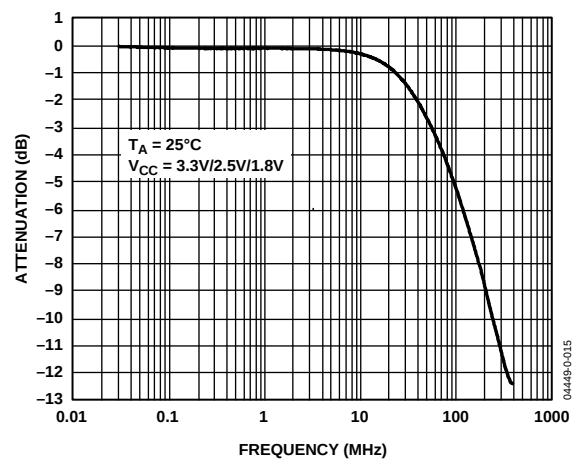
Figure 9. Leakage Current vs. Temperature,  $V_{DD} = 3.3\text{ V}$ Figure 12. Charge Injection ( $Q_{INJ}$ ) vs. Source Voltage ( $V_S$ )Figure 10. Leakage Current vs. Temperature,  $V_{DD} = 2.5\text{ V}$ Figure 13.  $t_{ON}/t_{OFF}$  Time vs. TemperatureFigure 11. Leakage Current vs. Temperature,  $V_{DD} = 1.8\text{ V}$ 

Figure 14. Bandwidth

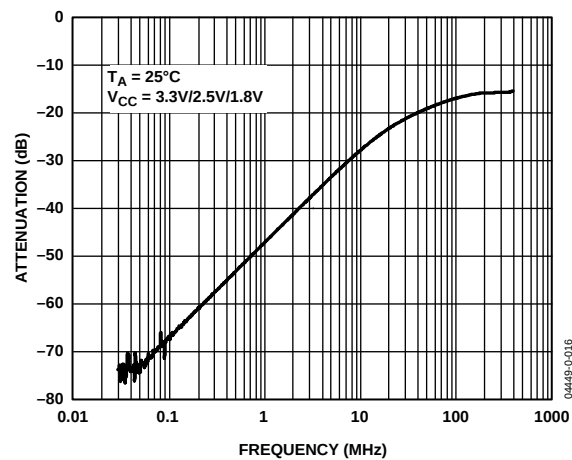


Figure 15. Off Isolation vs. Frequency

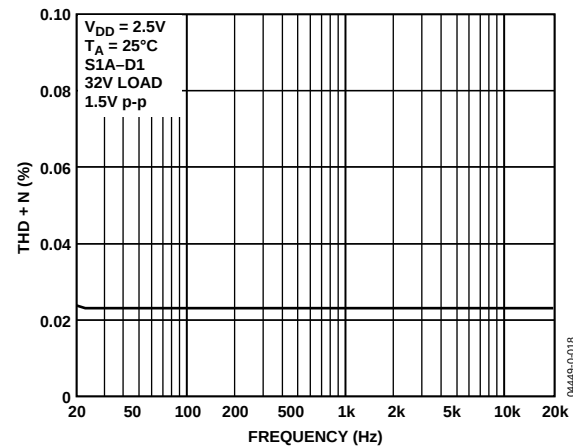


Figure 17. Total Harmonic Distortion + Noise (THD + N) vs. Frequency

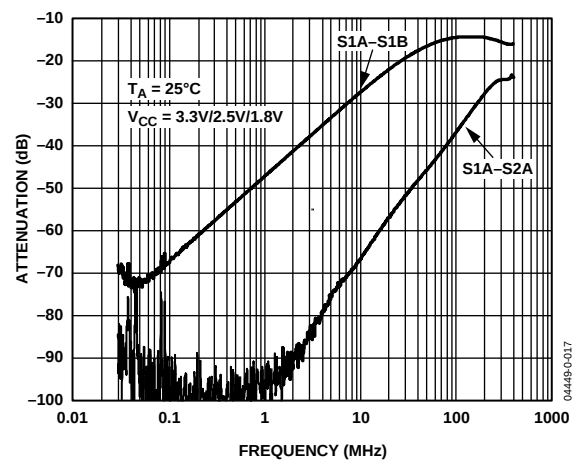


Figure 16. Crosstalk vs. Frequency

## TEST CIRCUITS

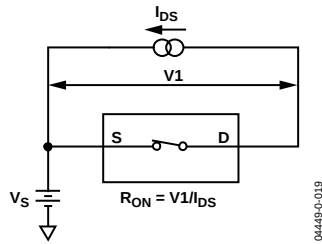


Figure 18. On Resistance

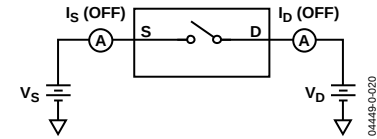


Figure 19. Off Leakage

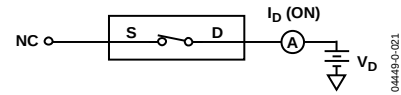


Figure 20. On Leakage

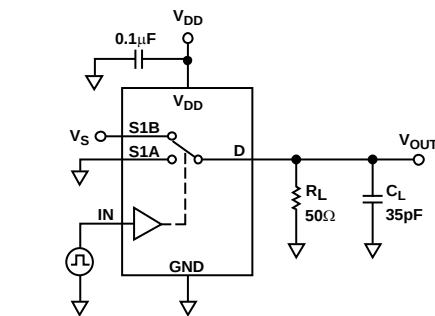
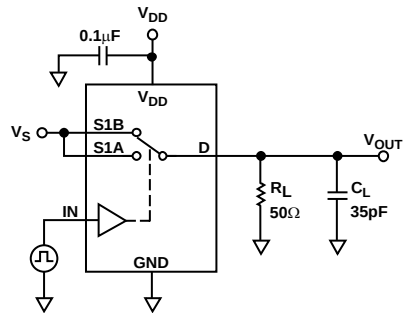
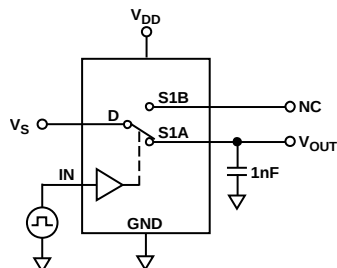
Figure 21. Switching Times,  $t_{ON}$ ,  $t_{OFF}$ Figure 22. Break-Before-Make Time Delay,  $t_{BBM}$ 

Figure 23. Charge Injection

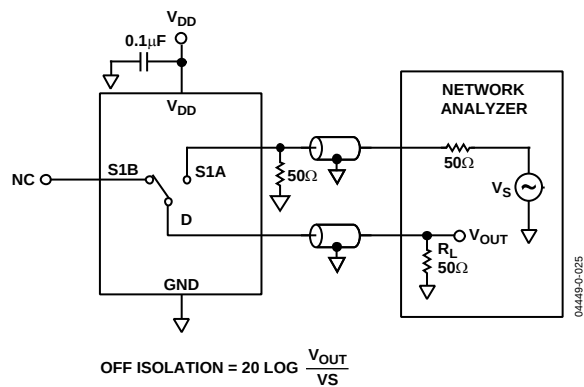


Figure 24. Off Isolation

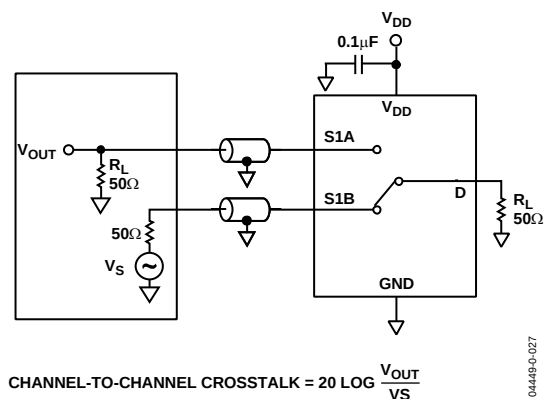


Figure 26. Channel-to-Channel Crosstalk (S1A to S1B)

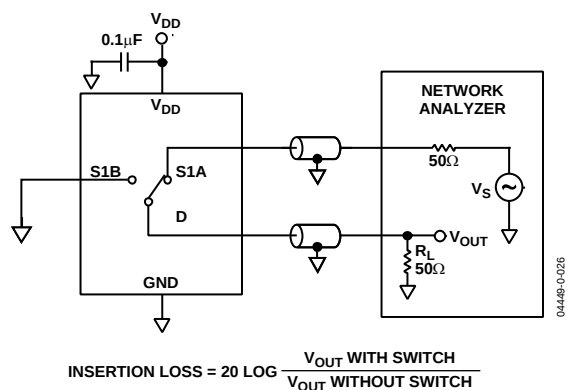


Figure 25. Bandwidth

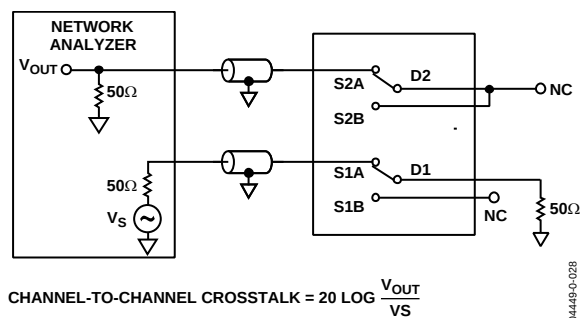


Figure 27. Channel-to-Channel Crosstalk (S1A to S2A)

## TERMINOLOGY

**I<sub>DD</sub>**

Positive supply current.

**V<sub>D</sub> (V<sub>S</sub>)**

Analog voltage on terminals, D and S.

**R<sub>ON</sub>**

Ohmic resistance between terminals, D and S.

**R<sub>FLAT (ON)</sub>**

Flatness is defined as the difference between the maximum and minimum value of on resistance as measured

**ΔR<sub>ON</sub>**

On resistance match between any two channels.

**I<sub>S</sub> (Off)**

Source leakage current with the switch off.

**I<sub>D</sub> (Off)**

Drain leakage current with the switch off.

**I<sub>D</sub>, I<sub>S</sub> (On)**

Channel leakage current with the switch on.

**V<sub>INL</sub>**

Maximum input voltage for Logic 0.

**V<sub>INH</sub>**

Minimum input voltage for Logic 1.

**I<sub>INL</sub> (I<sub>INH</sub>)**

Input current of the digital input.

**C<sub>S</sub> (Off)**

Off switch source capacitance. Measured with reference to ground.

**C<sub>D</sub> (Off)**

Off switch drain capacitance. Measured with reference to ground.

**C<sub>D</sub>, C<sub>S</sub> (On)**

On switch capacitance. Measured with reference to ground.

**C<sub>IN</sub>**

Digital input capacitance.

**t<sub>ON</sub>**

Delay time between the 50% and the 90% points of the digital input and switch on condition.

**t<sub>OFF</sub>**

Delay time between the 50% and the 90% points of the digital input and switch off condition.

**t<sub>B2M</sub>**

On or off time measured between the 80% points of both switches when switching from one to another.

### Charge Injection

A measure of the glitch impulse transferred from the digital input to the analog output during on-off switching.

### Off Isolation

A measure of unwanted signal coupling through an off switch.

### Crosstalk

A measure of unwanted signal that is coupled through from one channel to another as a result of parasitic capacitance.

### –3 dB Bandwidth

The frequency at which the output is attenuated by 3 dB.

### On Response

The frequency response of the on switch.

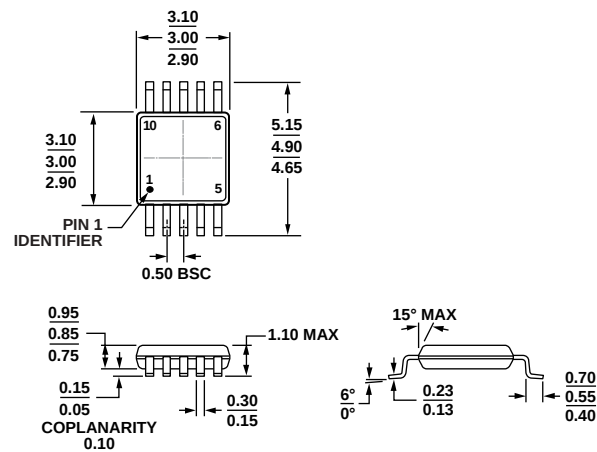
### Insertion Loss

The loss due to the on resistance of the switch.

### THD + N

The ratio of the harmonic amplitudes plus noise of a signal, to the fundamental.

OUTLINE DIMENSIONS



COMPLIANT TO JEDEC STANDARDS MO-187-BA  
Figure 28. 10-Lead Mini Small Outline Package [MSOP]  
(RM-10)  
Dimensions shown in millimeters

ORDERING GUIDE

| Model <sup>1</sup> | Temperature Range | Package Description                       | Package Option | Branding |
|--------------------|-------------------|-------------------------------------------|----------------|----------|
| ADG836LYRM         | –40°C to +125°C   | 10-Lead Mini Small Outline Package [MSOP] | RM-10          | SQA      |
| ADG836LYRMZ        | –40°C to +125°C   | 10-Lead Mini Small Outline Package [MSOP] | RM-10          | S1D      |
| ADG836LYRM-REEL7   | –40°C to +125°C   | 10-Lead Mini Small Outline Package [MSOP] | RM-10          | SQA      |

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