



# aAM3202 / aAM3203

ULTRA LOW POWER, DUAL-SPDT  
CMOS ANALOG SWITCHES

## Preliminary Specification

## PRODUCT SPECIFICATION

### General Description

The aAM3202 and aAM3203 are precision CMOS analog dual-SPDT switches or 2:1 multiplexers offering low on-resistance of less than  $4\Omega$ , with better than  $0.4\Omega$  matching between channels and on-resistance flatness of less than  $1.2\Omega$  over the specified analog input voltage range. The aAM3202 and aAM3203 have very fast turn-on switching speed of less than  $16\text{nS}$  over the full operating temperature range of  $-40^\circ\text{C}$  to  $85^\circ\text{C}$ . The aAM3202 and aAM3203 also consume a minimal amount of power, making them ideal for portable equipment.

The aAM3202 and aAM3203 connect 1-of-2 inputs to a common output by control of a select pin in a dual configuration. The aAM3202 has an inverted switch logic compared to the aAM3203. The parts are available in a 10-contact leadless QFN package and operate over the range from  $1.8\text{V}$  to  $5.5\text{V}$ .

### Features (at $5\text{V } V_{\text{DD}}$ )

- Low On-Resistance:  $4\Omega$  Max
- Guaranteed On-Resistance Match Between Channels,  $< 0.4\Omega$
- Guaranteed Flat On-Resistance Over Specified Signal Range,  $< 1.2\Omega$ .
- Turn-On Time:  $12\text{nS}$  at  $25^\circ\text{C}$
- Turn-Off Time:  $5\text{nS}$  at  $25^\circ\text{C}$
- Break Before Make Interval:  $7\text{nS}$  typ
- Temperature Range:  $-40^\circ\text{C}$  to  $85^\circ\text{C}$
- Uses a Single Supply,  $3\text{V}$  to  $5\text{V}$  Nominal

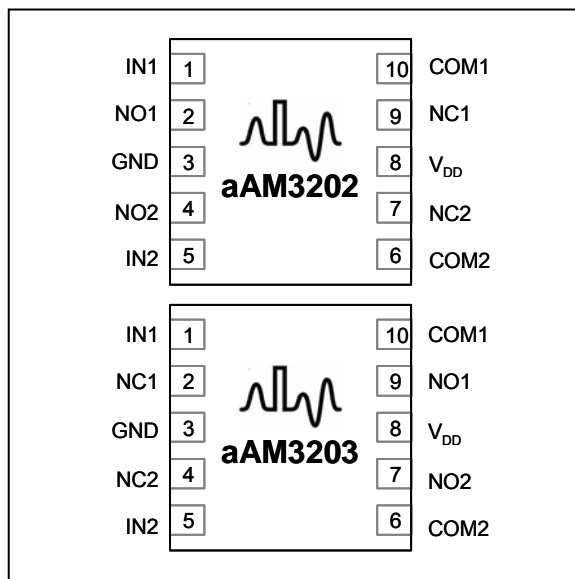
### Applications

- Mobile Communications
- Computers and Peripherals
- Battery Management
- FAX Machines/Printers/Copiers
- Portable Medical Instruments

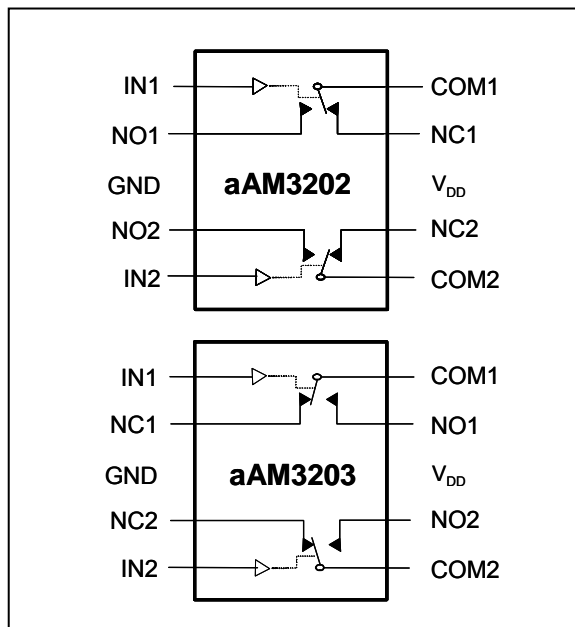
### Ordering Information

Part Number	Package	Temperature Range	Part Marking	How Supplied
aAM3202Q10	10-Lead QFN	$-40^\circ\text{C}$ to $+85^\circ\text{C}$	aAM3202	3000 units on T&R
aAM3203Q10	10-Lead QFN	$-40^\circ\text{C}$ to $+85^\circ\text{C}$	aAM3203	3000 units on T&R

### Pin Configuration



### Functional Diagrams



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## Absolute Maximum Ratings<sup>1</sup>

Parameter	Rating	
Supply Voltage	+7V	
Analog Input/Output Voltage	-0.5V to $V_{DD} + 0.5V$	
IN1/IN2 Input Voltage	-0.5V to +7V	
Continuous Current, any terminal	50mA	
Storage Temperature Range	-60°C to +150°C	
Lead Soldering Temperature	260°C	
ESD <sup>2</sup>	Human Body Model	2000V
	Machine Model	250V
Thermal Resistance - $\theta_{JA}$	TBD	
Lead Temperature	260°C	

### NOTES:

1. Absolute maximum ratings are limits beyond which operation may cause permanent damage to the device. These are stress ratings only; functional operations at or above these limits is not implied.
2. Human Body Model: 100pF capacitor discharged through a 1.5k $\Omega$  resistor into each pin. Machine Model: 200pF capacitor discharged directly into each pin.
3. These specifications are guaranteed only for the test conditions listed.

## Recommended Operating Ratings

Symbol	Parameter	Min	Max	Units
$V_{DD}$	Supply Voltage	+1.8	+6	V
$V_{NO}$ , $V_{NC}$ , $V_{COM}$	Analog Signal Level	0	$V_{DD}$	V
$T_A$	Operating Temperature Range	-40	+85	°C

## DC Electrical Characteristics (Digital section)<sup>3</sup>

Limits apply for  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$  and  $V_{DD} = +5.0V$  unless otherwise noted.

Parameter	Symbol	Conditions	Min	Max	Units
Min Hi-Level Input Voltage	$V_{IH}$	$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	$V_{DD} = +2.7V$ $V_{DD} = +4.5V$	2.0V 2.4V	V
Max Low-Level Input Voltage	$V_{IL}$	$-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$	$V_{DD} = +2.7V$ $V_{DD} = +4.5V$	0.4V 0.8V	V
Digital Input Leakage	$I_{IN}$	$V_{ADD} \& V_{EN} = 0V$ or $+5.5V$ $V_{DD} = +5.5V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$	-0.1 -1.0	0.1 1.0 $\mu\text{A}$
Digital Input Power OFF Leakage	$I_{OFF}$	$V_{ADD} \& V_{EN} = 0V$ or $+5.5V$ $V_{DD} = 0V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$	-0.1 -1.0	0.1 1.0 $\mu\text{A}$

## DC Electrical Characteristics (Analog Section)<sup>3</sup>

Limits apply for  $-40^\circ\text{C} \leq T_A \leq +85^\circ\text{C}$  and  $V_{DD} = +5.0V$  unless otherwise noted.

Parameter	Symbol	Conditions	Min	Typ	Max	Units
ON-Resistance	$R_{ON}$	$I_{NO} = -10\text{mA}$ $V_{COM} = 0V$ to $+5V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		2 4	$\Omega$
		$I_{NO} = -10\text{mA}$ $V_{COM} = 0V$ to $+3V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		4 7	$\Omega$
ON-Resistance channel matching	$\Delta R_{ON}$	$I_{NO} = -10\text{mA}$ , $V_{DD} = +4.5V$ $V_{COM} = 0$ to $V_{DD}$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		0.1 0.4	$\Omega$
		$I_{NO} = -10\text{mA}$ , $V_{DD} = +2.7V$ $V_{COM} = 0$ to $V_{DD}$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		0.1 0.4	$\Omega$
ON-Resistance Flatness	$R_{FLAT}$	$I_{NO} = -10\text{mA}$ , $V_{DD} = +5V$ $V_{COM} = +1V, +2.5V, +4V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		0.5 1.2	$\Omega$
		$I_{NO} = -10\text{mA}$ , $V_{DD} = 3V$ $V_{COM} = +.6V, +1.5V, +2.4V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		1.5 2.5	$\Omega$
Supply Current	$I_{DD}$	$V_{DD} = +3.3V$ or $+5.5V$ , $V_{ADD} \& V_{EN} = 0V$	$T_A = +25^\circ\text{C}$ $T_A = -40^\circ\text{C}$ to $+85^\circ\text{C}$		0.1 1	$\mu\text{A}$

## Dynamic Electrical Characteristics<sup>3</sup>

Limits apply for  $-40^{\circ}\text{C} \leq T_A \leq +85^{\circ}\text{C}$  and  $V_{DD} = +5.0\text{V}$  unless otherwise noted.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Turn-On Time	$t_{ON(EN)}$	$V_{DD} = +5\text{V}, V_{NO} = 3\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$		12	16	ns
		$V_{DD} = +3\text{V}, V_{NO} = 2\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$		14	20	ns
Turn-Off Time	$t_{OFF(EN)}$	$V_{DD} = +5\text{V}, V_{NO} = 3\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$		5	8	ns
		$V_{DD} = +3\text{V}, V_{NO} = 2\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$		6	10	ns
Break-Before-Make Interval	$t_{OPEN}$	$V_{DD} = +5\text{V}, V_{NO} = 3\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	1	7		ns
		$V_{DD} = +3\text{V}, V_{NO} = 2\text{V}$ $C_L = 35\text{pF}, R_L = 300\Omega$	$T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C to } +85^{\circ}\text{C}$	1	7		ns
Logic Input Cap.	$C_{IN}$	$f = 1\text{MHz}$	$T_A = +25^{\circ}\text{C}, f = 1\text{MHz}$		8		pF
NO-off, NC-off-ch Cap.	$C_{NO(OFF)}$	$f = 1\text{MHz}; V_{EN} = V_{NO} = 0\text{V}$	$T_A = +25^{\circ}\text{C}, f = 1\text{MHz}$		8		pF
COM-On-ch Cap	$C_{COM(ON)}$	$V_{EN} = +2.4\text{V}; V_{COM} = 0\text{V}$	$T_A = +25^{\circ}\text{C}, f = 1\text{MHz}$		32		pF

## Test Circuits / Timing Diagrams

Figure 1. Switching Time

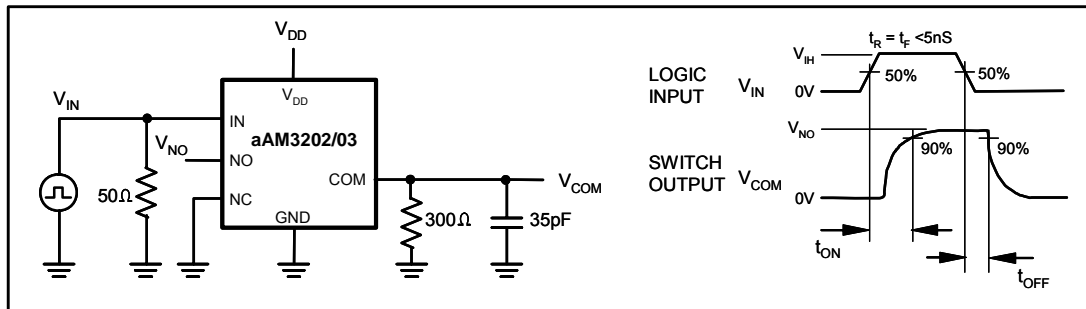
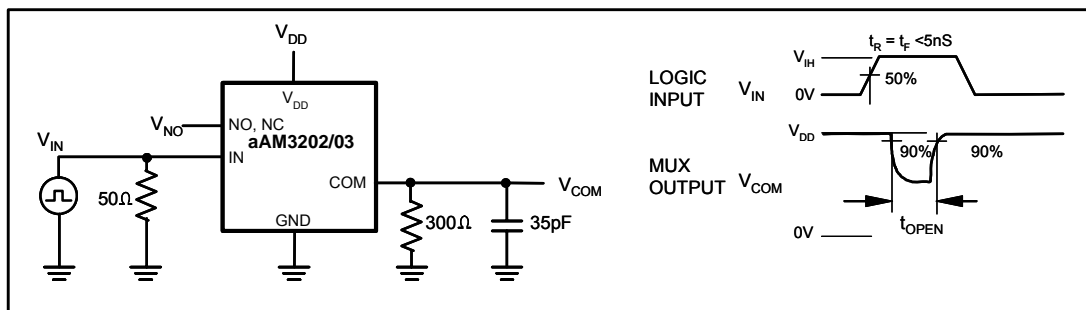


Figure 2. Break-Before-Make Interval

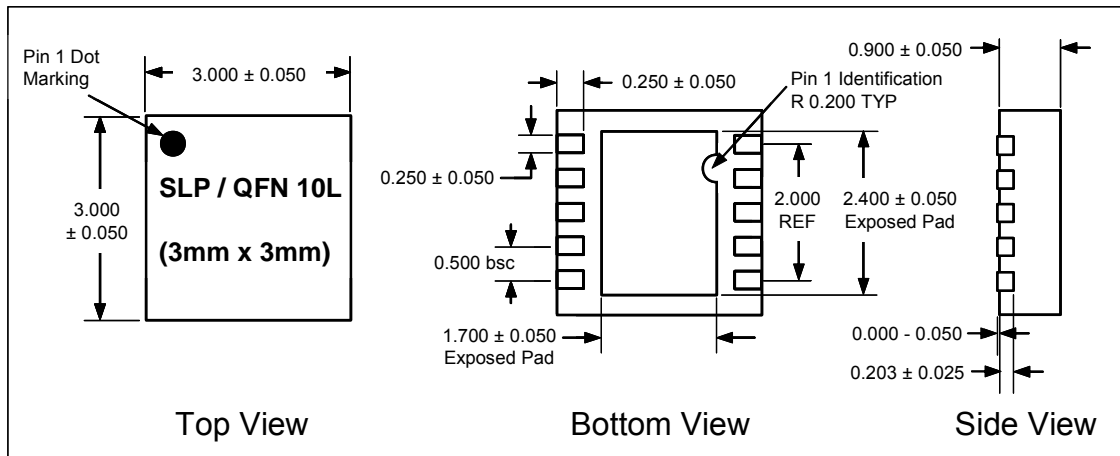


## Truth Table - aAM3202 or aAM3203

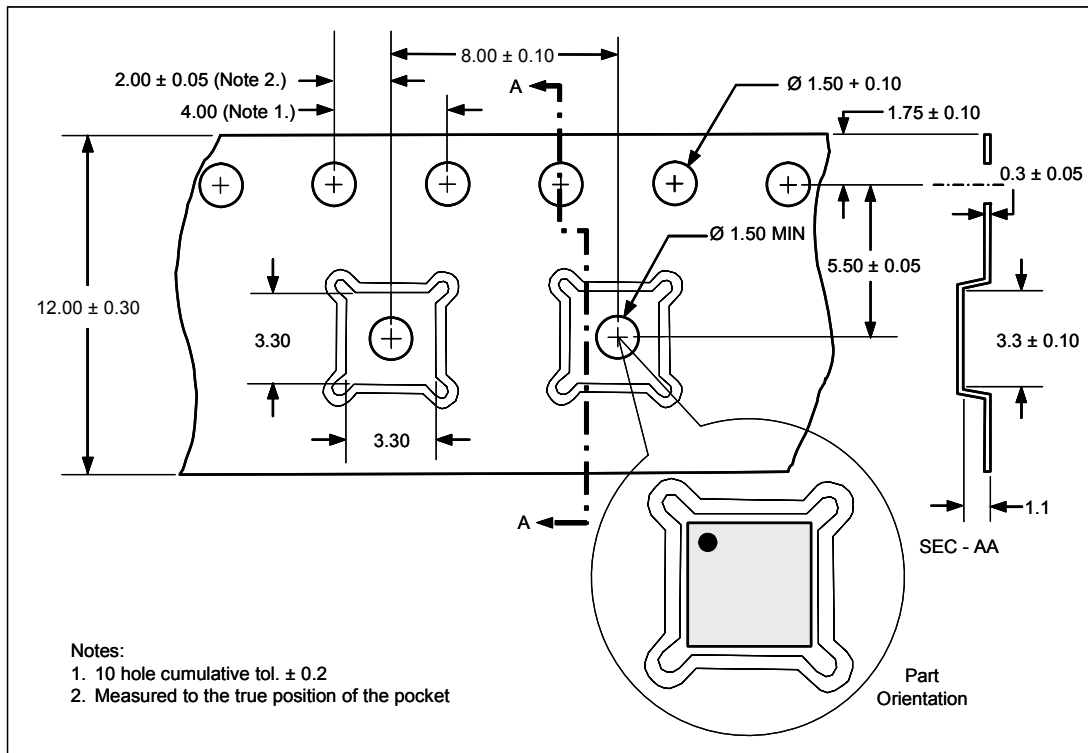
IN1	COM1 Connection	IN2	COM2 Connection
0	NC1	0	NC2
1	NO1	1	NO2

## Packaging Information

This QFN package is lead-free.



## Tape & Reel Dimensions



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