



aAM3104

ULTRA LOW POWER, 4-CHANNEL CMOS ANALOG MULTIPLEXER PRODUCT SPECIFICATION

Preliminary Specification

General Description

The aAM3104 is a precision CMOS analog multiplexer offering low on-resistance of less than 4Ω, with better than 0.4Ω matching between channels and extremely flat resistance over the specified analog input voltage range of less than 1.2Ω. The aAM3104 has very fast enable switching speed of less than 20nS over the full operating temperature range of -40°C to 85°C. The aAM3104 also consumes a minimal amount of power, making them ideal for portable equipment.

The aAM3104 connects 1-of-4 inputs to a common output by control of a 2-bit binary address. An enable pin disconnects all inputs from the output. The part is available in a 10-contact, leadless QFN package and operates over the range from 1.8V to 5.5V.

Features (5V V_{DD})

- Low On-Resistance: 4Ω Max
- Guaranteed On-resistance match between channels, < 0.4Ω
- Guaranteed Flat On-resistance over specified signal range, < 1.2Ω.
- Enable Turn-On time: 14nS at 25°C
- Enable Turn-Off time: 6nS at 25°C
- Transition Time: 14nS at 25°C
- Break before Make Interval: 8nS at 25°C
- Temperature Range: -40°C to 85°C
- Uses a Single Supply: 3V to 5V nominal

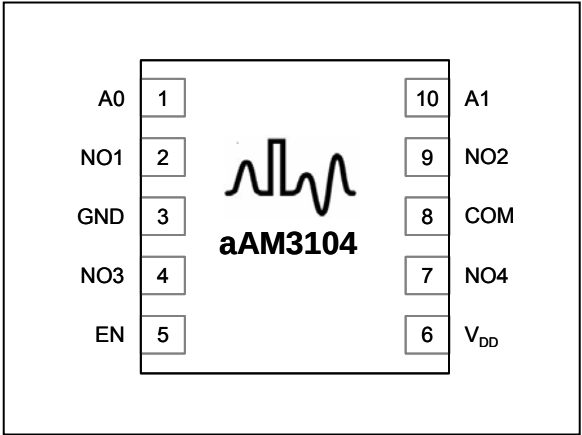
Applications

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

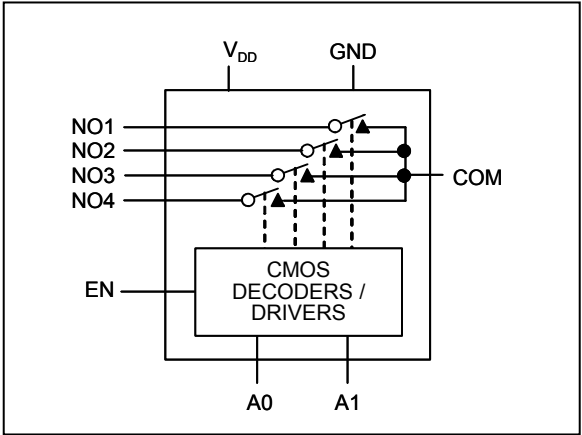
Ordering Information

Part Number	Package	Temperature Range	Part Marking	How Supplied
aAM3104Q10	10-Lead QFN	-40°C to +85°C	aAM3104	3000 units on T&R

Pin Configuration



Functional Diagram



Absolute Maximum Ratings¹

Parameter		Rating
Supply Voltage		+7V
Analog Input/Output Voltage		-0.5V to V _{DD} + 0.5V
Address/EN Input Voltage		-0.5V to V _{DD} + 0.5V
Continuous Current, any terminal		50mA
Storage Temperature Range		-60°C to +150°C
Lead Soldering Temperature		260°C
ESD ²	Human Body Model	2000V
	Machine Model	250V
Thermal Resistance - θ _{JA}		TBD

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 Ω 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	+5.5	V
V_{NO} , V_{COM}	Analog Signal Level	0	V_{DD}	V
T_A	Operating Temperature Range	-40	+85	°C

DC Electrical Characteristics (Digital section)³

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}	$V_{ADD} \& V_{EN} = 0V \text{ or } +5.5V$ $V_{DD} = +5.5V$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$	-0.1 -1.0	0.1 1.0	μA

DC Electrical Characteristics (Analog Section)³

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}	$I_{NO} = -10mA$ $V_{COM} = 0V \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		2	4	Ω
		$V_{DD} = +3V$, $I_{NO} = -10mA$ $V_{COM} = 0V \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		4	7	Ω
ON-Resistance channel matching	ΔR_{ON}	$I_{NO} = -10mA$, $V_{DD} = +4.5V$ $V_{COM} = 0 \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		0.1	0.4	Ω
		$I_{NO} = -10mA$, $V_{DD} = +2.7V$ $V_{COM} = 0 \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		0.1	0.4	Ω
ON-Resistance Flatness	R_{FLAT}	$I_{NO} = -10mA$, $V_{DD} = +5V$ $V_{COM} = 0 \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		0.75	1.2	Ω
		$I_{NO} = -10mA$, $V_{DD} = +3V$ $V_{COM} = 0 \text{ to } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		1.2	3	Ω
Supply Current	I_{DD}	$V_{DD} = +3.3V \text{ or } +5.5V$, $V_{ADD} \& V_{EN} = 0V \text{ or } V_{DD}$ $T_A = +25^{\circ}\text{C}$ $T_A = -40^{\circ}\text{C} \text{ to } +85^{\circ}\text{C}$		0.1	1	μA

Dynamic Electrical Characteristics³

Limits apply for -40°C ≤ T_A ≤ +85°C and V_{DD} = +5.0V unless otherwise noted.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Transition Time	t _{TRANS}	V _{DD} = +5V, V _{NO} = 3V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		12	20	ns
		V _{DD} = +3V, V _{NO} = 2V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		17	24	ns
Break-Before-Make Interval	t _{OPEN}	V _{DD} = +5V, V _{NO} = 3V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C	1	3		ns
		V _{DD} = +3V, V _{NO} = 2V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C	1	3		
Enable Turn-On Time	t _{ON(EN)}	V _{DD} = +5V, V _{NO} = 3V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		10	20	ns
		V _{DD} = +3V, V _{NO} = 2V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		13	24	ns
Enable Turn-Off Time	t _{OFF(EN)}	V _{DD} = +5V, V _{NO} = 3V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		7	13	ns
		V _{DD} = +3V, V _{NO} = 2V C _L = 35pF, R _L = 300Ω	T _A = +25°C T _A = -40°C to +85°C		10	16	ns
Logic Input Cap.	C _{IN}	f = 1MHz	T _A = +25°C, f = 1MHz		8		pF
NO-off-ch Cap.	C _{NO(OFF)}	f = 1MHz; V _{EN} = V _{NO} = 0V	T _A = +25°C, f = 1MHz		8		pF
COM-Off-ch Cap.	C _{COM(OFF)}	V _{EN} = +0.8V; V _{COM} = 0V	T _A = +25°C, f = 1MHz		50		pF
COM-On-ch Cap.	C _{COM(ON)}	V _{EN} = +2.4V; V _{COM} = 0V	T _A = +25°C, f = 1MHz		60		pF

Test Circuits / Timing Diagrams

Figure 1. Enable Switching Time

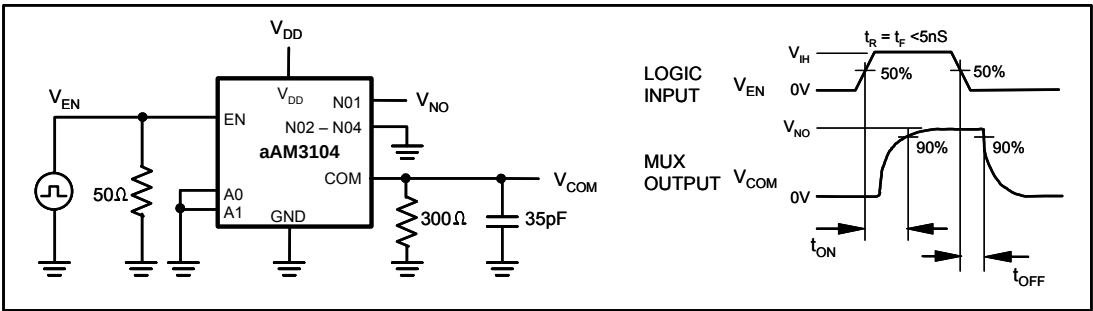
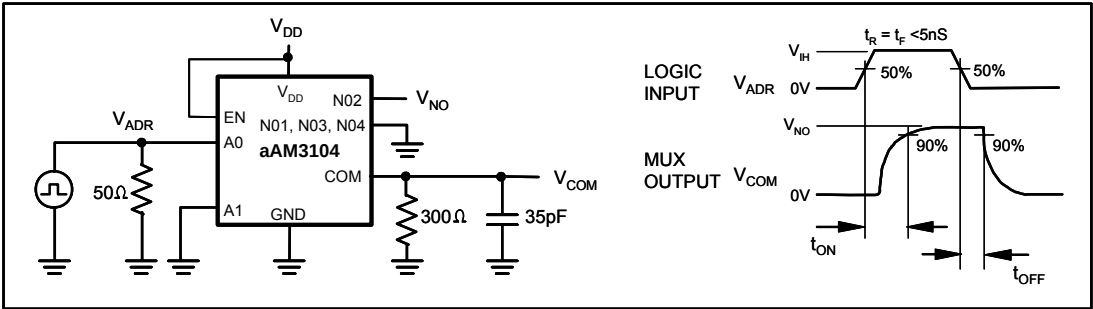
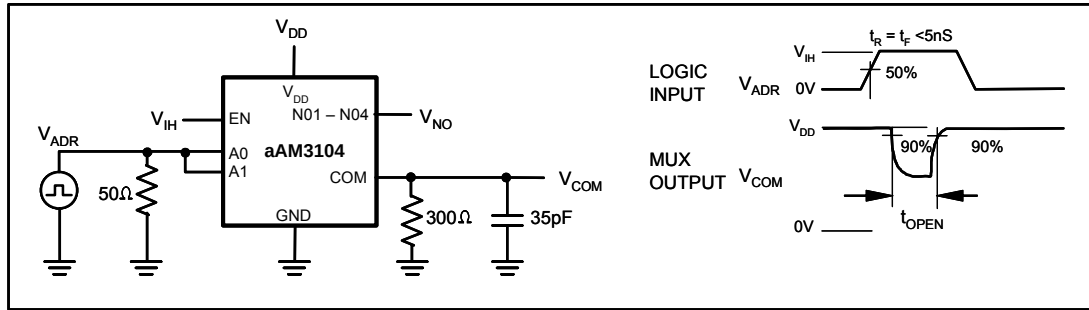


Figure 2. Transition Time



Test Circuits / Timing Diagrams (Cont'd)

Figure 3. Break-Before-Make Time

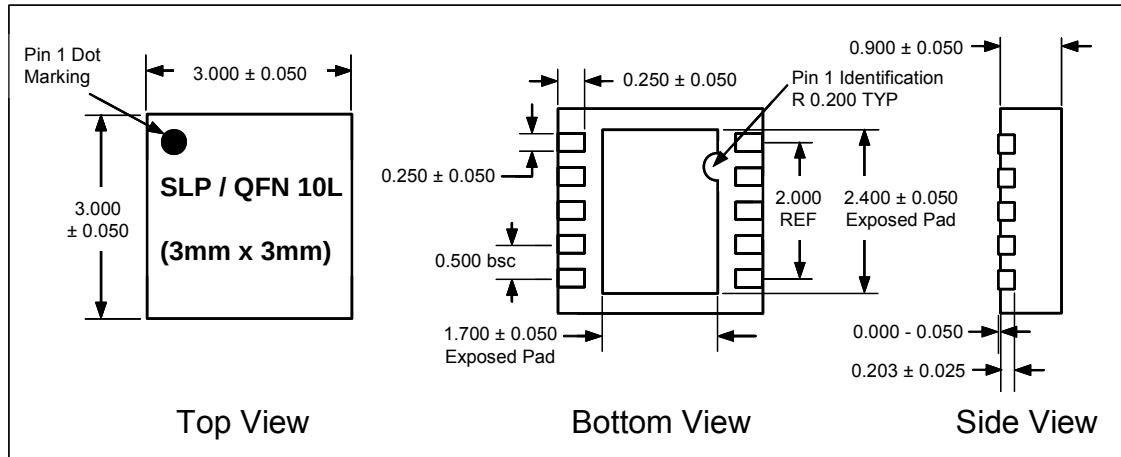


Truth Table

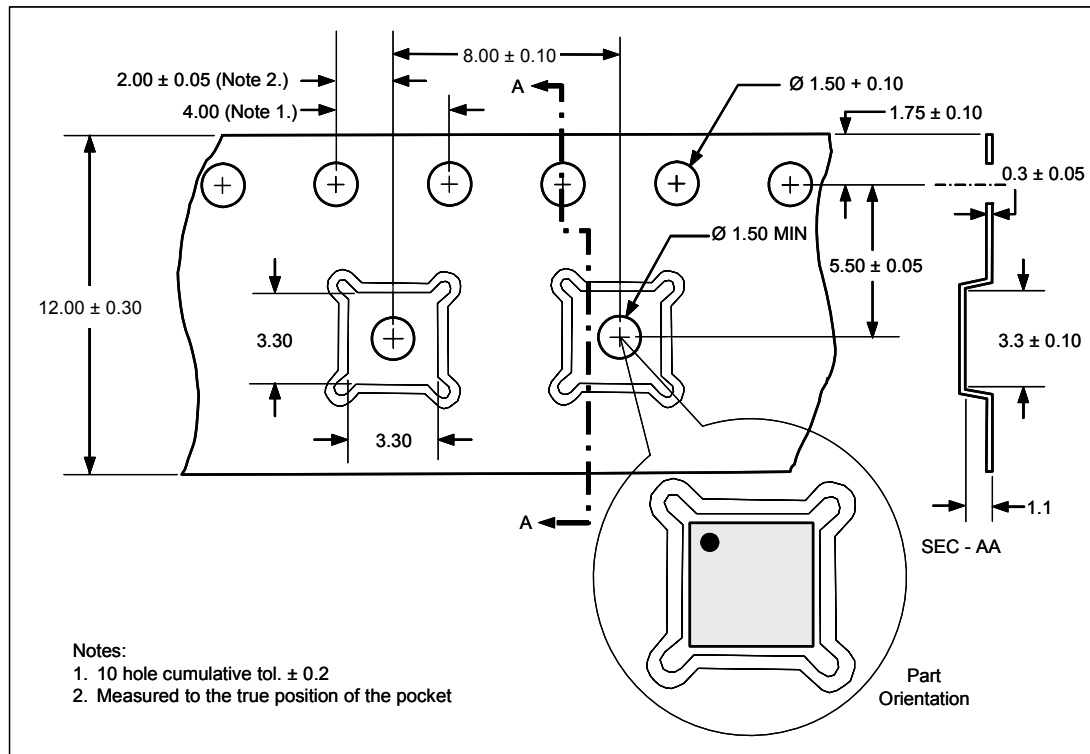
A1	A0	EN	ON Switch
X	X	0	None
0	0	1	1
0	1	1	2
1	0	1	3
1	1	1	4

Logic "0" $V_{IL} \leq 0.8V$, Logic "1" $\geq 2.4V$

QFN-10 Package Dimensions



Tape & Reel Dimensions



Data Sheet Classifications

Preliminary Specification

This classification is shown on the heading of each page of a specification for products that are either under development (design and qualification), or in the formative planning stages. Andigilog reserves the right to change or discontinue these products without notice.

New Release Specification

This classification is shown on the heading of the first page only of a specification for products that are either under the later stages of development (characterization and qualification), or in the early weeks of release to production. Andigilog reserves the right to change the specification and information for these products without notice.

Fully Released Specification

Fully released datasheets do not contain any classification in the first page header. These documents contain specification on products that are in full production. Andigilog will not change any guaranteed limits without written notice to the customers. Obsolete datasheets that were written prior to January 1, 2001 without any header classification information should be considered as obsolete and non-active specifications, or in the best case as Preliminary Specifications.

LIFE SUPPORT POLICY

ANDIGILOG'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF THE PRESIDENT AND GENERAL COUNSEL OF ANDIGILOG, INC. As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body, or (b) support or sustain life, and whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury to the user.
2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

Andigilog, Inc.
8380 S. Kyrene Rd., Suite 101
Tempe, Arizona 85284-2120
Tel: (480) 940-6200
Fax: (480) 940-4255