



AiP5V331

Low On-Resistance Wideband/Video Dual 4-Channel Multiplexer/Demultiplexer

Product Specification

Specification Revision History:

Version	Date	Description
2019-06-A1	2019-06	New
2021-12-A2	2021-12	Modify Ordering Information
2022-09-A3	2022-09	Modify general description
2023-11-A4	2023-11	Modify ambient temperature to $-40^{\circ}\text{C} \sim +125^{\circ}\text{C}$ and modify Ordering Information



1、 General Description

AiP5V331 is a true bidirectional Dual 4-channel multiplexer/demultiplexer that is recommended for both S-Video or composite video switching applications. The switch can be driven from a current output RAMDAC or voltage output composite video source.

Low On-resistance and wide bandwidth make it ideal for video and other applications. Also this device has exceptionally high current capability which is far greater than most analog switches offered today. A single 5V supply is all that is required for operation.

The AiP5V331 offers a high-performance, low-cost solution to switch between video sources.

Features:

- High-performance, low-cost solution to switch between video sources
- Wide bandwidth: 150MHz
- Low On-Resistance: 3Ω
- Low crosstalk at 10MHz: -58dB
- Ultra-low quiescent power (0.1uA typical)
- Single supply operation: +5.0V
- Fast switching: 10ns
- High-current output: 100mA
- Specified from -40°C to +125°C
- Packaging information: SOP16/SSOP16/TSSOP16

**Ordering Information:****Tube packing specifications:**

Part number	Packaging form	Marking code	Tube quantity	Boxed tube quantity	Boxed quantity	Notes
AiP5V331SA16.TB	SOP16	AiP5V331	50 PCS/tube	200 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP5V331VB16.TB	SSOP16	AiP5V331	100 PCS/tube	100 tube/box	10000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 0.635mm
AiP5V331TA16.TB	TSSOP16	AiP5V331	96 PCS/tube	200 tube/box	19200 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Reel packing specifications:

Part number	Packaging form	Marking code	Reel quantity	Boxed reel quantity	Notes
AiP5V331SA16.TR	SOP16	AiP5V331	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 10.0mm×3.9mm Pin spacing: 1.27mm
AiP5V331VB16.TR	SSOP16	AiP5V331	4000 PCS/reel	8000 PCS/box	Dimensions of plastic enclosure: 4.9mm×3.9mm Pin spacing: 0.635mm
AiP5V331TA16.TR	TSSOP16	AiP5V331	5000 PCS/reel	10000 PCS/box	Dimensions of plastic enclosure: 5.0mm×4.4mm Pin spacing: 0.65mm

Note: If the physical information is inconsistent with the ordering information, please refer to the actual product.



2、Block Diagram And Pin Description

2.1、Block Diagram

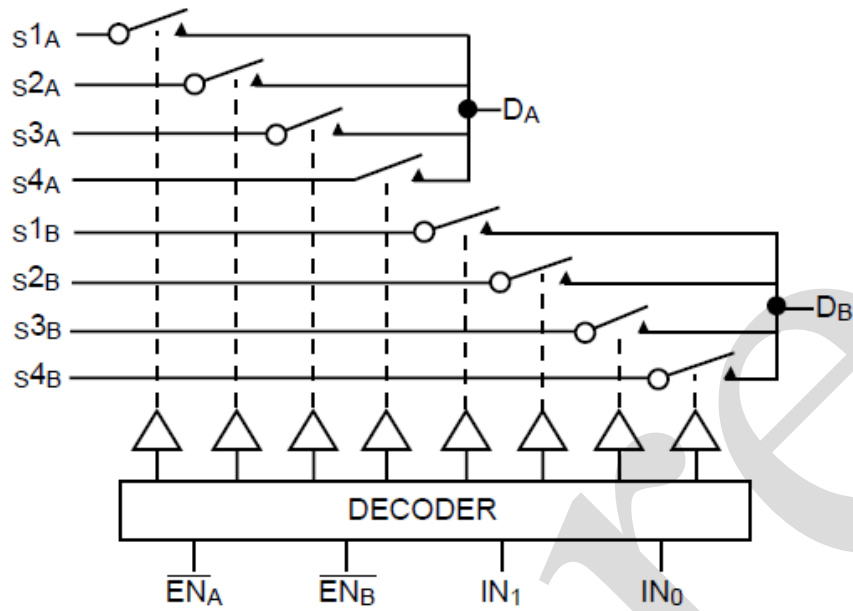
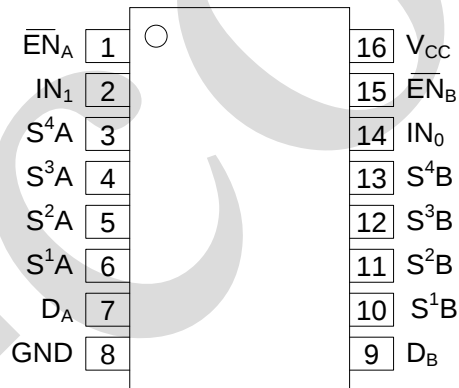


Figure 1. Block diagram

2.2、Pin Configurations





2.3、Pin Description

Pin No.	Pin Name	Description
1	$\overline{\text{EN}}_{\text{A}}$	enable
2	IN_1	select input
3	S^4A	analog video I/O
4	S^3A	analog video I/O
5	S^2A	analog video I/O
6	S^1A	analog video I/O
7	D_{A}	analog video I/O
8	GND	ground (0V)
9	D_{B}	analog video I/O
10	S^1B	analog video I/O
11	S^2B	analog video I/O
12	S^3B	analog video I/O
13	S^4B	analog video I/O
14	IN_0	select input
15	$\overline{\text{EN}}_{\text{B}}$	enable
16	V_{CC}	supply voltage

2.4、Function Table

Input				ON Switch
$\overline{\text{EN}}_{\text{A}}$	$\overline{\text{EN}}_{\text{B}}$	IN_1	IN_0	
H	X	X	X	disable A
X	H	X	X	disable B
L	L	L	L	$\text{S}^1\text{A}-\text{D}_{\text{A}}$, $\text{S}^1\text{B}-\text{D}_{\text{B}}$
L	L	L	H	$\text{S}^2\text{A}-\text{D}_{\text{A}}$, $\text{S}^2\text{B}-\text{D}_{\text{B}}$
L	L	H	L	$\text{S}^3\text{A}-\text{D}_{\text{A}}$, $\text{S}^3\text{B}-\text{D}_{\text{B}}$
L	L	H	H	$\text{S}^4\text{A}-\text{D}_{\text{A}}$, $\text{S}^4\text{B}-\text{D}_{\text{B}}$

Note: H=HIGH voltage level; L=LOW voltage level; X=don't care.



3、Electrical Parameter

3.1、Absolute Maximum Ratings

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Max.	Unit
supply voltage to ground potential	-	inputs and V_{CC} Only	-0.5	+7.0	V
supply voltage to ground potential	-	Outputs and D/O Only	-0.5	+7.0	V
DC Input Voltage	V_{IN}	-	-0.5	+7.0	V
DC Output Current	I_{OUT}	-	-	120	mA
total power dissipation	P_{tot}	-	-	500	mW
storage temperature	T_{stg}	-	-65	+150	°C
Soldering temperature	T_L	10s	260		°C

Note:

[1] For SOP16 packages: above 70°C the value of P_{tot} derates linearly with 8mW/K.

[2] For (T)SSOP16 packages: above 60°C the value of P_{tot} derates linearly with 5.5mW/K.

3.2、Recommended Operating Conditions

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
supply voltage	V_{CC}	-	-	5	-	V
ambient temperature	T_{amb}	-	-40	-	+125	°C

3.3、Electrical Characteristics

3.3.1、DC Characteristics

(T_{amb} =-40°C to +125°C, GND=0V, V_{CC} =5V $\pm$ 5%, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
analog signal range	V_{ANALOG}	-	0	-	2	V
HIGH-level input voltage	V_{IH}	guaranteed logic HIGH level	2.0	-	-	V
LOW-level input voltage	V_{IL}	guaranteed logic LOW level	-0.5	-	0.8	V
input HIGH current	I_{IH}	V_{CC} =Max, V_{IN} = V_{CC}	-	-	± 1	uA
input LOW current	I_{IL}	V_{CC} =Max, V_{IN} =GND	-	-	± 1	uA
analog output leakage current	I_O	$0 \leq S^1, S^2$ or $D \leq V_{CC}$; switch OFF	-	-	± 1	uA
clamp diode voltage	V_{IK}	V_{CC} =Min, I_{IN} =-18mA	-	-0.7	-1.2	V
short circuit current	I_{OS}	$S^1, S^2, D=0V$ or V_{CC}	100	-	-	mA
input hysteresis at control pins	V_{hys}	-	-	150	-	mV
switch ON-resistance	R_{ON}	V_{CC} =Min, V_{OUT} =0.975V; R_L =75 Ω , I_{ON} =13mA	-	3	7	Ω
		V_{CC} =Min, V_{OUT} =1.95V; R_L =75 Ω , I_{ON} =26mA	-	7	10	Ω



Note:

[1] For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device type.

[2] Typical values are at $V_{CC}=5.0V$, $T_{amb}=25^{\circ}C$ ambient and maximum loading.

[3] Not more than one output should be shorted at one time. Duration of the test should not exceed one second.

[4] Measured by the voltage drop between S^1 , S^2 , and D I/O pins at indicated current through the switch. On-Resistance is determined by the lower of the voltages on the S^1 , S^2 , and D I/O pins.

3.3.2、AC Characteristics

($T_{amb}=-40^{\circ}C$ to $+125^{\circ}C$, $GND=0V$, $V_{CC}=5V \pm 5\%$, unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
turn on time	t_{ON}	$R_L=75\Omega$, $C_L=20pF$; see Figure 2	-	2.5	5	ns
turn off time	t_{OFF}	$R_L=75\Omega$, $C_L=20pF$; see Figure 2	-	1.1	5	ns
-3dB Bandwidth	B_W	$R_L=150\Omega$	150	-	-	MHz
crosstalk	X_{TALK}	$R_{IN}=10\Omega$, $R_L=150\Omega$, 10MHz	-	-58	-	dB
differential gain	D_G	$R_L=150\Omega$, $f=3.58MHz$	-	0.64	-	%
differential phase	D_P	$R_L=150\Omega$, $f=3.58MHz$	-	0.27	-	Deg.
input/enable capacitance	C_{IN}	$V_{IN}=0V$, $f=1MHz$	-	-	6	pF
capacitance, switch off	C_{OFF}	$V_{IN}=0V$, $f=1MHz$	-	-	6	pF
capacitance, switch on	C_{ON}	$V_{IN}=0V$, $f=1MHz$	-	-	20	pF
off isolation	O_{IRR}	$R_L=150\Omega$, 10MHz	-	-38	-	dB

Note: This parameter is determined by device characterization but is not production tested.

3.3.3、Power Supply Characteristics

(Voltages are referenced to GND (ground=0V), unless otherwise specified.)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
quiescent power supply current	I_{CC}	$V_{CC}=Max$, $IN=GND$ or V_{CC}	-	0.1	3.0	μA
supply current per input at TTL HIGH	ΔI_{CC}	$V_{CC}=Max$, $IN=3.4V$	-	-	2.5	mA
supply current per input per MHz	I_{CCD}	$V_{CC}=Max$, S^1 , S^2 and D pins open; $\overline{EN}=GND$; control input toggling 50%duty cycle	-	-	0.25	mA/MHz

Note:

[1] For Max. or Min. conditions, use appropriate value specified under Electrical Characteristics for the applicable device.

[2] Typical values are at $V_{CC}=5.0V$, $T_{amb}=25^{\circ}C$ ambient.

[3] Per TTL driven input ($V_{IN}=3.4V$, control inputs only); S^1 , S^2 , and D pins do not contribute to I_{CC} .

[4] This current applies to the control inputs only and represent the current required to switch internal capacitance at the specified frequency. The S^1 , S^2 , and D I/O pins generate no significant AC or DC currents as they transition. This parameter is not tested, but is guaranteed by design.



4、Testing Circuit

4.1、AC Testing Circuit

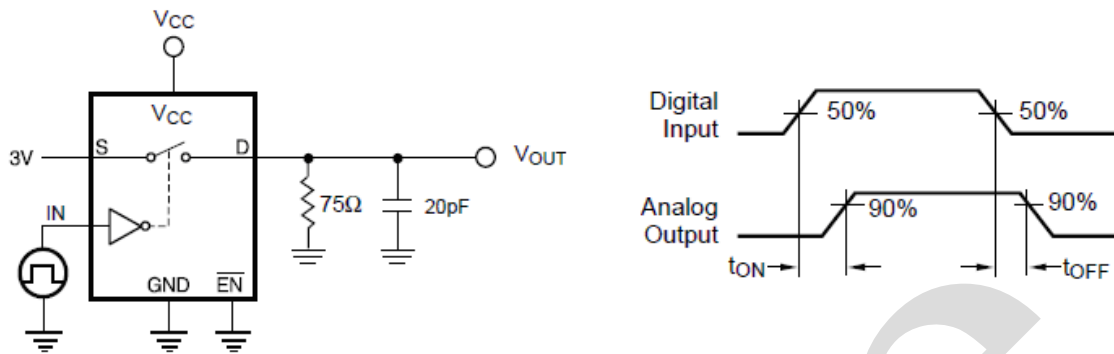
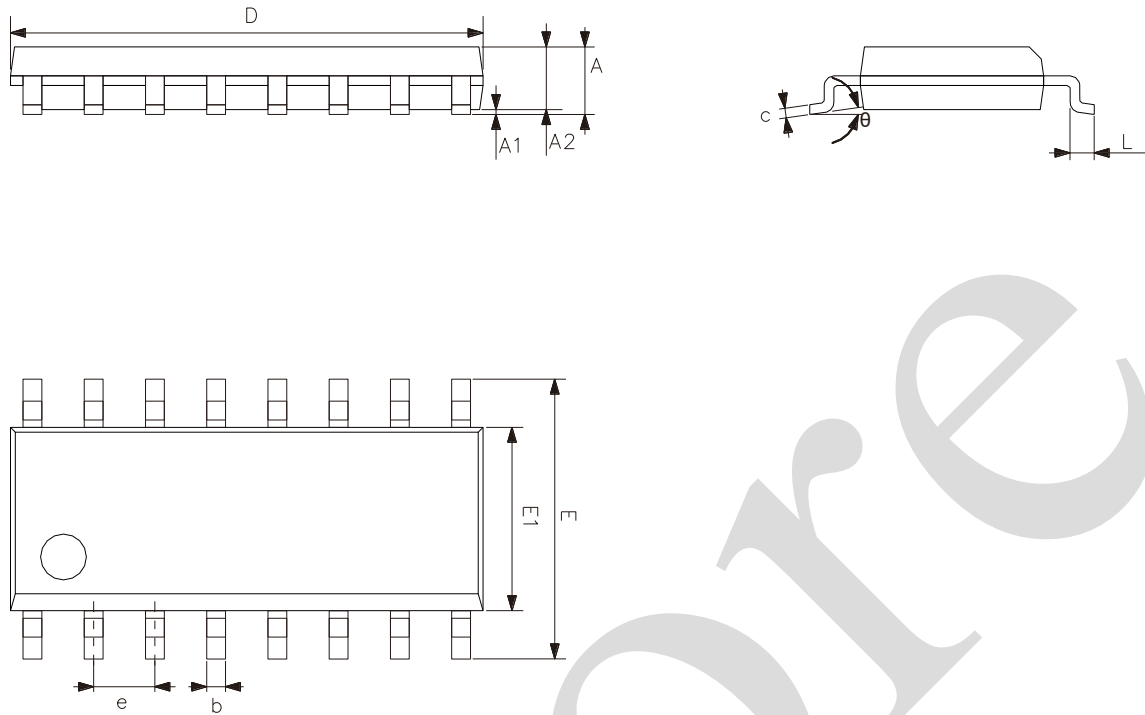


Figure 2. Switching time



5、Package Information

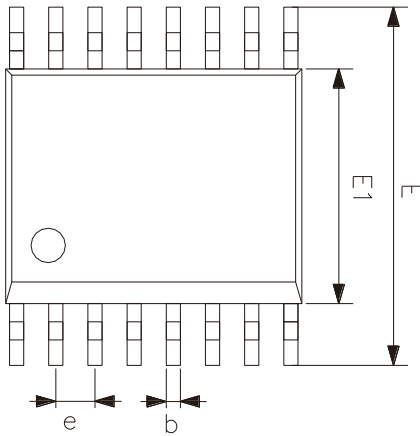
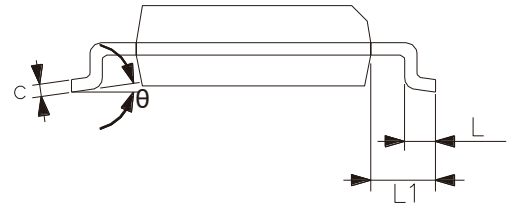
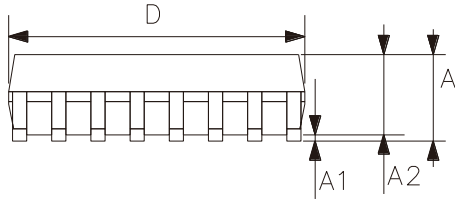
5.1、SOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	1.35	1.80
A1	0.10	0.25
A2	1.25	1.55
b	0.33	0.51
c	0.19	0.25
D	9.50	10.10
E	5.80	6.30
E1	3.70	4.10
e	1.27	
L	0.35	0.89
θ	0°	8°



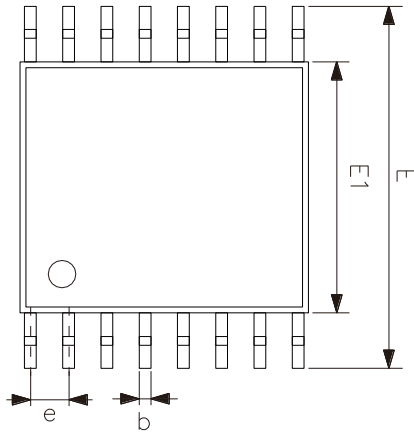
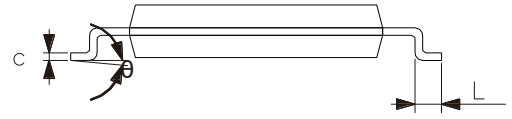
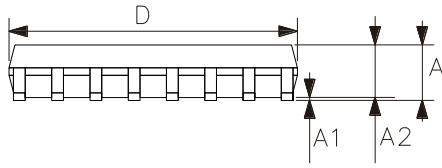
5.2、SSOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	—	1.75
A1	0.02	0.23
A2	1.30	1.50
b	0.23	0.31
c	0.20	0.24
D	4.70	5.10
E	5.80	6.25
E1	3.80	4.02
e	0.635	
L	0.45	0.80
L1	1.05	
θ	0 °	8 °



5.3、TSSOP16



Symbol	Dimensions (mm)	
	Min.	Max.
A	-	1.20
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
c	0.09	0.20
D	4.90	5.10
E1	4.30	4.50
E	6.20	6.60
e	0.65	
L	0.45	0.75
θ	0°	8°



6、Statements And Notes

6.1、The name and content of Hazardous substances or Elements in the product

Part name	Hazardous substances or Elements									
	Lead and lead compounds	Mercury and mercury compounds	Cadmium and cadmium compounds	Hexavalent chromium compounds	Polybrominated biphenyls	Polybrominated biphenyl ethers	Dibutyl phthalate	Butylbenzyl phthalate	Di-2-ethylhexyl phthalate	Diisobutyl phthalate
Lead frame	○	○	○	○	○	○	○	○	○	○
Plastic resin	○	○	○	○	○	○	○	○	○	○
Chip	○	○	○	○	○	○	○	○	○	○
The lead	○	○	○	○	○	○	○	○	○	○
Plastic sheet installed	○	○	○	○	○	○	○	○	○	○
explanation	○: Indicates that the content of hazardous substances or elements in the detection limit of the following the SJ/T11363-2006 standard. ×: Indicates that the content of hazardous substances or elements exceeding the SJ/T11363-2006 Standard limit requirements.									

6.2、Notes

Recommended carefully reading this information before the use of this product;

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This information is using to the reference only, the company is not responsible for any loss;

The company is not responsible for the any infringement of the third party patents or other rights of the responsibility.