



CDG706_CDG707

8/16 Channel Multiplexers

Version: Rev 1.0.0 Date: 2025-6-18

Features ■■

- 1.8V to 5.5V single supply
- $\pm 2.5\text{V}$ dual supply
- 2.5Ω on resistance
- 0.5Ω on resistance flatness
- 100 pA leakage currents
- 40 ns switching times
- Single 16-to-1 multiplexer CDG706
- Differential 8-to-1 multiplexer CDG707
- 28-lead TSSOP package
- Low power consumption
- TTL-/CMOS-compatible inputs

Application ■■

- Data acquisition systems
- Communication systems
- Relay replacement
- Audio and video switching
- Battery-powered systems

Description ■■

The CDG706 and CDG707 are low-voltage, CMOS analog multiplexers comprising 16 single channels and eight differential channels, respectively. The CDG706 switches one of 16 inputs(S1–S16) to a common output, D, as determined by the 4-bit binary address lines A0, A1, A2, and A3. The CDG707 switches one of eight differential inputs to a common differential output as determined by the 3-bit binary address lines A0, A1, and A2. An EN input on both devices is used to enable or disable the device. When disabled, all channels are switched OFF.

Low-power consumption and operating supply range of 1.8V to 5.5V make the CDG706 and CDG707 ideal for battery-powered, portable instruments. All channels exhibit break-before-make switching action preventing momentary shorting when switching channels. These devices are also designed to operate from a dual supply of $\pm 2.5\text{V}$.

These multiplexers are designed on an enhanced submicron process that provides low-power dissipation yet gives high switching speed, very low ON resistance, and leakage currents. ON resistance is in the region of a few ohms and is closely matched between switches and very flat over the full signal range. These parts can operate equally well as either multiplexers or demultiplexers and have an input signal range that extends to the supplies. The CDG706 and CDG707 are available in small 28-lead TSSOP packages.

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Pin Configurations

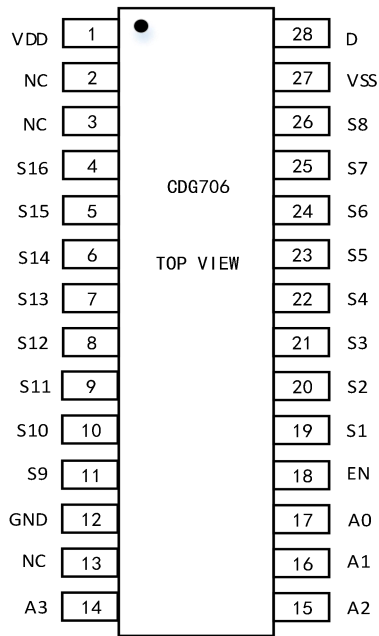


Figure 1.CDG706 Pin Configuration

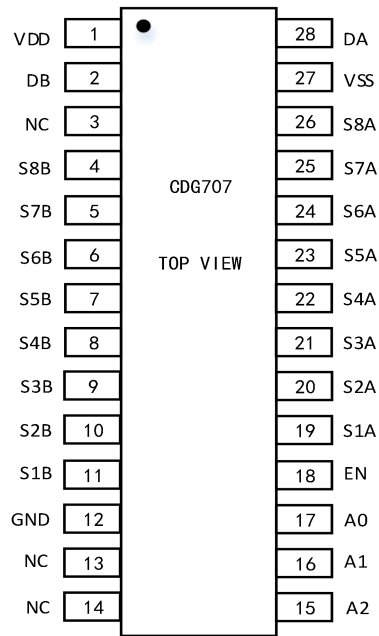


Figure 2.CDG707 Pin Configuration

CDG706 Truth Table

A3	A2	A1	A0	EN	ON Switch
X	X	X	X	0	None
0	0	0	0	1	1
0	0	0	1	1	2
0	0	1	0	1	3
0	0	1	1	1	4
0	1	0	0	1	5
0	1	0	1	1	6
0	1	1	0	1	7
0	1	1	1	1	8
1	0	0	0	1	9
1	0	0	1	1	10
1	0	1	0	1	11
1	0	1	1	1	12
1	1	0	0	1	13
1	1	0	1	1	14
1	1	1	0	1	15
1	1	1	1	1	16

CDG707 Truth Table

A2	A1	A0	EN	ON Switch Pair
X	X	X	0	None
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8

X=Don not care

Functional Block diagram

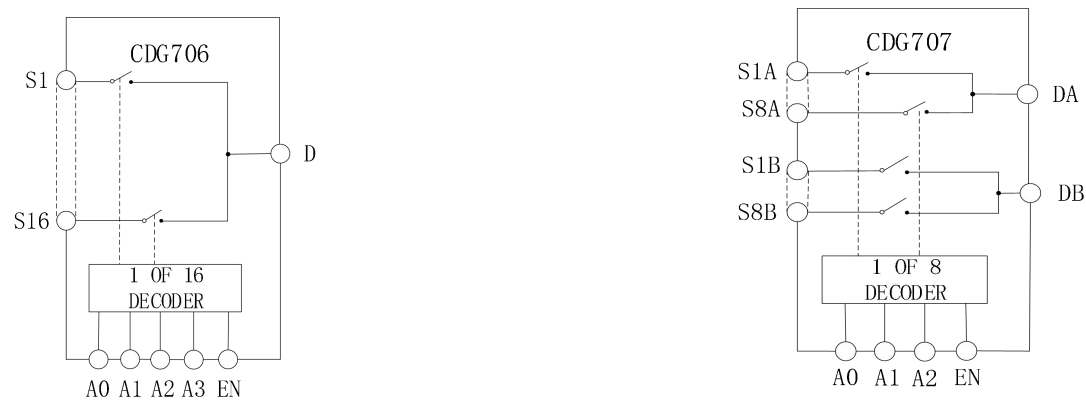


Figure 3.CDG706/CDG707Functional Block Diagrams

CDG706 Truth Table

A3	A2	A1	A0	EN	ON Switch
X	X	X	X	0	None
0	0	0	0	1	1
0	0	0	1	1	2
0	0	1	0	1	3
0	0	1	1	1	4
0	1	0	0	1	5
0	1	0	1	1	6
0	1	1	0	1	7
0	1	1	1	1	8
1	0	0	0	1	9
1	0	0	1	1	10

1	0	1	0	1	11
1	0	1	1	1	12
1	1	0	0	1	13
1	1	0	1	1	14
1	1	1	0	1	15
1	1	1	1	1	16

CDG707 Truth Table

A2	A1	A0	EN	ON Switch Pair
X	X	X	0	None
0	0	0	1	1
0	0	1	1	2
0	1	0	1	3
0	1	1	1	4
1	0	0	1	5
1	0	1	1	6
1	1	0	1	7
1	1	1	1	8

X=Don not care

Absolute Maximum Ratings

Parameter	Rating
V _{DD} to GND	−0.3 V to +7 V
Analog, Digital Inputs1	−0.3 V to V _{DD} + 0.3 V or 30 mA, whichever occurs first
Peak Current, S or D	100 mA
Continuous Current, S or D	30mA
Operating Temperature Range	−40°C to +85°C
Storage Temperature Range	−65°C to +150°C
Junction Temperature	150°C
TSSOP Package, Power Dissipation	
θ _{JA} Thermal Impedance	97.9°C/W
θ _{JC} Thermal Impedance	14°C/W
Lead Temperature, Soldering Vapor Phase(60 sec)	300°C
IR Reflow, Peak Temperature (<20sec)	220°C

Electrical Characteristics

($V_{DD} = 5\text{ V} \pm 10\%$, $V_{SS} = 0\text{ V}$, $GND = 0\text{ V}$, $+25^\circ\text{C}$, unless otherwise noted.)

PARAMETER	COND IT ION	CDG706, CDG707			
		MIN	TYP	MAX	UNIT
Analog Switch					
Analog Signal Range		0		V _{DD}	V
On Resistance (Ron)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	2.5	4.5	Ω
On Resistance Match Between Channels (ΔRon)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	--	--	Ω
On Resistance Flatness(RFLAT (ON))		--	0.5	--	Ω
Leakage Currents					
Source Off Leakage, I _S (Off)	V _{DD} =5.5V, V _D = 4.5 V/1 V, V _S = 1 V/4.5 V	--	±0.01	±0.1	nA
Drain Off Leakage, I _D (Off)-CDG706	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V	--	±0.01	±0.4	nA
Drain Off Leakage, I _D (Off)-CDG707		--	±0.01	±0.2	nA
Channel On Leakage, I _D , I _S (On)-CDG706	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V	--	±0.01	±0.4	nA
Channel On Leakage, I _D , I _S (On)-CDG707		--	±0.01	±0.2	nA
Digital Inputs					
Input High Voltage, VINH		2.4	--	--	V
Input Low Voltage, VINL		--	--	0.8	V
Input Current IINL or IINH		--	0.005	--	μA
Digital Input Capacitance, CIN		--	5	--	pF
Dynamic Characteristics					
t _{TRANSITION}	R _L =300 Ω,C _L =35pF,V _{S1} =3V/0V,V _{S16} =0V/3V	--	40	--	ns
Break-Before-Make Time Delay, t _{OPEN}	R _L =300Ω,C _L =35pF	--	30	--	ns
t _{ON} (EN)	R _L =300Ω,C _L =35pF,V _S =3V	--	32	--	ns
t _{OFF} (EN)	R _L =300Ω,C _L =35pF,V _S =3V	--	10	--	ns
Charge Injection	V _S =2.5V,R _S =0Ω,C _L =1nF	--	±5	--	pC
Off Isolation	R _L =50Ω,C _L =5pF,f=10MHz	--	-60	--	dB
	R _L =50Ω,C _L =5pF,f=1MHz	--	-80	--	dB
-3dB Bandwidth					
CDG706	R _L = 50 Ω, C _L = 5 pF	--	25	--	MHz
CDG707	R _L = 50 Ω, C _L = 5 pF	--	36	--	MHz

C_S (OFF)	$f=1\text{MHz}$	--	13	--	pF
C_D (OFF)					
CDG706	$f=1\text{MHz}$	--	180	--	pF
CDG707	$f=1\text{MHz}$	--	90	--	pF
$C_D, C_S(\text{ON})$					
CDG706	$f=1\text{MHz}$	--	200	--	pF
CDG707	$f=1\text{MHz}$	--	100	--	pF
Power Requirements					
I_{DD}	$V_{DD}=5.5\text{V}$, Digital inputs=0V or 5.5V		0.001	1.0	μA

($V_{DD} = 3\text{ V} \pm 10\%$, $V_{SS} = 0\text{ V}$, GND = 0 V, +25°C, unless otherwise noted.)

PARAMETER	CONDIT ION	CDG706, CDG707			
		MIN	TYP	MAX	UNIT
Analog Switch					
Analog Signal Range		0	--	V _{DD}	V
On Resistance (Ron)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	6	11	Ω
On Resistance Match Between Channels (ΔRon)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	--	--	Ω
On Resistance Flatness(RFLAT (ON))		--	--	--	Ω
Leakage Currents					
Source Off Leakage, I _S (Off)	V _{DD} =3.3V,V _D = 1V/3 V, V _S = 3 V/1 V	--	±0.01	±0.1	nA
Drain Off Leakage, I _D (Off)-CDG706	V _D = 1 V/3 V, V _S = 3 V/1 V	--	±0.01	±0.4	nA
Drain Off Leakage, I _D (Off)-CDG707	V _D = 1 V/3 V, V _S = 3 V/1 V	--	±0.01	±0.2	nA
Channel On Leakage, I _D , I _S (On)-CDG706	V _D = V _S = 1 V or 3 V	--	±0.01	±0.4	nA
Channel On Leakage, I _D , I _S (On)-CDG707	V _D = V _S = 1 V or 3 V	--	±0.01	±02	nA
Digital Inputs					
Input High Voltage, VINH		2.0	--	--	V
Input Low Voltage, VINL		--	--	0.8	V
Input Current IINL or IINH		--	0.005	--	μA
Digital Input Capacitance, CIN		--	5	--	pF
Dynamic Characteristics					
t _{TRANSITION}	R _L = 300 Ω,C _L =35pF,V _{S1} =2V/0V,V _{S16} =0V/2V	--	45	--	ns
Break-Before-Make Time Delay, t _{OPEN}	R _L =300Ω,C _L =35pF	--	30	--	ns
t _{ON} (EN)	R _L =300Ω,C _L =35pF,V _S =2V	--	40	--	ns

t _{OFF} (EN)	R _L =300Ω,C _L =35pF,V _S =2V	--	20	--	ns
Charge Injection	V _S =1.5V,R _S =0Ω,C _L =1nF	--	±5	--	pC
Off Isolation	R _L =50Ω,C _L =5pF,f=10MHz	--	-60	--	dB
	R _L =50Ω,C _L =5pF,f=1MHz	--	-80	--	dB
-3dB Bandwidth					
CDG706	R _L = 50 Ω, C _L = 5 pF	--	25	--	MHz
CDG707	R _L = 50 Ω, C _L = 5 pF	--	36	--	MHz
C _S (OFF)	f=1MHz	--	13	--	pF
C _D (OFF)					
CDG706	f=1MHz	--	180	--	pF
CDG707	f=1MHz	--	90	--	pF
C _D ,C _S (ON)					
CDG706	f=1MHz	--	200	--	pF
CDG707	f=1MHz	--	100	--	pF
Power Requirements					
I _{DD}	V _{DD} =3.3V,Digital inputs=0V or 3.3V		0.001	1.0	μA

Typical Characteristics

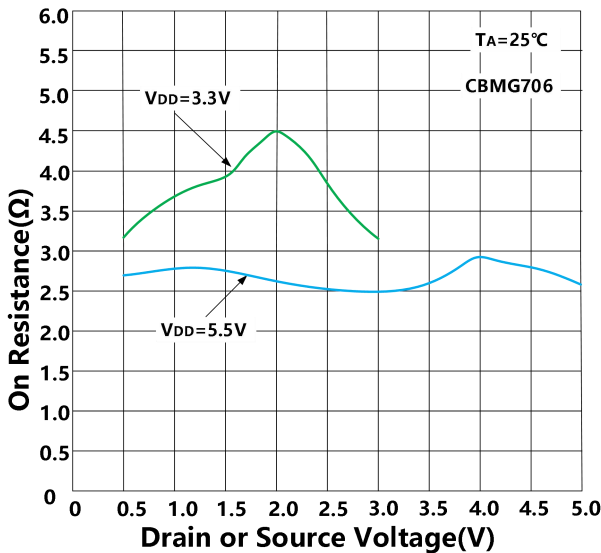


Figure 4. ON Resistance as a Function of VD (VS) for Single Supply (CDG706)

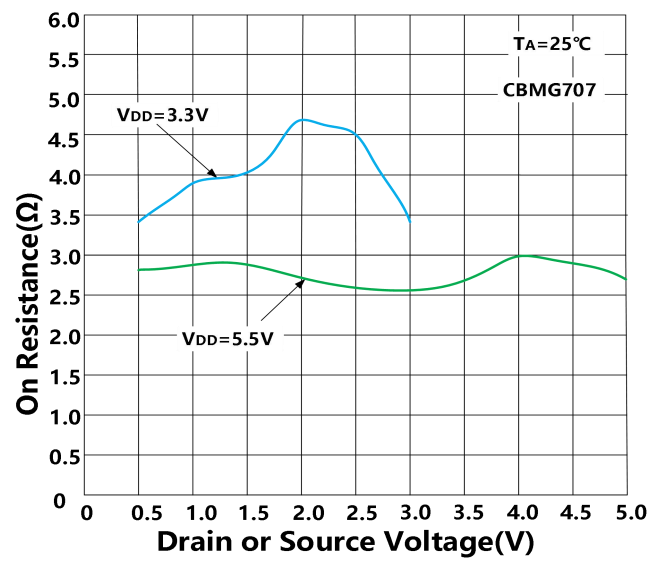


Figure 5. ON Resistance as a Function of VD (VS) for Single Supply (CDG707)

Test Circuit

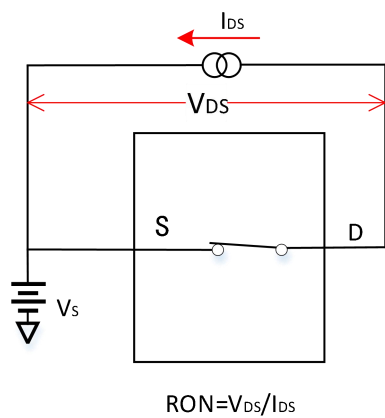


Figure 6. On Resistance

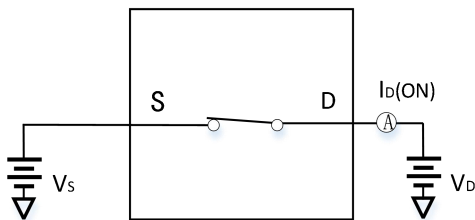


Figure 7. On Leakage

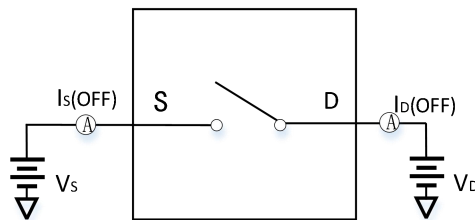


Figure 8. Off Leakage

Package Outline Dimensions

TSSOP-28

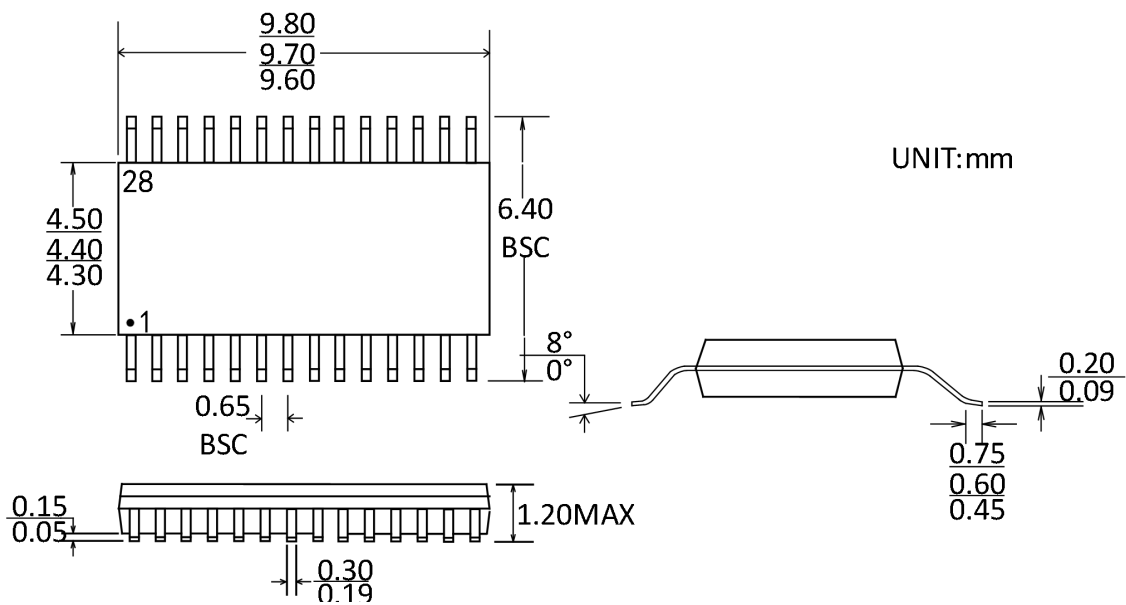


Figure 9. 28-Lead Thin Shrink Small Outline Package [TSSOP]

Package/Ordering Information

MODEL	TEMPERATURE	PACKAGE DESCRIPTION	PACKAGE OPTION
CDG706ATS28	-40°C~85°C	TSSOP-28	Tape and Reel, 2500
CDG706ATS28-RL	-40°C~85°C	TSSOP-28	Tape and Reel, 3000
CDG706ATS28-REEL	-40°C~85°C	TSSOP-28	Tape and Reel, 4000
CDG707ATS28	-40°C~85°C	TSSOP-28	Tape and Reel, 2500
CDG707ATS28-RL	-40°C~85°C	TSSOP-28	Tape and Reel, 3000
CDG707ATS28-REEL	-40°C~85°C	TSSOP-28	Tape and Reel, 4000

Revision Log

Version	Revision date	Change content	Reason for Change	Modified by	Reviewed By	Note
V1.0	2025.6.18	Initial version	Regular update	WW	LYL	