



CDG704

4-Channel Multiplexer

Version: Rev 1.0.0 Date: 2025-6-18

Features ■■

- 1.8V to 5.5V single supply
- 2.5Ω on resistance
- Low On-Resistance Flatness
- -3 dB Bandwidth >200 MHz
- Rail-to-Rail Operation
- 10-Lead MSOP Package
- Fast Switching Times
 t_{ON} 20ns/ t_{OFF} 13ns
- Typical Power Consumption (<0.01 mW)
- TTL/CMOS Compatible

Application ■■

- Battery Powered Systems
- Communication Systems
- Sample-and-Hold Systems
- Audio Signal Routing
- Data Acquisition System
- Video Switching

Description ■■

The CDG704 is a CMOS analog multiplexer, comprising four single channels. This multiplexer is designed on an advanced submicron process that provides low power dissipation yet gives high switching speed, low on resistance, low leakage currents and high bandwidths.

The on resistance profile is very flat over the full analog signal range. This ensures excellent linearity and low distortion when switching audio signals. Fast switching speed also makes the part suitable for video signal switching.

The CDG704 can operate from a single supply range of $+1.8$ V to $+5.5$ V, making it ideal for use in battery powered instruments and with the new generation of DACs and ADCs from Analog Devices.

The CDG704 switches one of four inputs to a common output, D, as determined by the 3-bit binary address lines, A0, A1 and EN. A Logic "0" on the EN pin disables the device.

Each switch of the CDG704 conducts equally well in both directions when ON. The CDG704 exhibits break-before-make switching action.

The CDG704 is available in 10-lead MSOP package.

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Pin Configurations

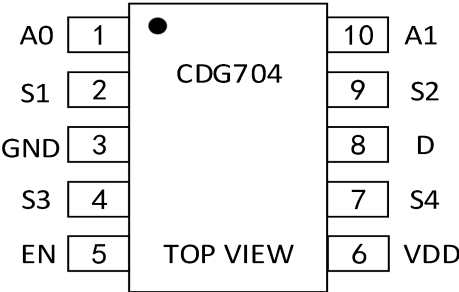


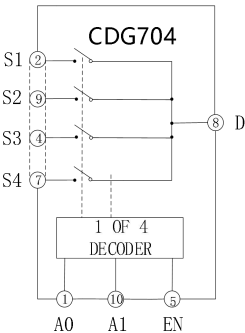
Figure 1.CDG704 Pin Configuration

CDG704 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

X=Don not care

Functional Block diagram



Switches shown for a logic "0" input

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

X=Don not care

Absolute Maximum Ratings

Parameter	Rating
V_{DD} to GND	-0.3 V to +7 V
Analog, Digital Inputs ¹	-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
MSOP Package, Power Dissipation	
θ_{JA} Thermal Impedance	206°C/W
θ_{JC} Thermal Impedance	44°C/W
θ_{JA} Thermal Impedance	206°C/W
Lead Temperature, Soldering Vapor Phase(60 sec)	215°C
IR Reflow, Peak Temperature (<20sec)	220°C

Electrical Characteristics

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

PARAMETER	CONDIT ION	CDG704			
		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	Ω
On Resistance Match Between Channels (ΔRon)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	--	--	Ω
On Resistance Flatness(RFLAT (ON))		--	0.75	--	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)	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V	--	±0.01	±0.1	nA
Channel On Leakage, I _D , I _S (On)	V _D = 4.5 V/1 V, V _S = 1 V/4.5 V	--	±0.01	±0.1	nA
Digital Inputs					

Input High Voltage, VINH		2.4	--	--	V
Input Low Voltage, VINL		--	--	0.8	V
Input Current IINL or IINH		--	0.005	--	μ A
Dynamic Characteristics					
Break-Before-Make Time Delay, t_{OPEN}	$R_L=300\Omega, C_L=35pF$	--	8	--	ns
t_{ON} (EN)	$R_L=300\Omega, C_L=35pF, V_S=3V$	--	14	--	ns
t_{OFF} (EN)	$R_L=300\Omega, C_L=35pF, V_S=3V$	--	6	--	ns
Charge Injection	$V_S=2.5V, R_S=0\Omega, C_L=1nF$	--	3	--	pC
Off Isolation	$R_L=50\Omega, C_L=5pF, f=10MHz$	--	-60	--	dB
	$R_L=50\Omega, C_L=5pF, f=1MHz$	--	-80	--	dB
Channel-to-Channel Crosstalk	$R_L=50\Omega, C_L=5pF, f=10MHz$	--	-62	--	dB
	$R_L=50\Omega, C_L=5pF, f=1MHz$	--	-82	--	dB
-3dB Bandwidth	$R_L=50\Omega, C_L=5pF$	--	200	--	MHz
C_S (OFF)	$f=1MHz$	--	9	--	pF
C_D (OFF)	$f=1MHz$	--	37	--	pF
C_D, C_S (ON)	$f=1MHz$	--	54	--	pF
Power Requirements					
I_{DD}	$V_{DD}=5.5V, \text{Digital inputs}=0V \text{ or } 5.5V$		0.001	1.0	μ A

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

PARAMETER	COND ITION	CDG704			
		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;	--	4.5	8	Ω
On Resistance Match Between Channels (ΔRon)	S = 0 V to V _{DD} , I _{DS} = 10 mA;	--	0.1	--	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)	V _D = 1 V/3 V, V _S = 3 V/1 V	--	±0.01	±0.1	nA
Channel On Leakage, I _D , I _S (On)	V _D = V _S = 1 V or 3 V	--	±0.01	±0.1	nA
Digital Inputs					
Input High Voltage, VINH		2.0	--	--	V
Input Low Voltage, VINL		--	--	0.4	V
Input Current IINL or IINH		--	0.005	--	μA
Dynamic Characteristics					
Break-Before-Make Time Delay, t _{OPEN}	R _L =300Ω,C _L =35pF	--	8	--	ns
t _{ON} (EN)	R _L =300Ω,C _L =35pF,V _S =2V	--	14	--	ns
t _{OFF} (EN)	R _L =300Ω,C _L =35pF,V _S =2V	--	6	--	ns
Charge Injection	V _S =1.5V,R _S =0Ω,C _L =1nF	--	3	--	pC
Off Isolation	R _L =50Ω,C _L =5pF,f=10MHz	--	-60	--	dB
	R _L =50Ω,C _L =5pF,f=1MHz	--	-80	--	dB
Channel-to-Channel Crosstalk	R _L =50Ω,C _L =5pF,f=10MHz	--	-62	--	dB
	R _L =50Ω,C _L =5pF,f=1MHz	--	-82	--	dB
-3dB Bandwidth	R _L = 50 Ω, C _L = 5 pF	--	200	--	MHz
C _S (OFF)	f=1MHz	--	9	--	pF
C _D (OFF)		--	37	--	pF
C _D ,C _S (ON)		--	54	--	pF
Power Requirements					
I _{DD}	V _{DD} =3.3V,Digital inputs=0V or 3.3V		0.001	1.0	μA

Typical Characteristics

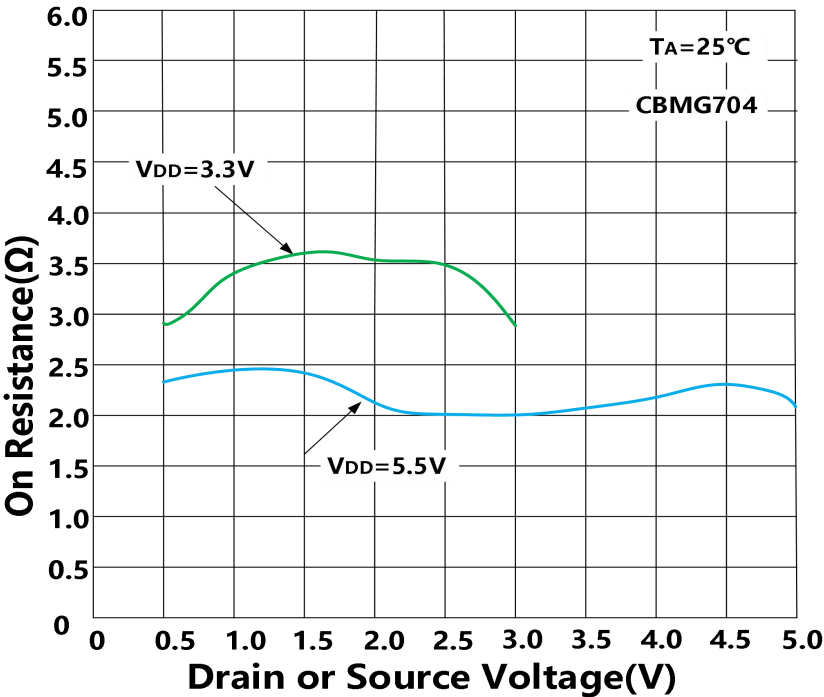


Figure 2. On Resistance as a Function of V_D (V_S) Single Supplies

Test Circuit

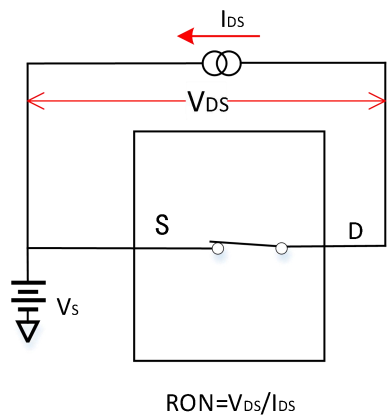


Figure 3. On Resistance

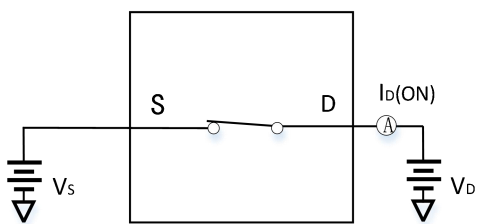


Figure 4. On Leakage

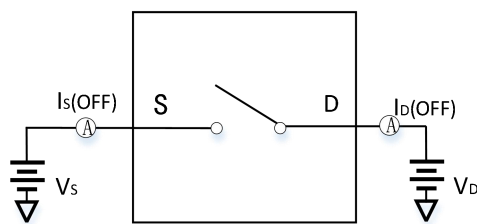


Figure 5. Off Leakage

Package Outline Dimensions

MSOP-10

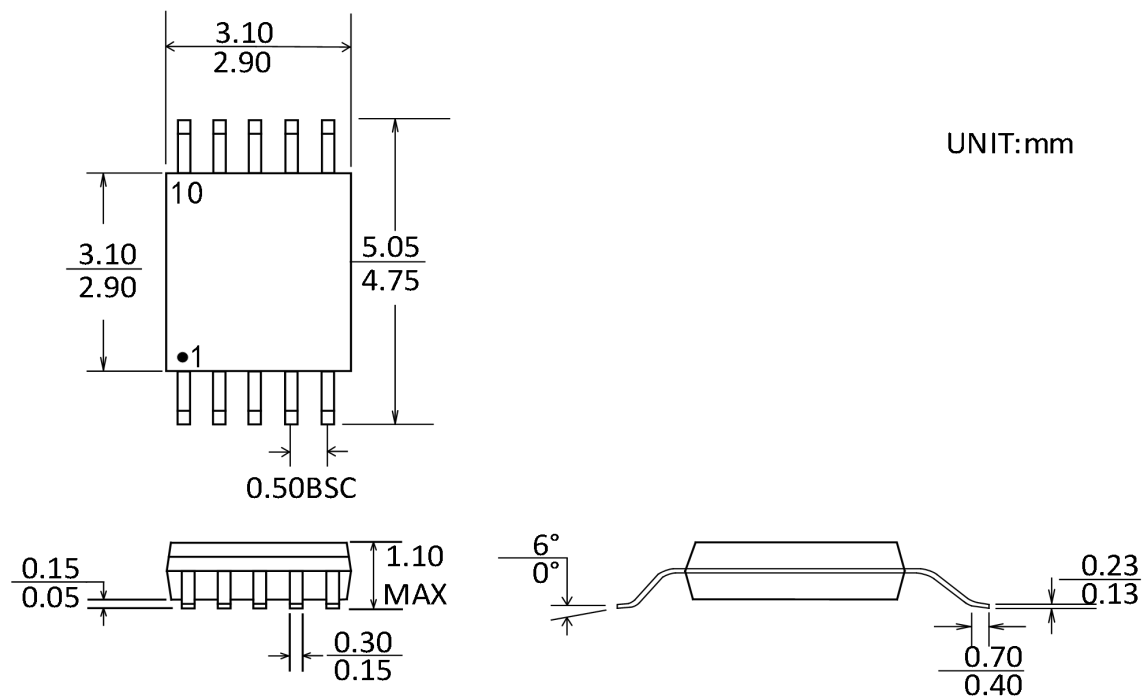


Figure 7. 10-Lead Outline Package [MSOP]

Package/Ordering Information

MODEL	TEMPERATURE	PACKAGE DESCRIPTION	PACKAGE OPTION
CDG704AMS10	-40°C~85°C	MSOP-10	Tape and Reel, 3000

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	