Features

- 1.8 V to 5.5 V single supply
- Low on resistance (3 Ω Max),at VDD=5.5V
- Low on resistance flatness
- −3 dB bandwidth > 200 MHz
- 8-lead MSOP and SOP packages
- Fast switching times: t_{ON} = 20 ns t_{OFF} = 10 ns
- Typical power consumption: (< 0.1 μW)
- TTL/CMOS compatible

Application

- Cell phones
- Video switching
- Sample hold systems
- Audio signal routing
- Communication systems
- Battery-powered systems
- USB 1.1 signal switching circuits
- Mechanical reed relay replacement

Description

The CBMG721, CBMG722, and CBMG723 are monolithic CMOS SPST switches. These switches are designed on an advanced submicron process that provides low power dissipation yet gives high switching speed, low on resistance, and low leakage currents. The devices are packaged in an MSOP, making them ideal for space-constrained applications. The CBMG721, CBMG722, and CBMG723 are designed to operate from a single 1.8 V to 5.5 V supply, making them ideal for use in battery-powered instruments and with the new generation of DACs and ADCs from Corebai.

The CBMG721, CBMG722, and CBMG723 contain two independent single-pole/single-throw (SPST) switches. The CBMG721 and CBMG722 differ only in that both switches are normally open and normally closed, respectively. In the CBMG723, Switch 1 is normally open and Switch 2 is normally closed. Each switch of the CBMG721, CBMG722, and CBMG723 conducts equally well in both directions when on. The CBMG723 exhibits break-before-make switching action.

Catalog

Product Highlights

1. 1.8 V to 5.5 V single-supply operation.
2. Very low R_{ON} (3 Ω max at 5 V, 5 Ω max at 3 V).
3. Low on resistance flatness.
4. −3dB bandwidth >200 MHz.
5. Low power dissipation. CMOS construction ensures low power dissipation.
6. 8-lead MSOP

Pin Configurations

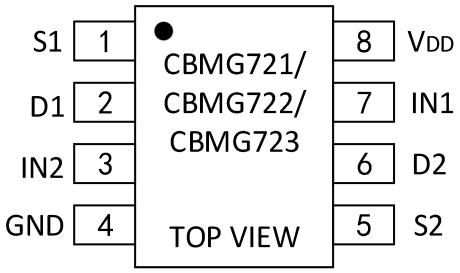


Figure 1. MSOP8 Pin Configuration

Table 1. Pin description

Pin No.	Pin Name	Description
1	S1	Source Pin 1. May be an input or an output.
2	D1	Drain Pin 1. May be an input or an output.
3	IN2	Logic Control Input for Switch S2→D2.
4	GND	Ground (0 V) Reference.
5	S2	Source Pin 2. May be an input or an output.
6	D2	Drain Pin 2. May be an input or an output.
7	IN1	Logic Control Input for Switch S1→D1.
8	V_{DD}	Positive Power Supply Input.

Functional Block diagram

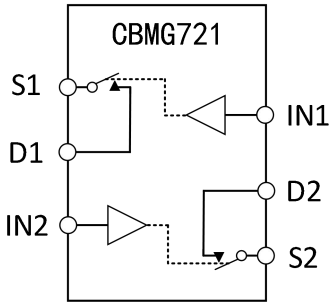


Figure 2. CBMG721

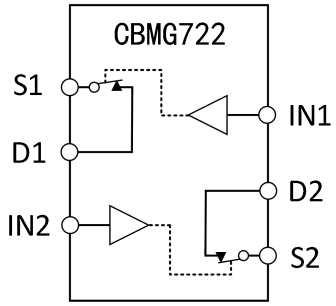


Figure 3. CBMG721

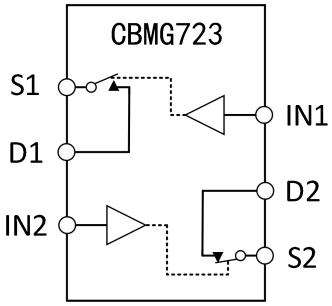


Figure 4. CBMG723

Switches shown for a logic "0" input

Table 2. Truth Table(CBMG721/CBMG722)

CBMG721 In	CBMG722 In	Switch Condition
0	1	OFF
1	0	ON

Table 3. Truth Table(CBMG723)

Logic	Switch 1	Switch 2
0	OFF	ON
1	ON	OFF

Absolute Maximum Ratings (1)

- 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
- 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
- 8-Lead MSOP :
  θ_{JA} Thermal Impedance : 206°C/W
- Lead Temperature, Soldering
  Vapor Phase(60 sec) : 215°C
  Infrared(15 sec) : 220°C
- Soldering (Pb-Free)
  Reflow, Peak Temperature : 260(+0/−5)°C
  Time at Peak Temperature : 10 to 40 sec
- ESD : 2 kV

Electrical Characteristics

VDD = +5 V±10%, GND = 0 V. All specifications −40°C to +85°C, unless otherwise noted.

Table 4.

PARAMETER	+25℃			−40°C to +85°C			Test Conditions	UNIT
	Min	Typ	Max	Min	Typ	Max		
Analog Switch								
Analog Signal Range				0V to V_{DD}				V
On Resistance (R_{ON})	--	2	4	--	--	5	V_S=0V to V_{DD}, I_S=−10mA;See Figure 8	Ω
On Resistance Match Between Channels (ΔR_{ON})	--	0.3	--	--	--	1.0	V_S=0 V to V_{DD}, I_S=−10mA	Ω
On Resistance Flatness (RFLAT(ON))	--	0.5	--	--	--	1.5	V_S=0 V to V_{DD}, I_S=−10mA	Ω
Leakage Currents							V_{DD}=+5.5V	
Source Off Leakage I_S (Off)	--	±0.01	--	--	--	--	V_S=4.5V/1V, V_D=1V/4.5V;See Figure 10	nA
Drain Off Leakage ID (Off)	--	±0.01	--	--	--	--	V_S=4.5V/1V, V_D=1V/4.5V;See Figure 10	nA
Channel On Leakage I_D, I_S (On)	--	±0.01	--	--	--	--	V_S=V_D=1V, or 4.5V;See Figure 9	nA
Digital Inputs								
Input High Voltage, V_{INH}				2.4	--	--		V
Input Low Voltage, V_{INL}				--	--	0.8		V
Input Current IINL or I_{INH}	--	0.005	--	--	--	±0.1	V_{IN}=V_{INL} or V_{INH}	μA
Dynamic Characteristics								
t_{ON}	--	14	--	--	--	20	R_L=300Ω,C_L=35pF,V_S=3V	ns
t_{OFF}	--	6	--	--	--	10	R_L=300Ω,C_L=35pF,V_S=3V	ns
Break-Before-Make Time Delay, t_D (CBMG723 Only)	--	7	--	1	--	--	R_L=300Ω,C_L=35pF,V_{S1}=V_{S2}=3V;	ns
Charge Injection	--	2	--				V_S=2V; R_S=0Ω, C_L=1nF;	pC
Off Isolation	--	-60	--				R_L=50Ω, C_L=5pF, f=10MHz	dB
	--	-80	--				R_L=50Ω, C_L=5pF, f=1MHz	dB

Channel-to-Channel Crosstalk	--	-77	--				R_L=50Ω, C_L=5pF, f=10MHz;	dB
	--	-97	--				R_L=50Ω, C_L=5pF, f=1MHz;	dB
Bandwidth −3 dB	--	200	--				R_L=50Ω, C_L=5pF;	MHz
C_S	--	7	--					pF
C_D	--	7	--					pF
C_D, C_S (On)	--	18	--					pF
Power Requirements								
I_{DD}	--	0.001	--	--	--	1.0	V_{DD}=+5.5V，Digital inputs=0V or 5V	μA

VDD = +3 V±10%, GND = 0 V. All specifications −40°C to +85°C, unless otherwise noted.

Table 5.

PARAMETER	+25℃			−40°C to +85°C			Test Conditions	UNIT
	Min	Typ	Max	Min	Typ	Max		
Analog Switch								
Analog Signal Range				0V to V_{DD}				V
On Resistance (R_{ON})	--	3.5	7	--	--	10	V_S=0V to V_{DD}, I_S=−10mA;See Figure 8	Ω
On Resistance Match Between Channels (ΔR_{ON})	--	0.3	--	--	--	1.0	V_S=0 V to V_{DD}, I_S=−10mA	Ω
On Resistance Flatness (RFLAT(ON))	--	1.5	--	--	--	--	V_S=0 V to V_{DD}, I_S=−10mA	Ω
Leakage Currents							V_{DD}=+3.3V	
Source Off Leakage I_S (Off)	--	±0.01	--	--	--	--	V_S=3V/1V, V_D=1V/3V;See Figure 10	nA
Drain Off Leakage ID (Off)	--	±0.01	--	--	--	--	V_S=3V/1V, V_D=1V/3V;See Figure 10	nA
Channel On Leakage I_D, I_S (On)	--	±0.01	--	--	--	--	V_S=V_D=1V, or 3V;See Figure 9	nA
Digital Inputs								
Input High Voltage, V_{INH}				2.0	--	--		V
Input Low Voltage, V_{INL}				--	--	0.4		V
Input Current IINL or I_{INH}	--	0.005	--	--	--	±0.1	V_{IN}=V_{INL} or V_{INH}	μA

Dynamic Characteristics								
t_{ON}	--	16	--	--	--	24	R_L=300Ω,C_L=35pF,V_S=2V	ns
t_{OFF}	--	7	--	--	--	11	R_L=300Ω,C_L=35pF,V_S=2V	ns
Break-Before-Make Time Delay, t_D (CBMG713 Only)	--	7	--	1	--	--	R_L=300Ω,C_L=35pF,V_{S1}=V_{S2}=2V	ns
Charge Injection	--	2	--				V_S=1.5V; R_S=0Ω, C_L=1nF	pC
Off Isolation	--	-60	--				R_L=50Ω, C_L=5pF, f=10MHz	dB
	--	-80	--				R_L=50Ω, C_L=5pF, f=1MHz	dB
Channel-to-Channel Crosstalk	--	-77	--				R_L=50Ω, C_L=5pF, f=10MHz	dB
	--	-97	--				R_L=50Ω, C_L=5pF, f=1MHz	
Bandwidth −3 dB	--	200	--				R_L=50Ω, C_L=5pF	MHz
C_S	--	7	--					pF
C_D	--	7	--					pF
C_D, C_S (On)	--	18	--					pF
Power Requirements								
I_{DD}	--	0.001	--	--	--	1.0	V_{DD}=+3.3V，Digital inputs=0V or 3V	μA

Typical Characteristics

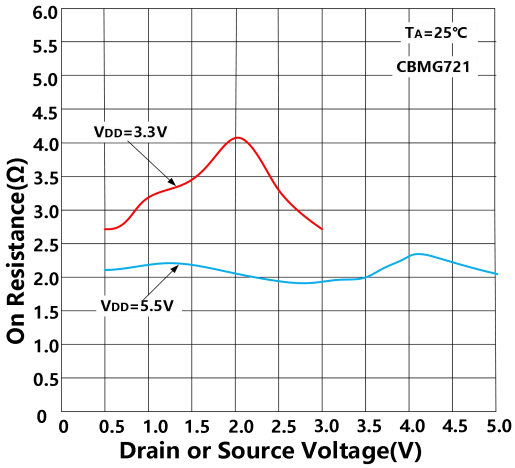


Figure 5.On Resistance vs. V_D (V_S)-(CBMG721)

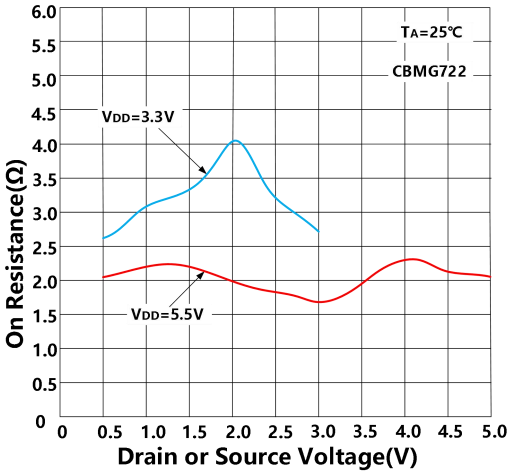


Figure 6.On Resistance vs. V_D (V_S)-(CBMG722)

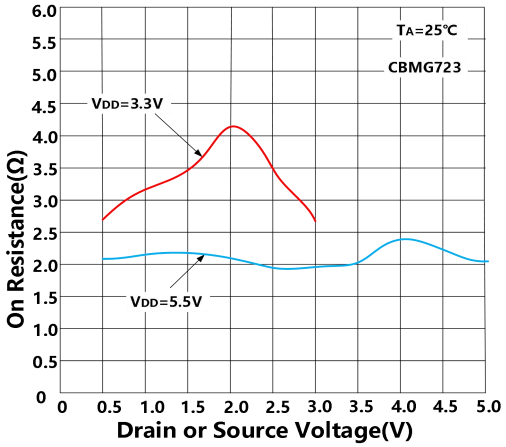
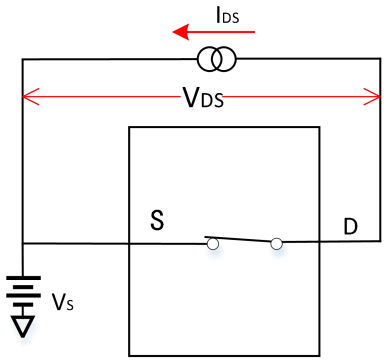


Figure 7.On Resistance vs. V_D (V_S)-(CBMG723)

Test Circuit



RON=V_{DS}/I_{DS}

Figure 8. On Resistance

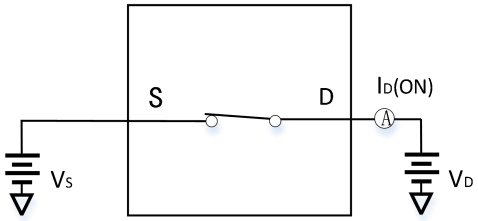


Figure 9. On Leakage

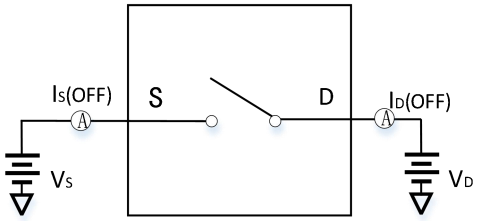


Figure 10. Off Leakage

Package Outline Dimensions

MSOP-8

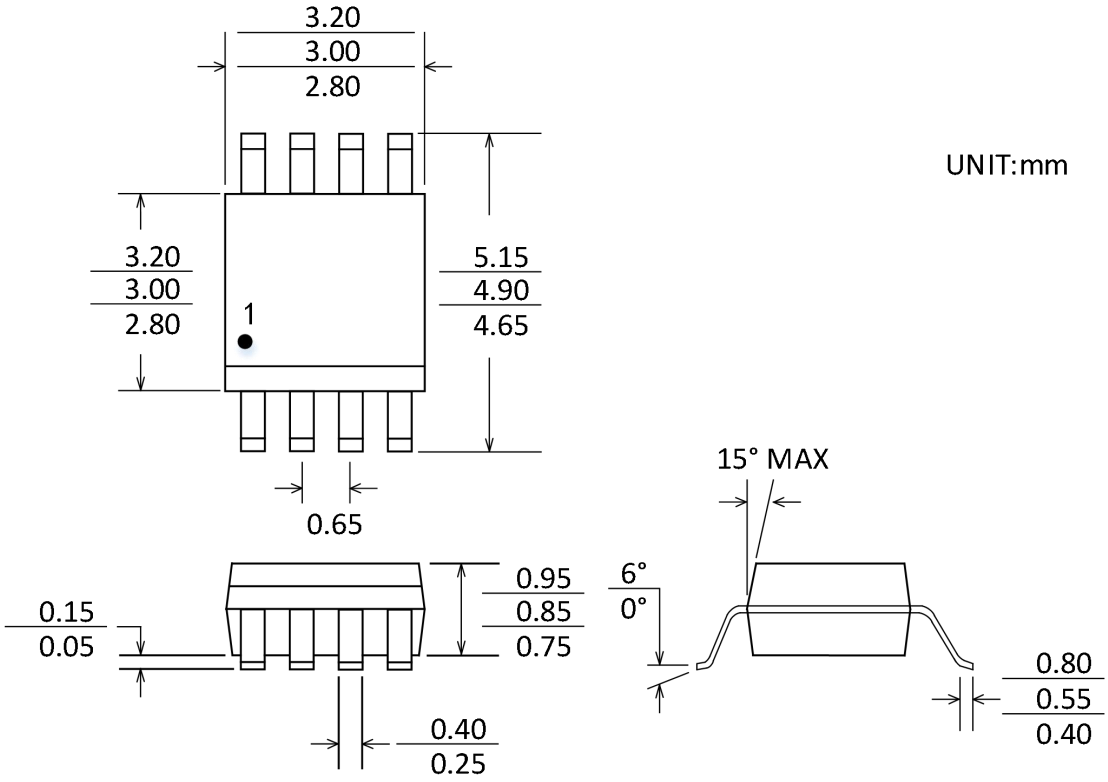


Figure 11. 8-Lead Mini Small Outline Package [MSOP]

Package/Ordering Information

PRODUCT TYPE	OPERATING TEMPERTURE	PACKAGE	PAKEAGE MARKING	NUMBER OF PACKAGES
CBMG721AMS8	-40℃~85℃	MSOP-8		Tape and Reel, 3000
CBMG722AMS8	-40℃~85℃	MSOP-8		Tape and Reel, 3000
CBMG723AMS8	-40℃~85℃	MSOP-8		Tape and Reel, 3000