

Features

- 1.8 V to 5.5 V single supply
- 2.5 Ω (typ) on resistance
- 0.75 Ω (typ) on resistance flatness
- -3 dB bandwidth > 200 MHz
- Rail-to-rail operation
- 8-Lead SOP package
- Fast switching times: $t_{ON} = 12$ ns $t_{OFF} = 6$ ns
- Typical power consumption: (< 0.01 μ W)
- TTL/CMOS compatible

Application

- Battery-powered systems
- Communication systems
- Sample-and-hold systems
- Audio signal routing
- Video switching
- Mechanical reed relay replacement

Description

The CBMG719 is a monolithic CMOS SPDT switch. This switch provides low power dissipation yet gives high switching speed, low on resistance, and low leakage currents. The CBMG719 can operate from a single-supply range of 1.8 V to 5.5 V.

Each switch of the CBMG719 conducts equally well in both directions when on. The CBMG719 exhibits break-before-make switching action. Because of the advanced submicron process, -3 dB bandwidths of greater than 200 MHz can be achieved.

The CBMG719 is available in an 8-lead MSOP package and SOT23-6 package.

Catalog

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Pin Configurations

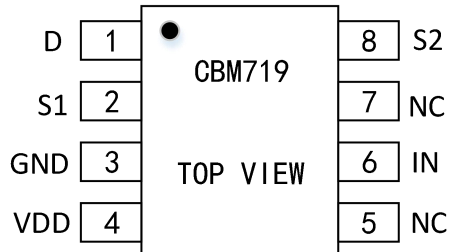


Figure 1. MSOP8 Pin Configuration

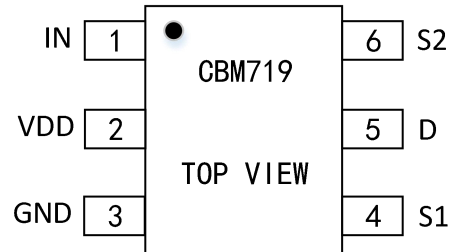


Figure 2. SOT23-6 Pin Configuration

Table 1.Pin Description

Pin No.		Pin Name	Description
MSOP	SOT-23		
1	5	D	Drain Terminal. Can be used as an input or output.
2	4	S1	Source Terminal. Can be used as an input or output.
3	3	GND	Ground 0V.
4	2	VDD	Positive Power Supply.
5	-	NC	Not Internally Connected.
6	1	IN	Digital Switch Control.
7	-	NC	Not Internally Connected.
8	6	S2	Source Terminal. Can be used as an input or output.

Block Diagram

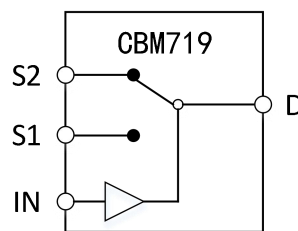


Figure 3. Block Diagram

Table 2.Truth Table

IN	S1	S2
0	ON	OFF
1	OFF	ON

Absolute Maximum Ratings ⁽¹⁾

- GND to V_{DD} : -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 +125°C
- Storage Temperature Range : -65°C to +150°C
- Junction Temperature : 150°C
- MSOP Package, Power Dissipation : 315 mW
- θ_{JA} Thermal Impedance : 206°C/W
- θ_{JC} Thermal Impedance : 44°C/W
- SOT-23 Package, Power Dissipation : 282 mW
- θ_{JA} Thermal Impedance : 229.6°C/W
- θ_{JC} Thermal Impedance : 91.99°C/W
- Lead Temperature, Soldering (10 sec) : 300°C
- IR Reflow, Peak Temperature (<20sec) : 220°C
- Soldering (Pb-Free) Reflow, Peak Temperature : 260(+0/-5)°C
- Time at Peak Temperature : 20 sec to 40 sec
- ESD : 1 kV

Electrical Characteristics

($V_{DD} = 5\text{ V} \pm 10\%$, $GND = 0\text{ V}$, $T_A = 25^\circ\text{C}$.)

Table 3.

PARAMETER	CONDITION	CBMG719			
		MIN	TYP	MAX	UNIT
Analog Switch					
Analog Signal Range					V
On Resistance (R_{ON})	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$; See Figure 7	--	2.5	7	Ω
On Resistance Match Between Channels (ΔR_{ON})	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$	--	0.1	0.4	Ω
On Resistance Flatness (RFLAT(ON))	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$	--	0.75	1.5	Ω
Leakage Currents					
Source Off Leakage I_S (Off)	$V_{DD} = 5.5\text{ V}$; $V_S = 4.5\text{V}/1\text{ V}$, $V_D = 1\text{ V}/4.5\text{ V}$; See Figure 9	--	± 0.01	± 0.25	nA
Channel On Leakage I_D , I_S (On)	$V_S = V_D = 1\text{ V}$ or $V_S = V_D = 4.5\text{ V}$; See Figure 8	--	± 0.01	± 0.25	nA
Digital Inputs					
Input High Voltage, V_{INH}		2.4	--	--	V
Input Low Voltage, V_{INL}		--	--	0.8	V
Input Current I_{INL} or I_{INH}	$V_{IN} = V_{INL}$ or V_{INH}	--	0.005	--	μA
Dynamic Characteristics					
t_{ON}	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_S = 3\text{ V}$;	--	7	12	ns
t_{OFF}	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_S = 3\text{ V}$;	--	3	6	ns
Break-Before-Make Time Delay, t_D	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_{S1} = V_{S2} = 3\text{ V}$;	1	8	--	ns
Off Isolation	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$	--	-67	--	dB
	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$	--	-87	--	dB
Channel-to-Channel Crosstalk	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$	--	-62	--	dB
	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$	--	-68	--	dB
Bandwidth -3 dB	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$;	--	200	--	MHz
C_S (Off)		--	7	--	pF
C_D , C_S (On)		--	27	--	pF

Power Requirements					
I_{DD}	$V_{DD} = 5.5\text{ V}$, Digital inputs = 0 V or 5.5 V	--	0.001	1.0	μA

($V_{DD} = 3\text{ V} \pm 10\%$, GND = 0 V, $T_A = 25^\circ\text{C}$.)

Table 4.

PARAMETER	CONDITION	CBMG719			
		MIN	TYP	MAX	UNIT
Analog Switch					
Analog Signal Range					V
On Resistance (R_{ON})	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$; See Figure 7	--	6	12	Ω
On Resistance Match Between Channels (ΔR_{ON})	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$	--	0.1	0.4	Ω
On Resistance Flatness (RFLAT(ON))	$V_S = 0\text{ V to }V_{DD}$, $I_S = -10\text{ mA}$	--	2.5	--	Ω
Leakage Currents					
Source Off Leakage I_S (Off)	$V_{DD} = 3.3\text{ V}$; $V_S = 3\text{ V}/1\text{ V}$, $V_D = 1\text{ V}/3\text{ V}$; See Figure 9	--	± 0.01	± 0.25	nA
Channel On Leakage I_D , I_S (On)	$V_S = V_D = 1\text{ V}$ or $V_S = V_D = 3\text{ V}$; See Figure 8	--	± 0.01	± 0.25	nA
Digital Inputs					
Input High Voltage, V_{INH}		2.0	--	--	V
Input Low Voltage, V_{INL}		--	--	0.8	V
Input Current I_{INL} or I_{INH}	$V_{IN} = V_{INL}$ or V_{INH}	--	0.005	--	μA
Dynamic Characteristics					
t_{ON}	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_S = 3\text{ V}$;	--	7	12	ns
t_{OFF}	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_S = 3\text{ V}$;	--	3	6	ns
Break-Before-Make Time Delay, t_D	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$, $V_{S1} = V_{S2} = 3\text{ V}$;	1	8	--	ns
Off Isolation	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$	--	-67	--	dB
	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$	--	-87	--	dB
Channel-to-Channel Crosstalk	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 10\text{ MHz}$	--	-62	--	dB
	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$	--	-82	--	dB
Bandwidth -3 dB	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$;	--	200	--	MHz
C_S (Off)		--	7	--	pF

C_D, C_S (On)		--	27	--	pF
Power Requirements					
I_{DD}	$V_{DD} = 3.3\text{ V}$, Digital inputs = 0 V or 3.3 V	--	0.001	1.0	μA

Typical Characteristics

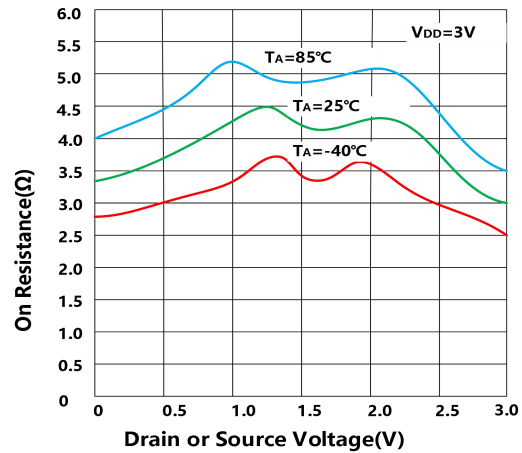
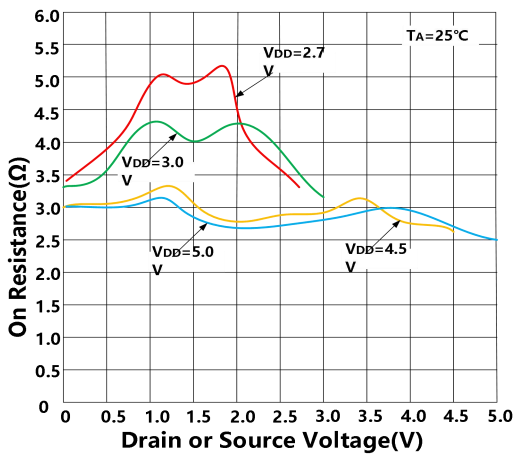


Figure 4. On Resistance vs. V_D (V_S), Single Supplies Figure 5. On Resistance vs. V_D (V_S) for Different Temperatures,
 $V_{DD} = 3\text{ V}$

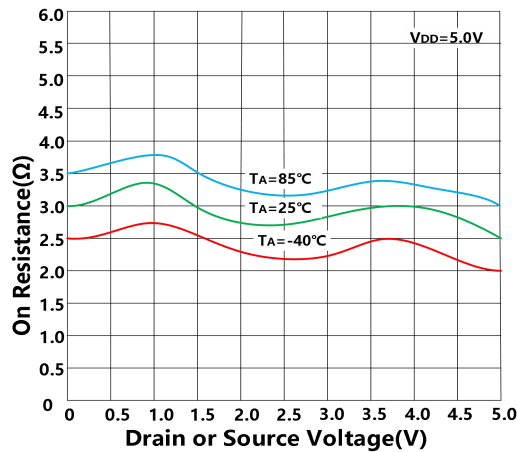


Figure 6. On Resistance vs. V_D (V_S) for Different
Temperatures, $V_{DD} = 5\text{ V}$

Test Circuit

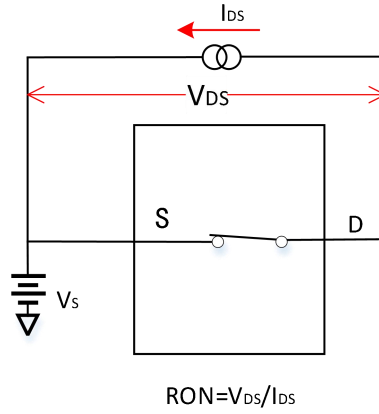


Figure 7. On Resistance

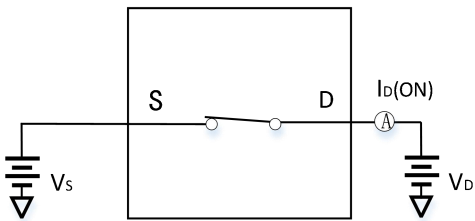


Figure 8. On Leakage

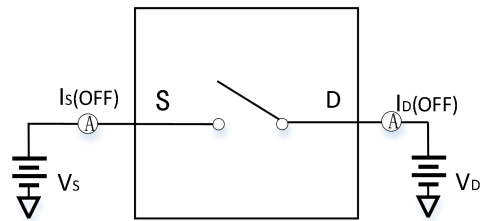


Figure 9. Off Leakage

Package Outline Dimensions

MSOP-8

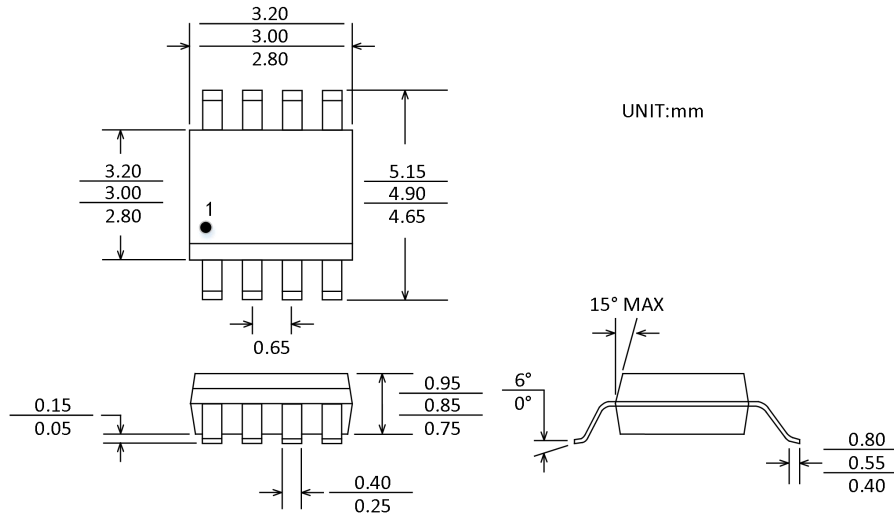


Figure 10. MSOP8 Outline Package

SOT23-6

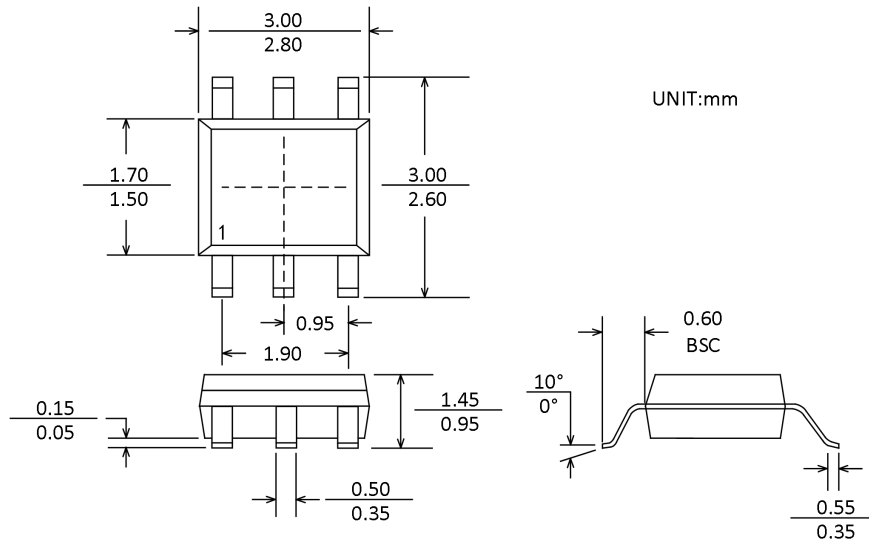


Figure 11. SOT23-6 Outline Package

Package/Ordering Information

PRODUCT TYPE	OPERATING TEMPERATURE	PACKAGE	PACKAGE MARKING	NUMBER OF PACKAGES
CBMG719AMS8	-40°C~125°C	MSOP-8	M719	Tape and Reel, 2500
CBMG719AMS8-RL	-40°C~125°C	MSOP-8	M719	Tape and Reel, 3000
CBMG719AMS8-REEL	-40°C~125°C	MSOP-8	M719	Tape and Reel, 4000
CBMG719AST6	-40°C~125°C	SOT23-6	T719	Tape and Reel, 3000