

## Features

- 1.8 V to 5.5 V single supply
- 2.5  $\Omega$  (typ) on resistance
- 0.75  $\Omega$  (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  $\mu$ 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.

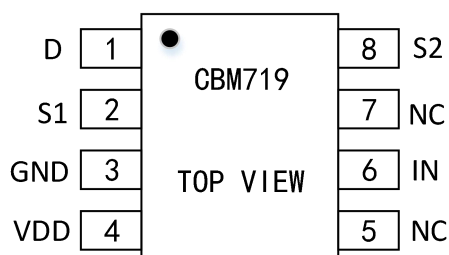
Each switch of the CBMG719 conducts equally well in both directions when on. The CBMG719 exhibits break-before-make switching action. Because of the advanced submicron process, -3 dB bandwidths of greater than 200 MHz can be achieved.

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

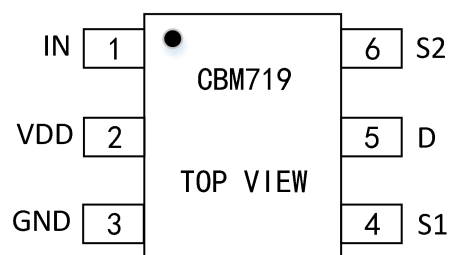
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## Pin Configurations



MSOP8 Pin Configuration

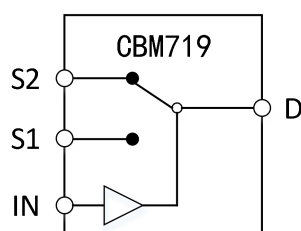


SOT-23 Pin Configuration

### 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



### Truth Table

IN	S1	S2
0	ON	OFF
1	OFF	ON

## Absolute Maximum Ratings <sup>(1)</sup>

- 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
- $\theta_{JA}$  Thermal Impedance : 206°C/W
- $\theta_{JC}$  Thermal Impedance : 44°C/W
- SOT-23 Package, Power Dissipation : 282 mW
- $\theta_{JA}$  Thermal Impedance : 229.6°C/W
- $\theta_{JC}$  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

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

PARAMETER	CONDITION	CBMG719			
		MIN	TYP	MAX	UNIT
<b>Analog Switch</b>					
Analog Signal Range					V
On Resistance ( $R_{ON}$ )	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$ ; See Figure 4	--	2.5	7	$\Omega$
On Resistance Match Between Channels ( $\Delta R_{ON}$ )	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$	--	0.1	0.4	$\Omega$
On Resistance Flatness (RFLAT(ON))	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$	--	0.75	1.5	$\Omega$
<b>Leakage Currents</b>					
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 5	--	$\pm 0.01$	$\pm 0.25$	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 6	--	$\pm 0.01$	$\pm 0.25$	nA
<b>Digital Inputs</b>					
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	--	$\mu\text{A}$
<b>Dynamic Characteristics</b>					
$t_{ON}$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ , $V_S = 3\text{ V}$ ;	--	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
<b>Power Requirements</b>					

$I_{DD}$	$V_{DD} = 5.5\text{ V}$ , Digital inputs = 0 V or 5.5 V	--	0.001	1.0	$\mu\text{A}$
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( $V_{DD} = 3\text{ V} \pm 10\%$ , GND = 0 V,  $T_A = 25^\circ\text{C}$ .)

PARAMETER	CONDITION	CBMG719			
		MIN	TYP	MAX	UNIT
<b>Analog Switch</b>					
Analog Signal Range					V
On Resistance ( $R_{ON}$ )	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$ ; See Figure 4	--	6	12	$\Omega$
On Resistance Match Between Channels ( $\Delta R_{ON}$ )	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$	--	0.1	0.4	$\Omega$
On Resistance Flatness (RFLAT(ON))	$V_S = 0\text{ V to }V_{DD}$ , $I_S = -10\text{ mA}$	--	2.5	--	$\Omega$
<b>Leakage Currents</b>					
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 5	--	$\pm 0.01$	$\pm 0.25$	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 6	--	$\pm 0.01$	$\pm 0.25$	nA
<b>Digital Inputs</b>					
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	--	$\mu\text{A}$
<b>Dynamic Characteristics</b>					
$t_{ON}$	$R_L = 300\ \Omega$ , $C_L = 35\text{ pF}$ , $V_S = 3\text{ V}$ ;	--	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
<b>Power Requirements</b>					
$I_{DD}$	$V_{DD} = 3.3\text{ V}$ , Digital inputs = 0 V or 3.3 V	--	0.001	1.0	$\mu\text{A}$

## Typical Characteristics

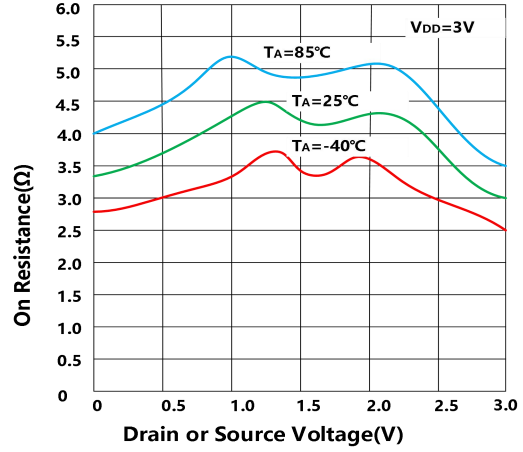
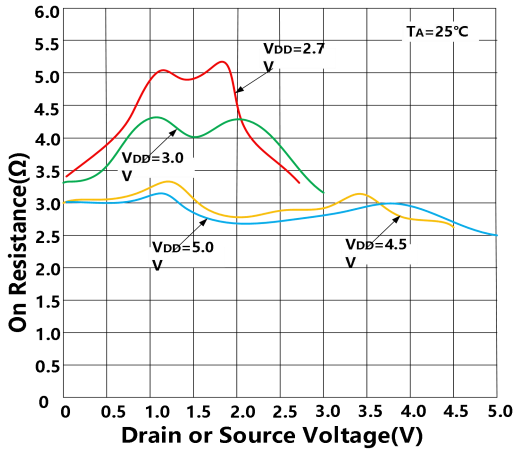


Figure 1. On Resistance vs.  $V_D$  ( $V_S$ ), Single Supplies    Figure 2. On Resistance vs.  $V_D$  ( $V_S$ ) for Different Temperatures,  
 $V_{DD} = 3V$

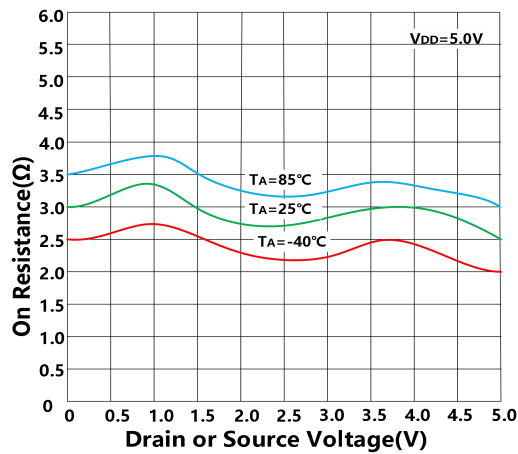


Figure 3. On Resistance vs.  $V_D$  ( $V_S$ ) for Different  
Temperatures,  $V_{DD} = 5V$

## Test Circuit

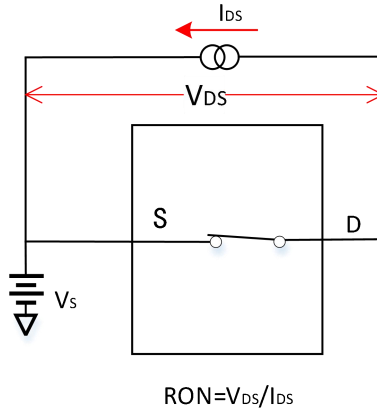


Figure 4. On Resistance

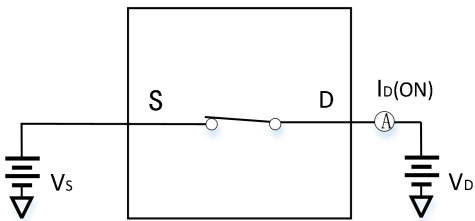


Figure 5. On Leakage

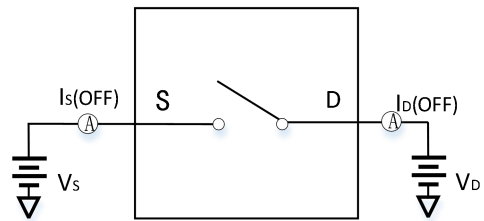
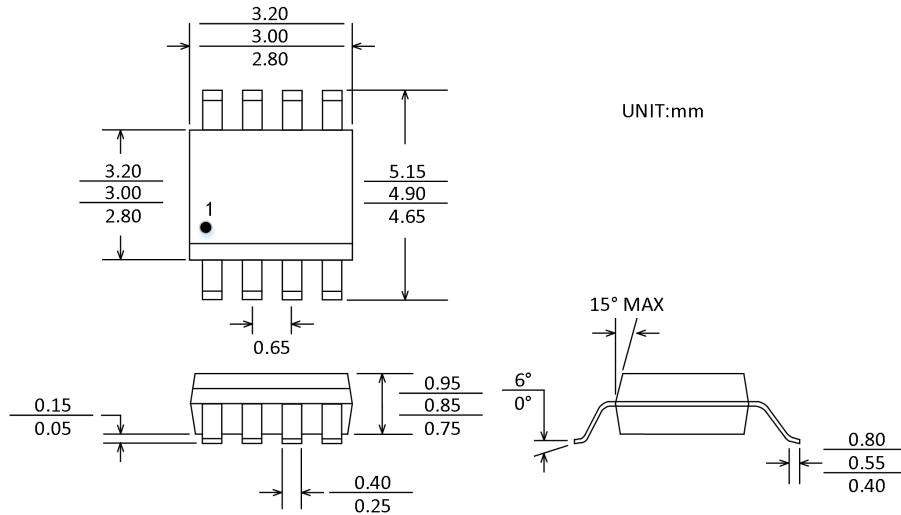


Figure 6. Off Leakage

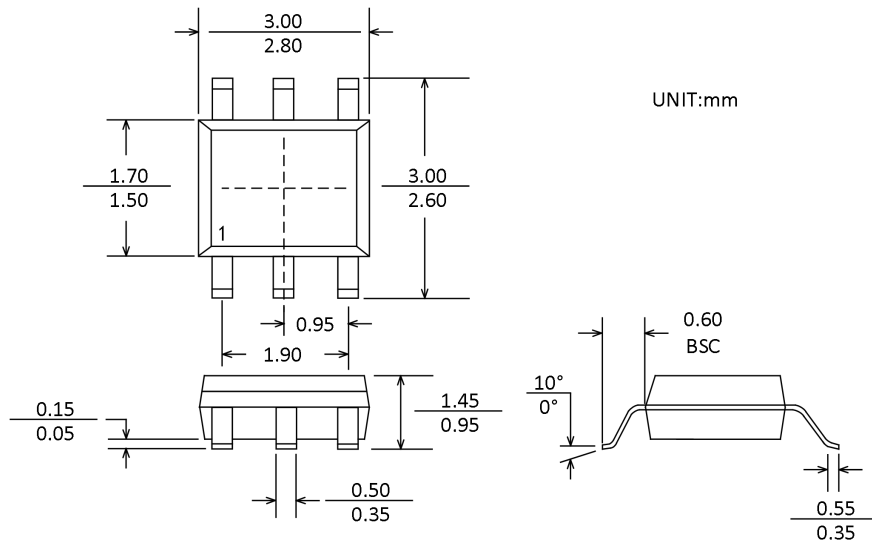


## Package Outline Dimensions

### MSOP-8



### SOT23-6



## Package/Ordering Information

PRODUCT TYPE	OPERATING TEMPERATURE	PACKAGE	PACKAGE MARKING	NUMBER OF PACKAGES
CBMG719AS8	-40°C~125°C	SOP-8	M719	Tape and Reel, 2500
CBMG719AS8-RL	-40°C~125°C	SOP-8	M719	Tape and Reel, 3000
CBMG719AS8-REEL	-40°C~125°C	SOP-8	M719	Tape and Reel, 4000
CBMG719AST5	-40°C~125°C	SOT23-5	T719	Tape and Reel, 3000