

Features

- Low on resistance, 3.3 Ω maximum
- Low on resistance flatness (0.5 Ω Typ)
- Dual ± 2.7 V to ± 5.5 V or single +2.7 V to +5.5 V supplies
- Rail-to-rail operation
- Low power consumption
- TTL/CMOS compatible

Application

- Automatic test equipment
- Power routing
- Communication systems
- Data acquisition systems
- Sample-and-hold systems
- Avionics
- Relay replacement
- Battery-powered systems

Description

The CBMG601 are monolithic, CMOS single-pole single throw (SPST) switches with on resistance typically less than 3.3 Ω . The low on-resistance flatness makes the CBMG601 ideally suited to many applications, particularly those requiring low distortion. These switches are ideal replacements for mechanical relays because they are more reliable, have lower power requirements, and are available in much smaller package sizes. The CBMG601 is a normally open (NO) switch. Each switch conducts equally well in both directions when the device is on, with the input signal range extending to the supply rails. The switches are available in tiny, 6-lead SOT-23; 8-lead MSOP;

Catalog

Features.....	1
Application.....	1
Description.....	1
Catalog.....	2
Revision log.....	3
Product Highlights.....	3
Pin Configurations.....	3
Functional Block Diagram.....	4
Absolute Maximum Ratings ⁽¹⁾	5
Electrical Characteristics.....	6
Typical Characteristics.....	8
Test Circuit.....	9
Package Outline Dimensions.....	10
MSOP-8.....	10
SOT23-6.....	11
Package/Ordering Information.....	12

Revision Log

Version	Revision date	Change content	Reason for Change	Modified by	Reviewed By	Note
V1.0	2025.9.18			WW	LYL	Initial Version

Product Highlights

1. Low on resistance ($2\ \Omega$ typical) On
2. Dual $\pm 2.7\text{ V}$ to $\pm 5.5\text{ V}$ or single $+2.7\text{ V}$ to $+5.5\text{ V}$ supplies
3. Tiny, 6-lead SOT-23; 8-lead MSOP
4. Rail-to-rail input signal range

Pin Configurations

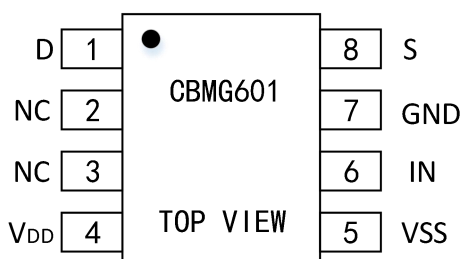


Figure 1. MSOP8 Pin Configuration

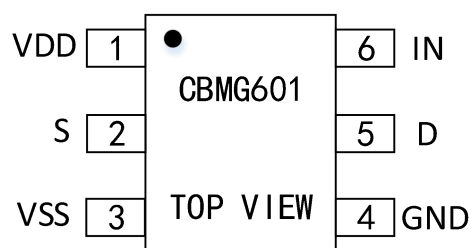


Figure 2. SOT23-6 Pin Configuration

Pin No.		Mnemonic	Description
MSOP-8	SOT23-6		
4	1	VDD	Most Positive Power Supply Potential.
8	2	S	Source Terminal. Can be an input or output.
5	3	VSS	Most Negative Power Supply Potential.
7	4	GND	Ground (0 V) Reference.
1	5	D	Drain Terminal. Can be an input or output.
6	6	IN	Logic Control Input.
2,3	N/A	NC	No Connect.

Functional Block diagram

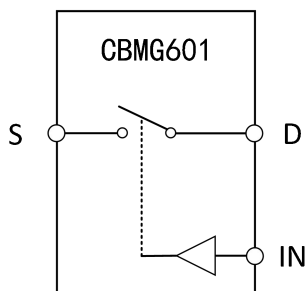


Figure 3.Switches shown for a logic "0" input

Truth Table

CBMG601 In	Switch Condition
0	OFF
1	ON

Absolute Maximum Ratings ⁽¹⁾

- V_{DD} to V_{SS} : 13V
- V_{DD} to GND : -0.3 V to +6.5 V
- V_{SS} to GND : -0.3 V to -6.5 V
- Analog Inputs1 : $V_{SS} - 0.3$ V to $V_{DD} + 0.3$ V
- Digital Inputs1 : -0.3 V to $V_{DD} + 0.3$ V or 30 mA (whichever occurs first)
- Peak Current, S or D : 200 mA(Pulsed at 1 ms, 10% duty cycle maximum)
- Continuous Current, S or D : 100mA
- Operating Temperature Range : -40°C to +85°C
- Storage Temperature Range : -65°C to +150°C
- Junction Temperature : 150°C
- θ_{JA} Thermal Impedance : 206°C/W
- θ_{JC} Thermal Impedance : 44°C/W
- 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: 260°C
- ESD : 2 kV

Electrical Characteristics

VDD = +5 V $\pm$ 10%, GND =VSS= 0 V. All specifications -40°C to +85°C, unless otherwise noted.

Table 3.

PARAMETER	+25°C			−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	5.5	--	--	8	V _{DD} = 4.5 V, V _S = 0 V to 4.5 V, I _{DS} = −10 mA;	Ω
On Resistance Flatness (R _{FLAT} (ON))	--	0.2	--	--	0.2	0.75	V _S = 1.5 V to 3.3 V, I _{DS} = −10 mA	Ω
Leakage Currents V _{DD} =+5.5V								
Source Off Leakage I _S (Off)	--	±0.01	±0.25	--	--	±1	V _S =4.5V/1V, V _D =1V/4.5V;	nA
Drain Off Leakage I _D (Off)	--	±0.01	±0.25	--	--	±1	V _S =4.5V/1V, V _D =1V/4.5V;	nA
Channel On Leakage I _D , I _S (On)	--	±0.01	±0.25	--	--	±1	V _S =V _D =1V, or 4.5V;	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}	--	0.005	--	--	--	±0.1	V _{IN} =V _{INL} or V _{INH}	μA
Dynamic Characteristics								
t _{ON}	--	110	220	--	--	280	R _L =300Ω, C _L =35pF, V _S =3.3V	ns
t _{OFF}	--	50	80	--	--	110	R _L =300Ω, C _L =35pF, V _S =3.3V	ns
Charge Injection	--	20	--	--			V _S =0V; R _S =0Ω, C _L =1nF;	pC
Off Isolation	--	-60	--	--			R _L =50Ω, C _L =5pF, f=10MHz	dB

Bandwidth -3 dB	--	180	--	--			R _L =50Ω, C _L =5pF;	MHz
C _S (OFF)	--	50	--	--			f=1MHz	pF
C _D (OFF)	--	50	--	--			f=1MHz	pF
C _D , C _S (On)	--	38	--	--			f=1MHz	pF
Power Requirements								
I _{DD}	--	0.00 1	--	--	--	1.0	V _{DD} =+5.5V, Digital inputs=0V or 5V	μA

$V_{DD} = 5V \pm 10\%$, $V_{SS} = -5V \pm 10\%$, $GND = 0V$, unless otherwise noted.

Table 4.

PARAMETER	+25°C			−40°C to +85°C			Test Conditions	UNIT
	Min	Typ	Max	Min	Typ	Max		
Analog Switch								
Analog Signal Range				VSS to VDD				V
On Resistance (RON)	--	2	3.3	--	--	5.5	VDD = +4.5 V,VSS=-4.5V VS =±4.5V, IDS = −10 mA;	Ω
On Resistance Flatness (RFLAT(ON))	--	0.2	--	--	0.2	0.75	VS =±3.3V, IDS = −10 mA;	Ω
Leakage Currents VDD=+5.5V, VSS=-5.5V								
Source Off Leakage IS (Off)	--	± 0.01	± 0.25	--	--	±1	VS=+4.5V/-4.5V, VD=-4.5V/+4.5V;	nA
Drain Off Leakage ID (Off)	--	± 0.01	± 0.25	--	--	±1	VD=-4.5V/+4.5V;	nA
Channel On Leakage ID, IS (On)	--	± 0.01	± 0.25	--	--	±1	VS=VD=+4.5V or -4.5V;	nA
Digital Inputs								
Input High Voltage, VINH				2.4	--	--		V
Input Low Voltage, VINL				--	--	0.8		V
Input Current IINL or IINH	--	0.00 5	--	--	--	±0.1	VIN=VINL or VINH	μA
Dynamic Characteristics								
tON	--	80	120	--	--	155	RL=300	ns

							$\Omega, C_L=35\text{pF}, V_S=3.3\text{V}$	
t_{OFF}	--	45	75	--	--	90	$R_L=300$ $\Omega, C_L=35\text{pF}, V_S=3.3\text{V}$	ns
Charge Injection	--	250	--		--		$V_S=0\text{V}; R_S=0\Omega, C_L=1\text{nF};$	pC
Off Isolation	--	-60	--		--		$R_L=50\Omega, C_L=5\text{pF}, f=1\text{MHz}$	dB
Bandwidth -3 dB	--	180	--		--		$R_L=50\Omega, C_L=5\text{pF};$	MHz
C_S (OFF)	--	50	--		--		$f=1\text{MHz}$	pF
C_D (OFF)	--	50	--		--		$f=1\text{MHz}$	pF
C_D, C_S (On)	--	145	--		--		$f=1\text{MHz}$	pF
Power Requirements								
I_{DD}	--	0.00 1	--	--	--	1.0	$V_{\text{DD}}=+5.5\text{V},$ $V_{\text{SS}}=-4.5\text{V},$ Digital inputs=0V or 5V	μA

Typical Characteristics

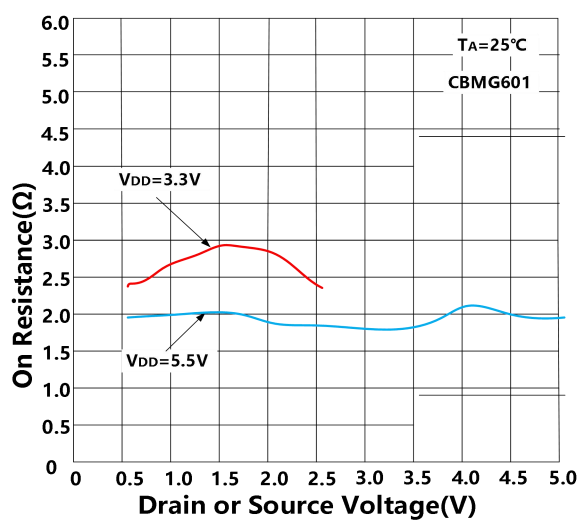


Figure 4. On Resistance vs. V_D (V_S)-(CBMG601)

Test Circuit

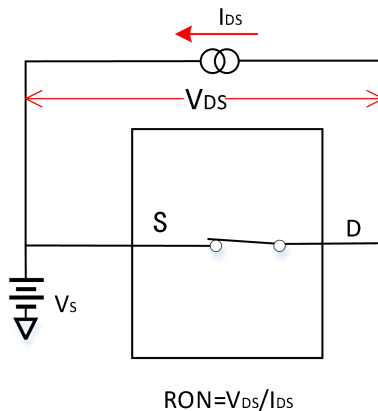


Figure 5. On Resistance

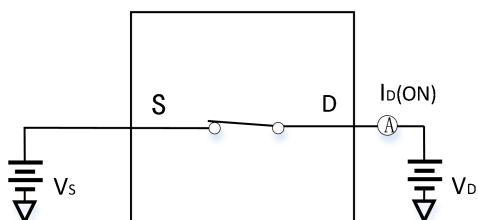


Figure 6. On Leakage

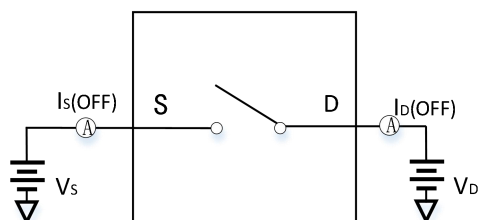


Figure 7. Off Leakage

Package Outline Dimensions

MSOP-8

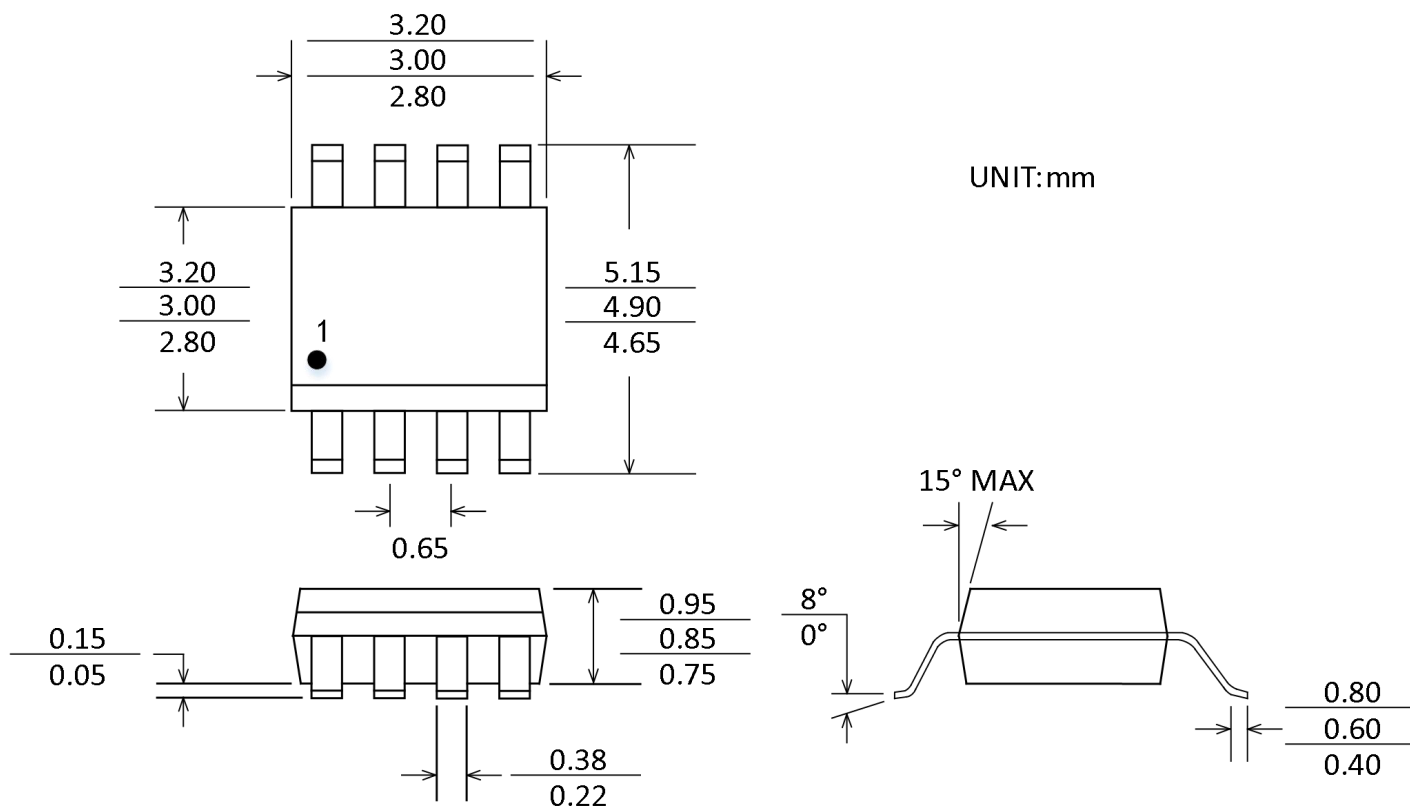


Figure 8. 8-Lead Mini Small Outline Package [MSOP]

SOT23-6

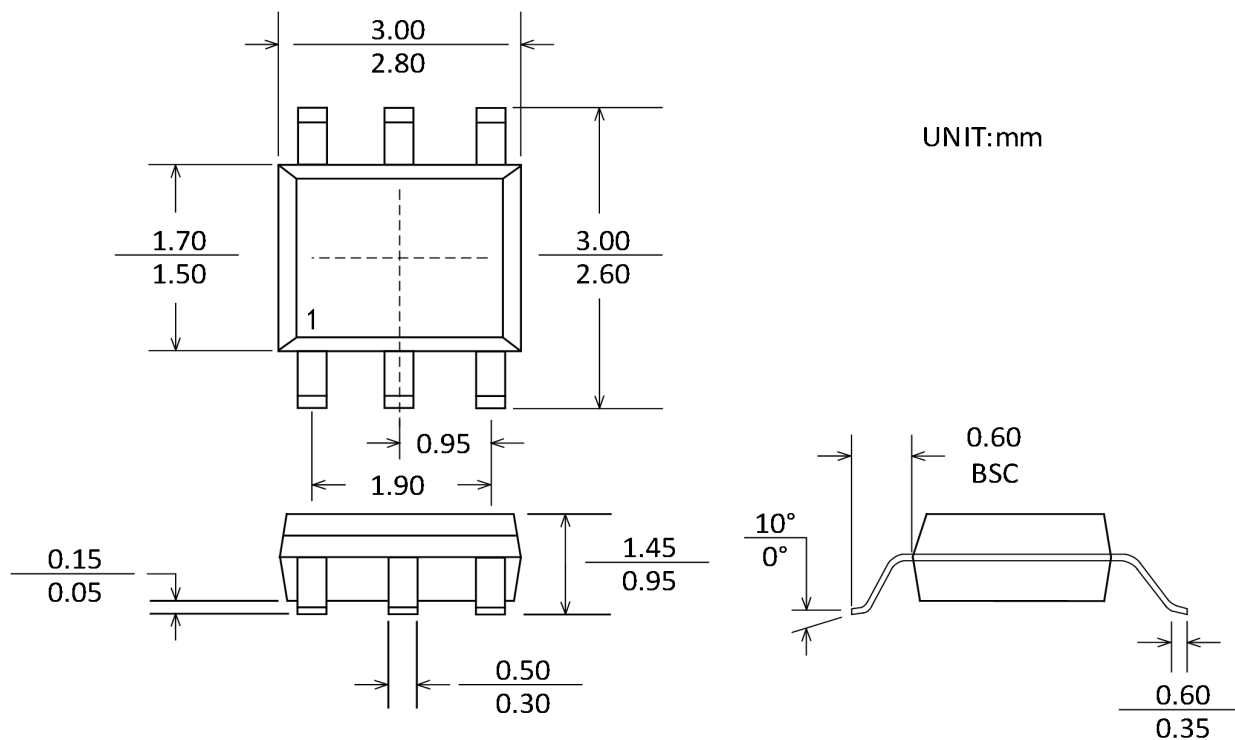


Figure 9. 6-Lead Small Outline Transistor Package [SOT-23]

Package/Ordering Information

PRODUCT TYPE	OPERATING TEMPERTURE	PACKAGE	PAKEAGE MARKING	NUMBER OF PACKAGES
CBMG601AST6	-40°C~85°C	SOT23-6		Tape and Reel, 3000
CBMG601AMS8	-40°C~85°C	MSOP-8		Tape and Reel, 3000