



CD8628 CD8629 CD8630

Zero-Drift, Single-Supply, Rail-to-Rail Input/Output Operational Amplifier

Version: Rev 1.0.0 Date: 2025-5-26

Features ■■

- Low Offset Voltage: 1 μ V
- Lowest auto-zero amplifier noise
- Input offset drift: 0.002 μ V/ $^{\circ}$ C
- 5 V single-supply operation
- High gain, CMRR, and PSRR: 130 dB
- low input bias current: 100 pA maximum
- Low supply current: 1.0 mA
- Overload recovery time: 50 μ s
- Rail-to-rail input and output swing

Application ■■

- Automotive sensors
- Pressure and position sensors
- Medical instrumentation
- Photodiode amplifiers
- Thermocouple amplifiers
- Precision current sensing

Description ■■

This amplifier has ultra low offset, drift, and bias current. The CD8628/CD8629 are wide bandwidth auto-zero amplifiers featuring rail-to-rail input and output swing and low noise. Operation is fully specified from 2.7 V to 5 V single supply(± 1.35 V to ± 2.5 V dual supply).

The CD8628,CD8629,CD8630 provide benefits previously found only in expensive auto-zeroing or chopper-stabilized amplifiers, these zero-drift amplifiers combine low cost with high accuracy and low noise. No external capacitor is required. In addition, the CD8628,CD8629,CD8630 greatly reduce the digital switching noise found in most chopper-stabilized amplifiers. With an offset voltage of only 1 μ V, drift of less than 0.005 μ V/ $^{\circ}$ C, and noise of only 0.5 μ V p-p (0.1 Hz to 10 Hz), the CD8628,CD8629,CD8630 are suited for applications where error sources cannot be tolerated. Position and pressure sensors, medical equipment, and strain gage amplifiers benefit greatly from nearly zero drift over their operating temperature range. Many systems can take advantage of the rail-to-rail input and output swings provided by the CD8628,CD8629,CD8630 to reduce input biasing complexity and maximize SNR.

The CD8628,CD8629,CD8630 are specified for the extended industrial temperature range(-40° C to $+125^{\circ}$ C). The CD8628 is available in 5-lead SOT-23. The CD8629 is available in the standard 8-lead narrow SOP and MSOP plastic packages. CD8630 quad amplifier is available in 14-lead narrow SOP and 14-lead TSSOP plastic packages.

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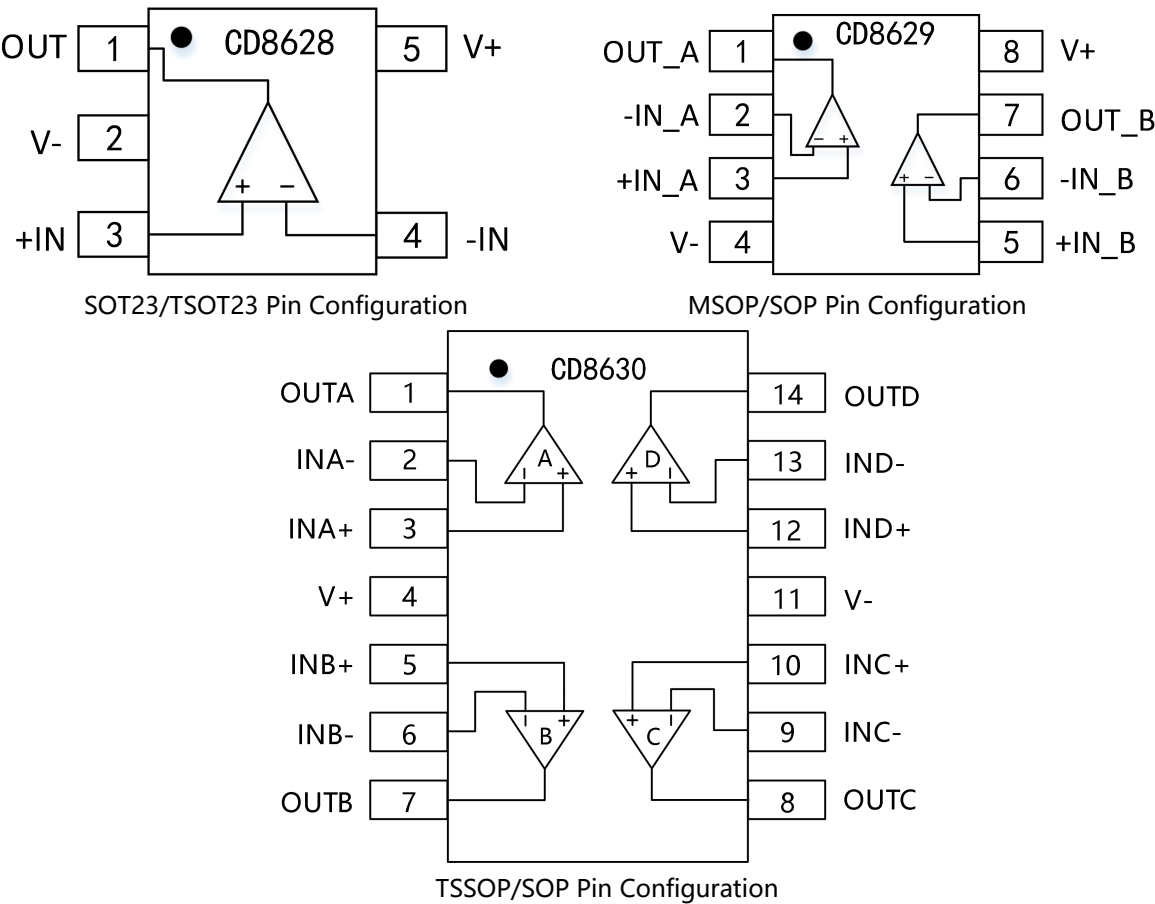
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Pin Configurations



Pin Description

Pin_N	Symbol SOT23 (CD8628)	Input/Output	Function
1	OUT	O	Output
2	V-	--	Negative power supply
3	+IN	I	None Inverting input
4	-IN	I	Inverting input
5	V+	--	Positive power supply
Pin_N	Symbol MSOP/SOP (CD8629)	Input/Output	Function
1	OUT_A	O	Output A
2	-IN_A	I	Inverting input A
3	+IN_A	I	None Inverting input A
4	V-	--	Negative power supply
5	+IN_B	I	None Inverting input B
6	-IN_B	I	Inverting input B
7	OUT_B	O	Output B

8	V+	--	Positive power supply
Pin_N	Symbol TSSOP/SOP (CD8630)	Input/Output	Function
1	OUT_A	O	Output A
2	-IN_A	I	Inverting input A
3	+IN_A	I	None Inverting input A
4	V+	--	Positive power supply
5	+IN_B	I	None Inverting input B
6	-IN_B	I	Inverting input B
7	OUT_B	O	Output B
8	OUT_C	O	Output C
9	-IN_C	I	Inverting input C
10	+IN_C	I	None Inverting input C
11	V-	--	Negative power supply
12	+IN_D	I	None Inverting input D
13	-IN_D	I	Inverting input D
14	OUT_D	O	Output D

Absolute Maximum Ratings

Parameter	Range
Supply Voltage	6V
Input Voltage	GND – 0.3 V to VS + 0.3 V
Differential Input Voltage	±5 V
Storage Temperature Range All Packages	–65°C to +150°C
Operating Temperature Range All Packages	–40°C to +125°C
Junction Temperature Range All Packages	–65°C to +150°C
SOT23-5	230°C/W (θ_{JA}) /146°C/W (θ_{JC})
MSOP-8	190°C/W (θ_{JA}) /44°C/W (θ_{JC})
SOP-8	105°C/W (θ_{JA}) /43°C/W (θ_{JC})
Lead Temperature	(Soldering, 60s) : 300°C
ESD (CD8628)	5kV (HBM)
ESD (CD8629)	5kV (HBM)

Electrical characteristics

($V_S = 5\text{ V}$, $V_{CM} = V_S/2$, $T_A = 25^\circ\text{C}$, unless otherwise noted.)

Table1.

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS					
Input Offset Voltage (V_{OS})	--	--	1	5	μV
Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)	$-40^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$	--	0.002	0.02	$\mu\text{V}/^\circ\text{C}$
Input Bias Current (I_B)	--	--	30	100	pA
Input Offset Current (I_{OS})	--	--	50	200	pA
Input Voltage Range	--	0	--	5	V
Common-Mode Rejection Ratio (CMRR)	$V_{CM} = 0\text{V to } 2.7\text{V}$	115	130	--	dB
Open-Loop Voltage Gain (A_{OL})	$R_L = 10\text{k}\Omega, V_O = 0.3\text{V to } 4.7\text{V}$	110	140	--	dB
INPUT CAPACITANCE					
Differential (C_{DIFF})	--	--	1.5	--	pF
Common-Mode (C_{COM})	--	--	8.0	--	pF
OUTPUT CHARACTERISTICS					
Output Voltage High (V_{OH})	$R_L = 100\text{k}\Omega$ 至地	4.99	4.996	--	V
	$R_L = 10\text{k}\Omega$ 至地	4.95	4.98	--	V
Output Voltage Low (V_{OL})	$R_L = 100\text{k}\Omega$ 至 V_+	--	1	5	mV
	$R_L = 10\text{k}\Omega$ 至 V_+	--	10	20	mV
Short-Circuit Limit (I_{SC})	--	± 25	± 50	--	mA
Output Current (I_{OUT})	--	--	± 30	--	mA
POWER SUPPLY					
Power Supply Rejection Ratio (PSRR)	$V_S = 2.7\text{V to } 5.5\text{V}$	115	130	--	dB
Supply Current/Amplifier (I_{SY})	$V_O = V_S/2$	--	0.75	1	mA
NOISE PERFORMANCE					
Voltage Noise(e_n p-p)	0.1Hz 至 10Hz	--	0.5	--	μVp — p
	0.1Hz 至 1.0Hz	--	0.16	--	μVp — p
Voltage Noise Density (e_n)	$f = 1\text{KHz}$	--	22	--	$\text{nV}/\sqrt{\text{Hz}}$
Current Noise Density (i_n)	$f = 10\text{Hz}$	--	5	--	$\text{fA}/\sqrt{\text{Hz}}$
DYNAMIC PERFORMANCE					

Slew Rate (SR)	$R_L=10k\Omega$	--	1	--	V/ μ s
Gain-Bandwidth Product (GBW)		--	2.5	--	MHz
Settling Time		--	0.05	--	ms

($V_S = 2.7V$, $V_{CM} = V_S/2$, $T_A = 25^\circ C$, unless otherwise noted.)

Table 2.

PARAMETER	CONDITION	MIN	TYP	MAX	UNIT
INPUT CHARACTERISTICS					
Input Offset Voltage (V_{OS})	--	--	1	5	μ V
Offset Voltage Drift ($\Delta V_{OS}/\Delta T$)	$-40^\circ C \leq T_A \leq +125^\circ C$	--	0.002	0.02	μ V/ $^\circ C$
Input Bias Current (I_B)	--	--	30	100	pA
Input Offset Current (I_{OS})	--	--	50	200	pA
Input Voltage Range	--	0		2.7	V
Common-Mode Rejection Ratio (CMRR)	$V_{CM} = 0V$ 至 $2.7V$	115	130	--	dB
Open-Loop Voltage Gain (A_{OL})	$R_L=10k\Omega$, $V_O=0.3V$ 至 $2.4V$	110	140	--	dB
INPUT CAPACITANCE					
Differential (C_{DIFF})	--	--	1.5	--	pF
Common-Mode (C_{COM})	--	--	8.0	--	pF
OUTPUT CHARACTERISTICS					
Output Voltage High (V_{OH})	$R_L=100k\Omega$ 至地	2.68	2.695	--	V
	$R_L=10k\Omega$ 至地	2.67	2.68	--	V
Output Voltage Low (V_{OL})	$R_L=100k\Omega$ 至 V_+	--	1	5	mV
	$R_L=10k\Omega$ 至 V_+	--	10	20	mV
Short-Circuit Limit (I_{SC})	--	± 10	± 15	--	mA
Output Current (I_{OUT})	--	--	± 10	--	mA
POWER SUPPLY					
Power Supply Rejection Ratio (PSRR)	$V_S = 2.7V$ 至 $5.5V$	115	130	--	dB
Supply Current/Amplifier (I_{SY})	$V_O=V_S/2$	--	0.75	1	mA
NOISE PERFORMANCE					
Voltage Noise(e_n p-p)	0.1Hz 至 10Hz		0.5		μ Vp - p
Voltage Noise Density (e_n)	$f=1kHz$	--	22	--	nV / $\sqrt{Hz}$
Current Noise Density (i_n)	$f=10Hz$	--	5	--	fA/ $\sqrt{Hz}$
DYNAMIC PERFORMANCE					
Slew Rate (SR)	$R_L=10k\Omega$	--	1	--	V/ μ s
Gain-Bandwidth Product (GBW)	--	--	2	--	MHz

Settling Time	--	--	0.05	--	ms
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Typical Characteristics

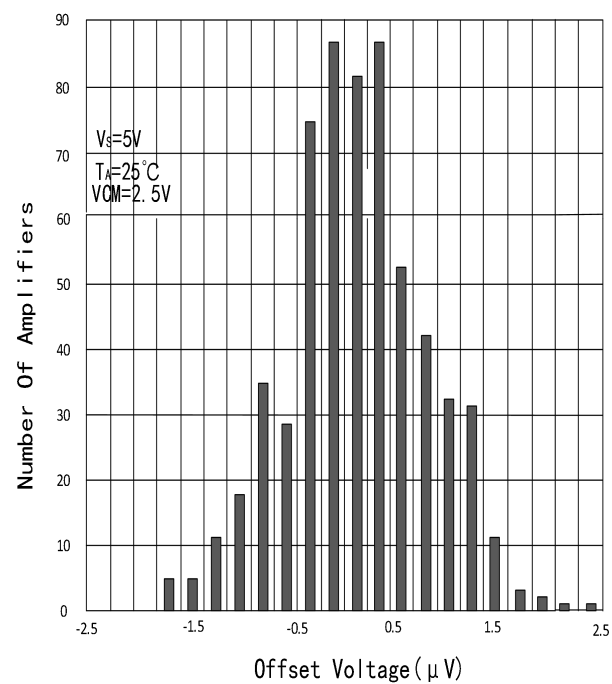


Figure 1.Input Offset Voltage Distribution

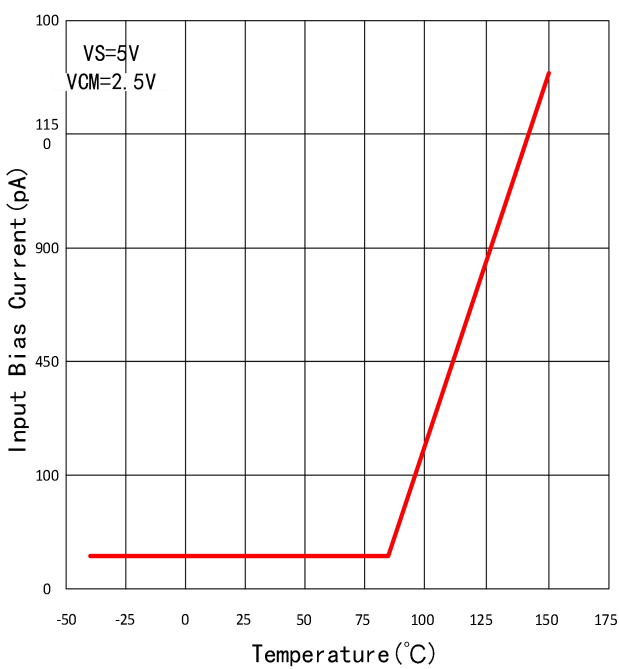


Figure 2.Input Bias Current vs. Temperature

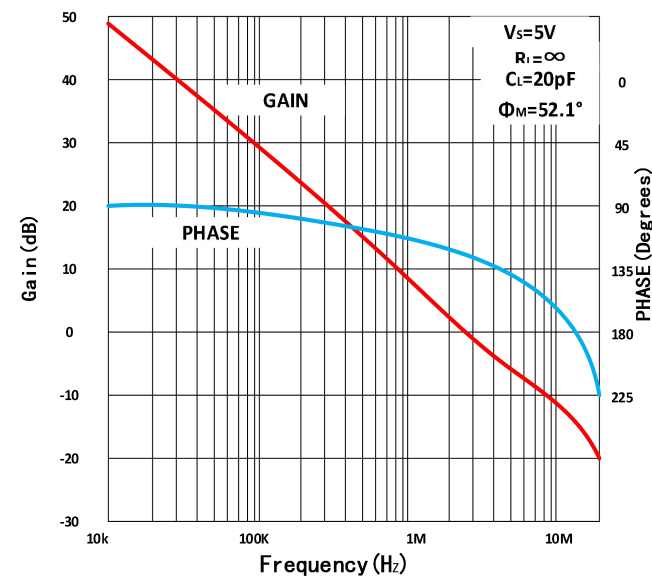


Figure 3.Open-Loop Gain and Phase vs. Frequency vs. Frequency

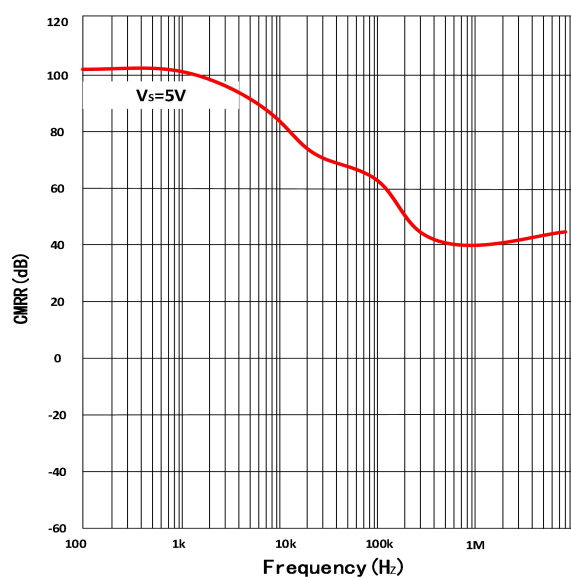
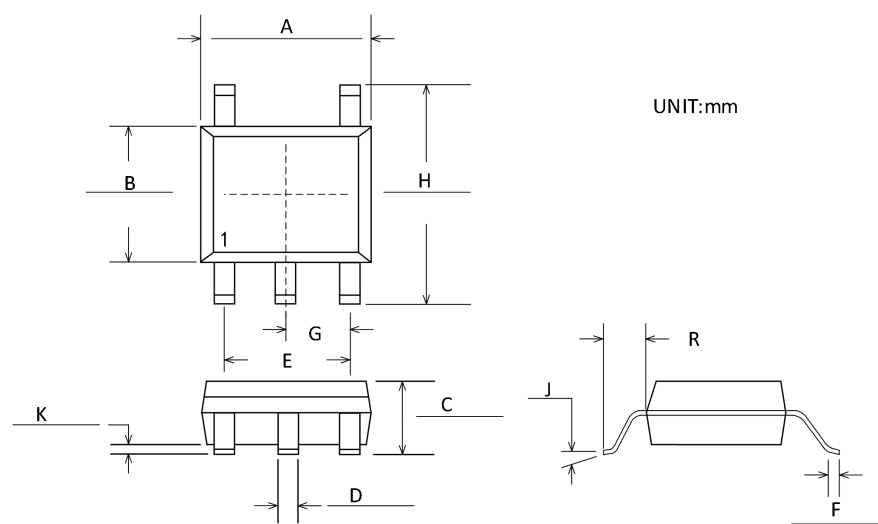


Figure4.Common-Mode Rejection Ratio (CMRR)

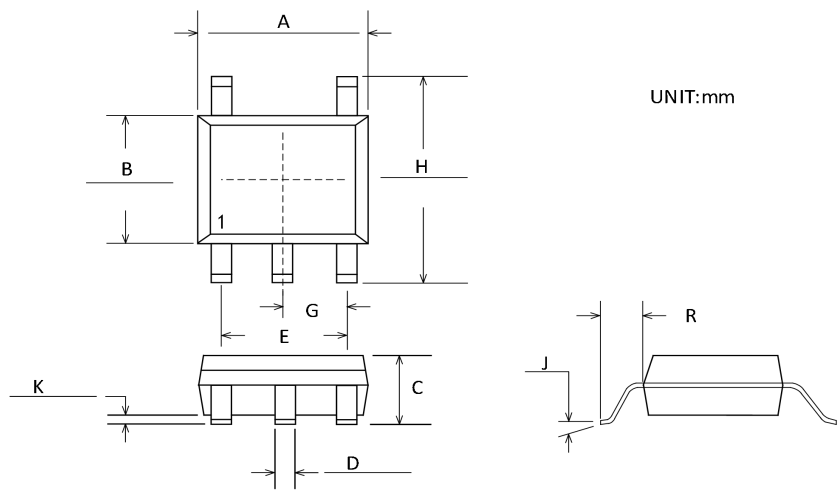
Package Outline Dimensions

SOT23-5



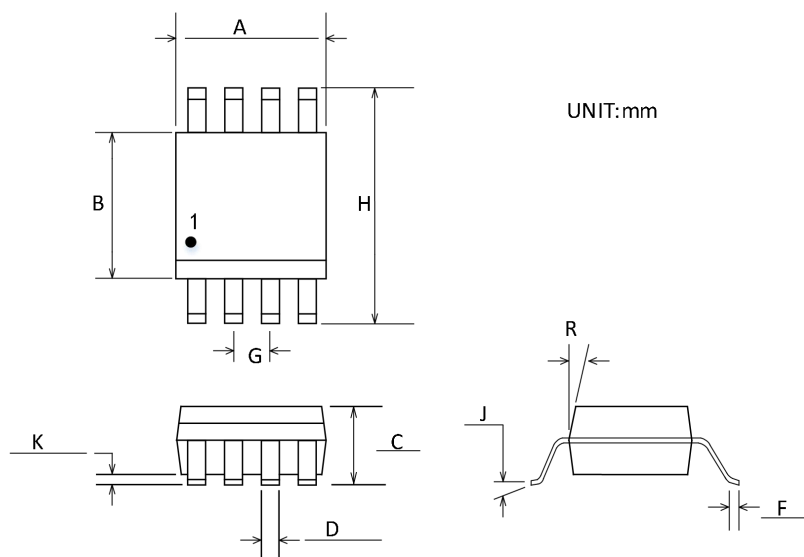
Symbol	Dimensions In Millimeters	
	Min	Max
A	2.80	3.00
B	1.50	1.70
C	0.95	1.45
D	0.35	0.50
E	1.90BSC	
F	0.35	0.55
G	0.95BSC	
H	2.60	3.00
J	0°	10°
K	0.05	0.15
R	0.60BSC	

TSOT23-5



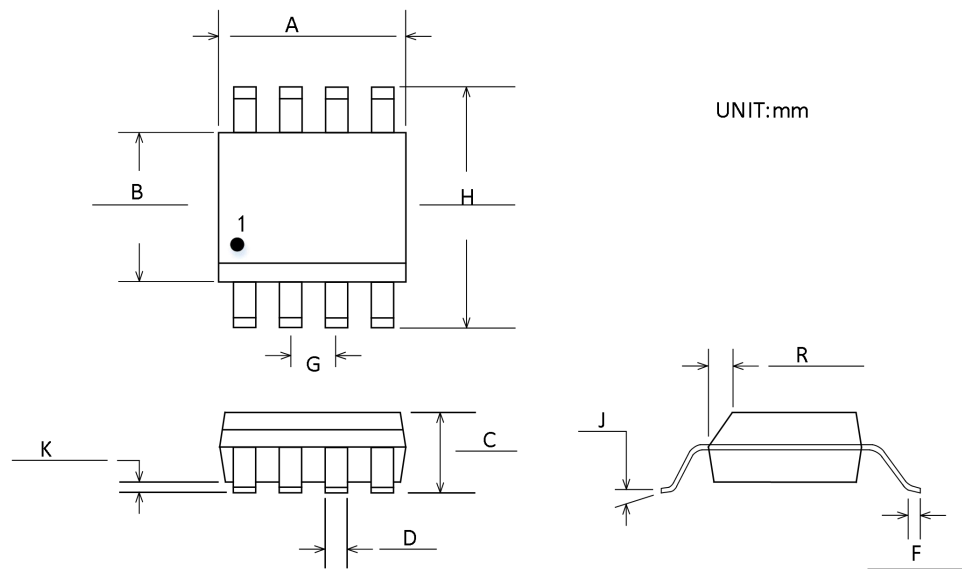
符号	尺寸 (毫米)	
	最小值	最大值
A	2.80	3.00
B	1.60	1.70
C	--	0.90
D	0.35	0.50
E	1.90BSC	
G	0.95BSC	
H	2.65	2.95
J	0°	8°
K	0.02	0.09
R	0.30	0.60

MSOP-8



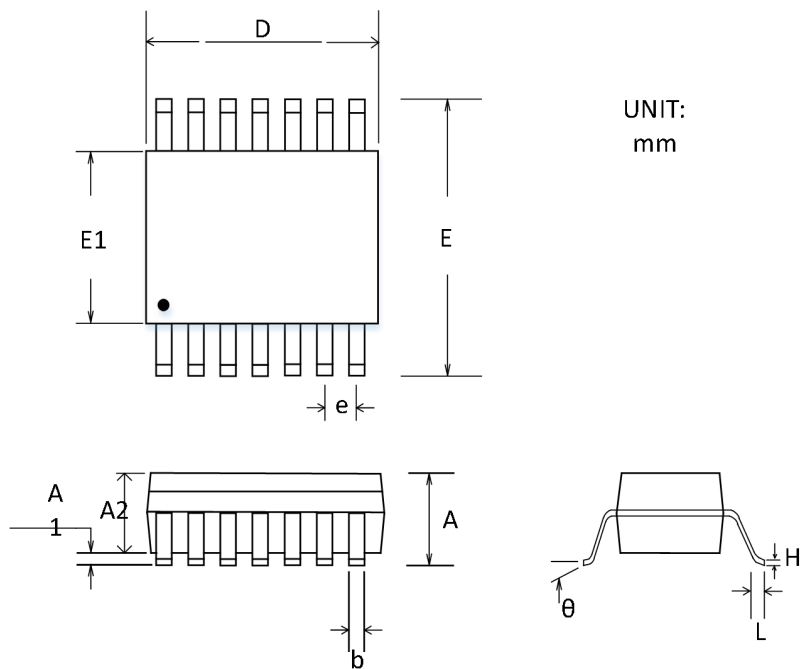
Symbol	Dimensions In Millimeters	
	Min	Max
A	2.80	3.20
B	2.80	3.20
C	1.10MAX	
D	0.25	0.40
F	0.40	0.80
G	0.65BSC	
H	4.65	5.15
J	0°	6°
K	0.05	0.15
R	15°MAX	

SOP-8



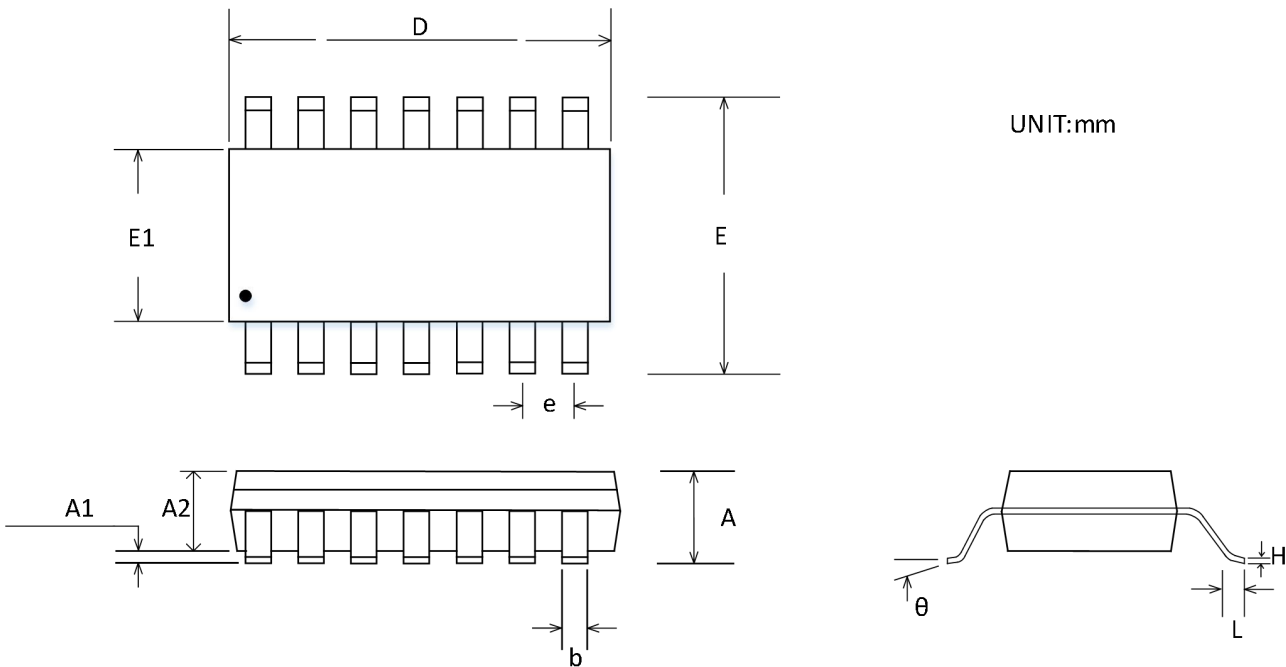
Symbol	Dimensions In Millimeters	
	Min	Max
A	4.80	5.00
B	3.80	4.00
C	1.35	1.75
D	0.31	0.51
F	0.40	1.27
G	1.27BSC	
H	5.80	6.20
J	0°	8°
K	0.10	0.25
R	0.25	0.50

TSSOP-14



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.20MAX	
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
D	4.90	5.10
E	6.40BSC	
E1	4.30	4.50
e	0.65BSC	
H	0.09	0.20
L	0.45	0.75
θ	0°	8°

SOP-14



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.35	1.75
A1	0.10	0.25
A2	1.25	1.50
b	0.31	0.51
D	8.55	8.75
E	5.80	6.20
E1	3.80	4.00
e	1.27BSC	
H	0.17	0.25
L	0.40	1.27
θ	0°	8°

Package/Ordering Information

MODEL	TEMPERATURE	PACKAGE DESCRIPTION	PACKAGE OPTION
CBM8628AST5	-40°C~125°C	SOT23-5	Tape and Reel, 3000
CBM8628ATT5	-40°C~125°C	TSOT-5	Tape and Reel, 3000
CBM8628AS8	-40°C~125°C	SOP-8	Tape and Reel, 2500
CBM8628AS8-RL	-40°C~125°C	SOP-8	Tape and Reel, 3000
CBM8628AS8-REEL	-40°C~125°C	SOP-8	Tape and Reel, 4000
CBM8629AMS8	-40°C~125°C	MSOP-8	Tape and Reel, 3000
CBM8629AS8	-40°C~125°C	SOP-8	Tape and Reel, 2500
CBM8629AS8-RL	-40°C~125°C	SOP-8	Tape and Reel, 3000
CBM8629AS8-REEL	-40°C~125°C	SOP-8	Tape and Reel, 4000
CBM8630ATS14	-40°C~125°C	TSSOP-14	Tape and Reel, 2500
CBM8630ATS14-RL	-40°C~125°C	TSSOP-14	Tape and Reel, 3000
CBM8630ATS14-REEL	-40°C~125°C	TSSOP-14	Tape and Reel, 4000
CBM8630AS14	-40°C~125°C	SOP-14	Tape and Reel, 2500
CBM8630AS14-RL	-40°C~125°C	SOP-14	Tape and Reel, 3000
CBM8630AS14-REEL	-40°C~125°C	SOP-14	Tape and Reel, 4000
CBM8628AST5	-40°C~125°C	SOT23-5	Tape and Reel, 3000

Revision Log

Version	Revision date	Change content	Reason for Change	Modified by	Reviewed By	Note
V1.0	2025.5.26	Initial version	Regular update	WW	LYL	