



CDV721 CDV722 CDV724

Precision, Low Noise Operational Amplifiers

Version: Rev 1.0.0 Date: 2025-5-26

Features ■■

- HIGH GAIN BANDWIDTH:10MHz
- RAIL-TO-RAIL INPUT AND OUTPUT 0.9mV Typical VOS
- INPUT VOLTAGE RANGE: -0.1V to +5.6V with $V_s = 5.5V$
- SUPPLY RANGE: +2.5V to +5.5V
- SHUTDOWN: CDV721S/CDV722S
- SPECIFIED UP TO +125°C
- MicroSIZE PACKAGES: SOT23-5, SOT23-6

Application ■■

- SENSORS
- PHOTODIODE AMPLIFICATION
- ACTIVE FILTERS
- TEST EQUIPMENT
- DRIVING A/D CONVERTERS

Description ■■

The CDV72X families of products offer low voltage operation and rail-to-rail input and output, as well as excellent speed/power consumption ratio, providing an excellent bandwidth (10MHz) and slew rate of 7V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

The devices are ideal for sensor interfaces, active filters and portable applications. The CDV721S, CDV722S include a shutdown mode. Under logic control, the amplifiers can be switched from normal operation to a standby current that is less than 1uA. The CDV72X families of operational amplifiers are specified at the full temperature range of -40°C to +125°C under single or dual power supplies of 2.5V to 5.5V.

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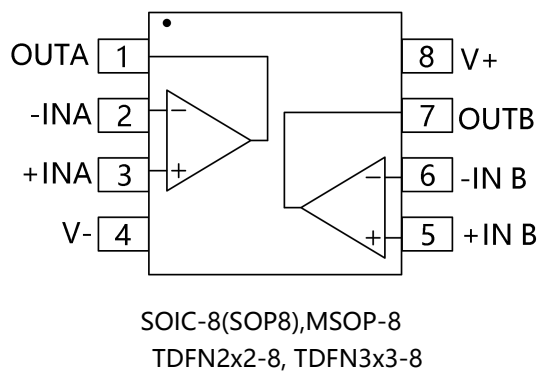
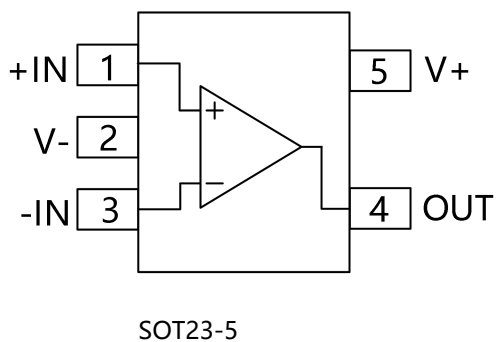
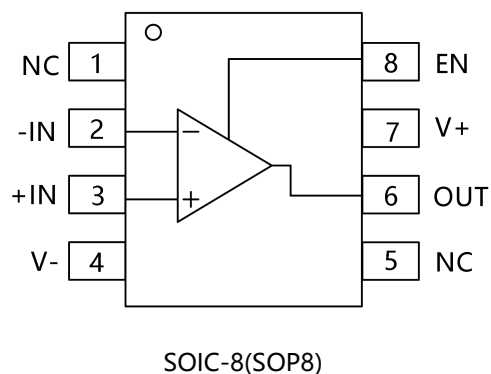
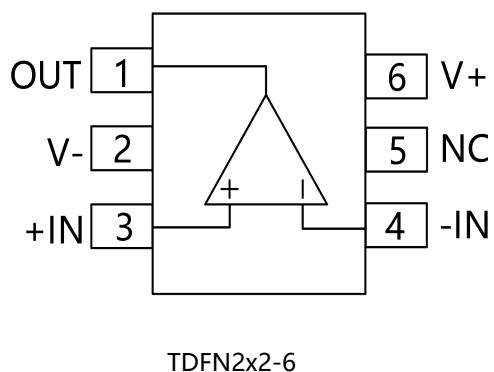
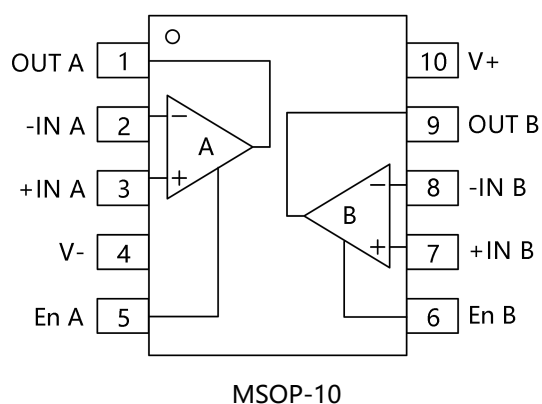
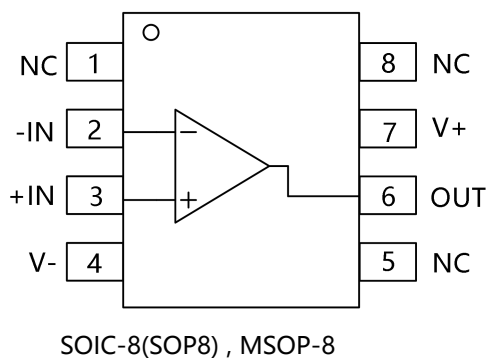
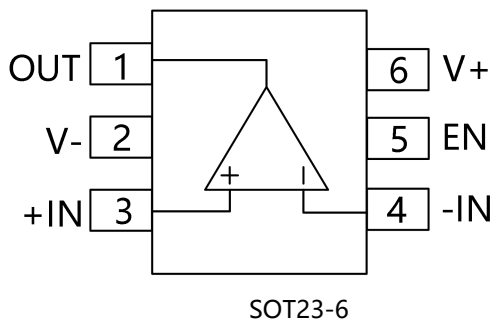
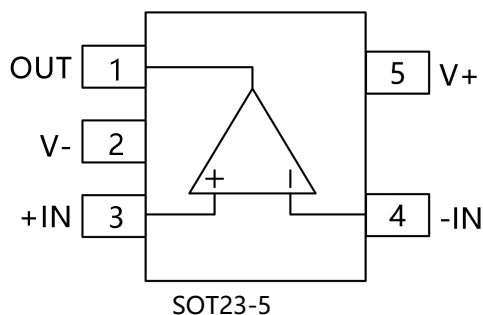
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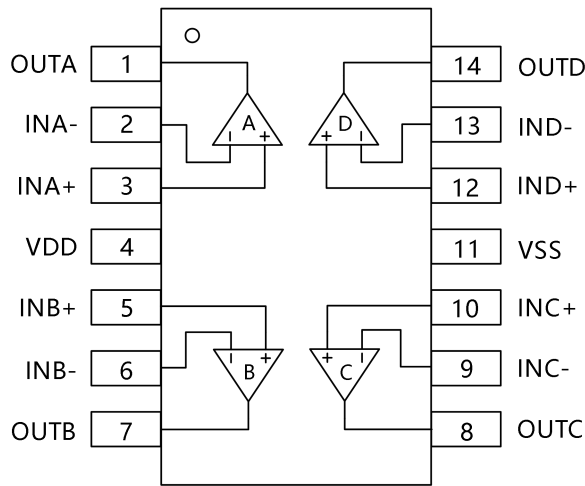
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Pin Configurations



Note: NC indicates no internal connection.



SOIC-14(SOP14),TSSOP-14

Absolute Maximum Ratings

Parameter	Range
Supply Voltage (VS)	7V
Input Voltage	– 0.5 to (V+) + 0.5V
Input Current	±10mA
Storage Temperature Range	–65°C to +150°C
Operating Temperature Range	–40°C to +125°C
Junction Temperature Range	–65°C to +150°C
Lead Temperature (Soldering,60 sec)	260°C
Package Thermal Resistance @ T_A= +25°C	
SOT23-5, SOT23-6	200°C/W
MSOP-10, SOIC-8, TSSOP-8	150°C/W
SOIC-14, TSSOP-14	100°C/W
HBM	5000V
MM	400V

Electrical characteristics

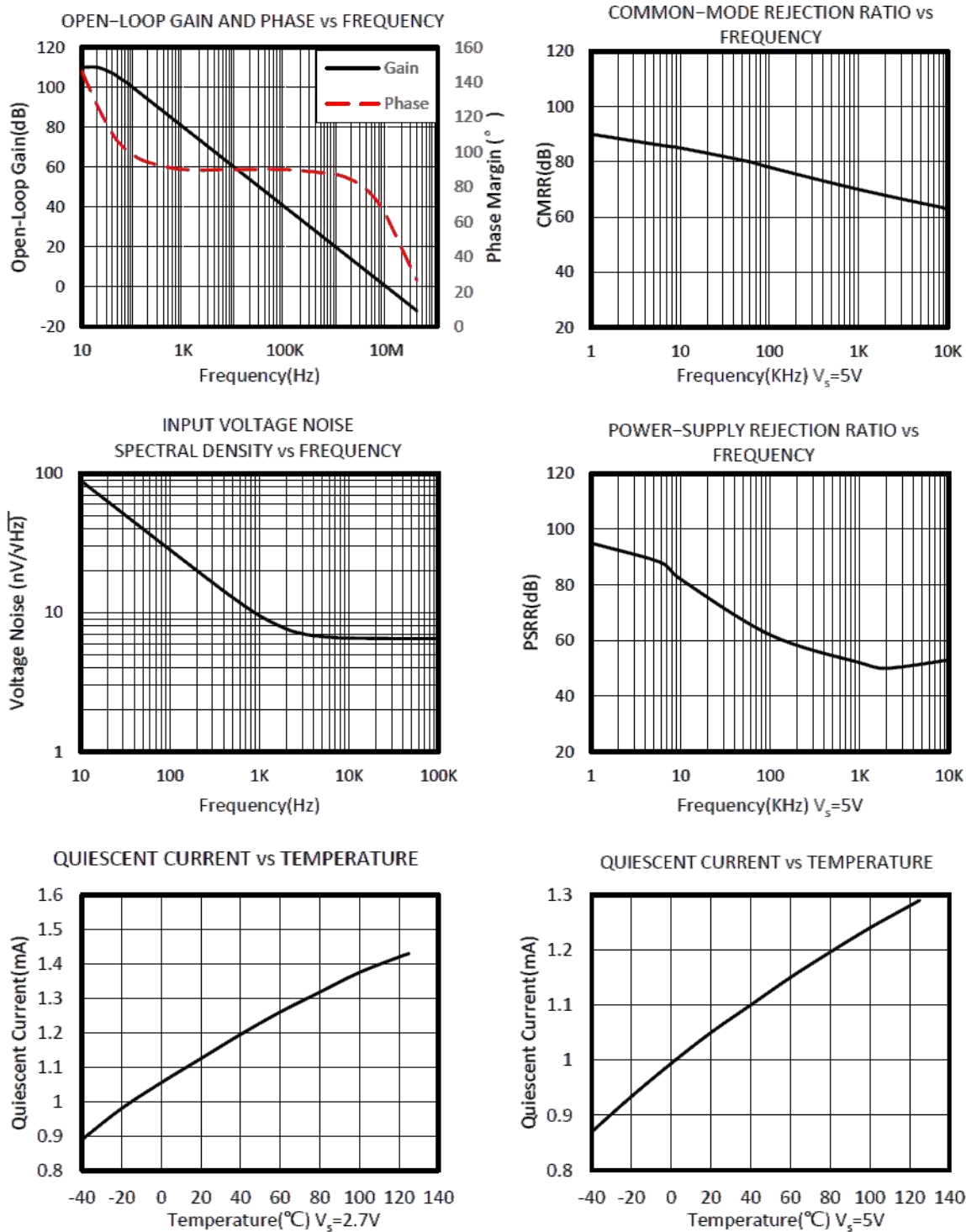
(At $T_A = +25^\circ\text{C}$, $V_S=5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.)

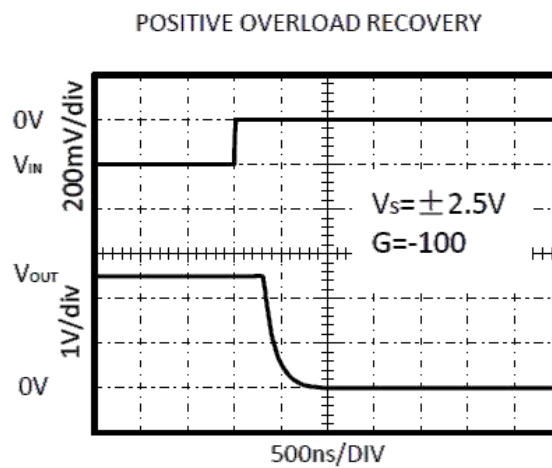
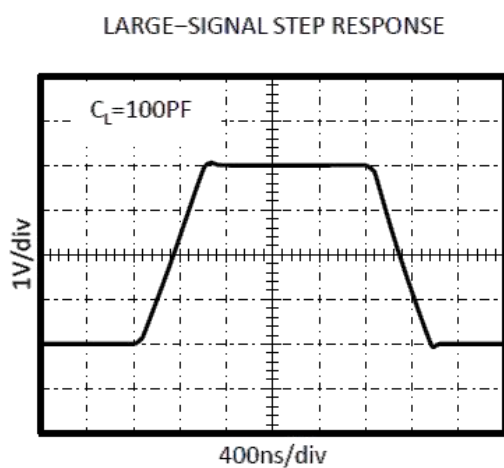
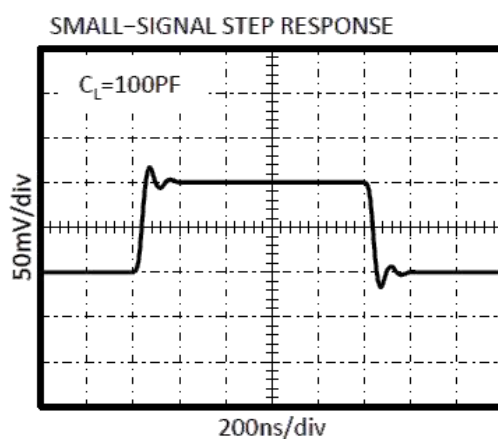
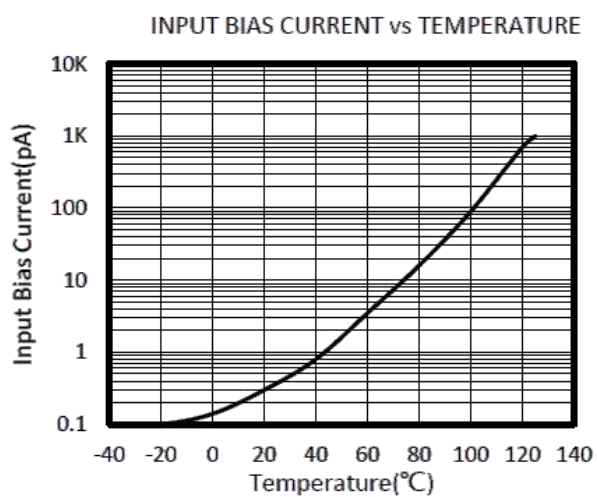
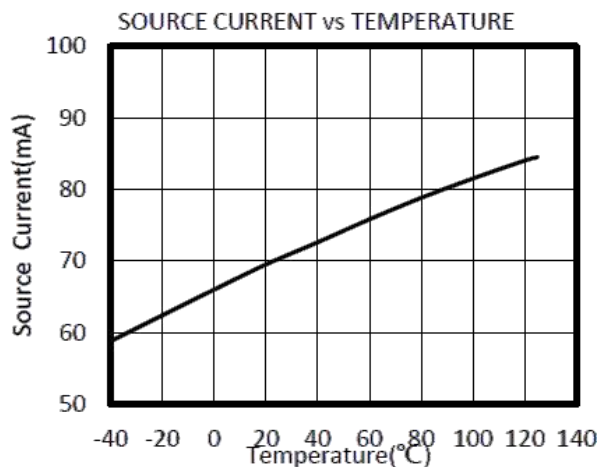
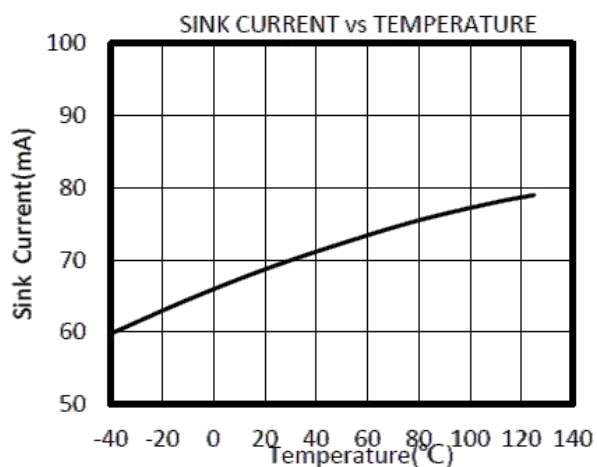
PARAMETER		CONDITIONS	TJ	CDV721S, CDV722S			UNIT
				CDV721, CDV722, CDV724			
				MIN	TYP	MAX	
POWER SUPPLY							
V _S	Operating Voltage Range		25°C	2.5		5.5	V
I _Q	Quiescent Current/Amplifier		25°C		1.15	1.4	uA
PSRR	Power-Supply Rejection Ratio	V _S =2.5V to 5.5V, V _{CM} =(V-)+0.5V	25°C	75	85		dB
			-40°C to 125°C	65			
INPUT							
V _{OS}	Input Offset Voltage		25°C		0.5	2.5	mV
V _{OS} T _C	Input Offset Voltage Average Drift	-40°C to 125°C			2.6		uV/°C
I _B	Input Bias Current		25°C		1	10	pA
I _{OS}	Input Offset Current		25°C		1	10	pA
V _{CM}	Common-Mode Voltage Range	V _S = 5.5V	25°C	-0.1		5.6	V
CMRR	Common-Mode Rejection Ratio	V _S = 5.5V, V _{CM} =-0.1V to 4V	25°C	73	85		dB
			-40°C to 125°C	67			
		V _S = 5.5V, V _{CM} =-0.1V to 5.6V	25°C	60	75		
			-40°C to 125°C	57			
OUTPUT							
A _{OL}	Open-Loop Voltage Gain	R _L =2KΩ, V _O =0.15V to 4.85V	25°C	86	95		dB
			-40°C to 125°C	65			
		R _L =10KΩ, V _O =0.05V to 4.95V	25°C	90	96		
			-40°C to 125°C	66			
	Output Swing From Rail	R _L =2KΩ	25°C		52		mV

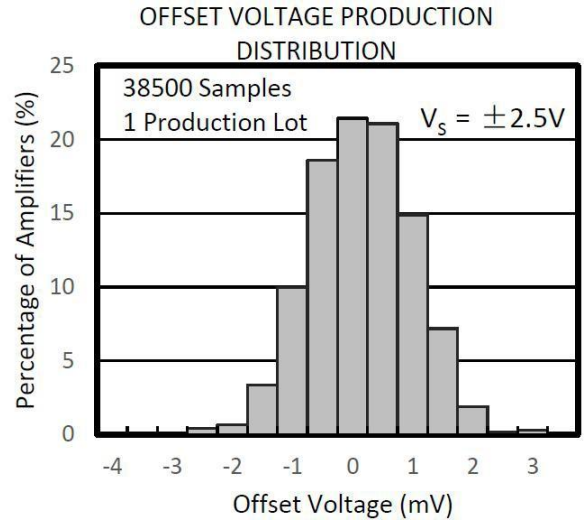
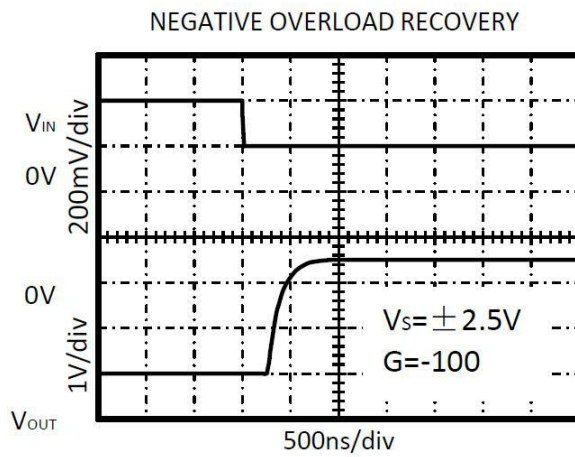
		$R_L=10K\Omega$			7		
I_{OUT}	Output Short-Circuit Current		25°C		70		mA
FREQUENCY RESPONSE							
S_R	Slew Rate		25°C		7		V/us
GBP	Gain-Bandwidth Product		25°C		10		MHz
P_M	Phase Margin		25°C		62		°
T_S	Setting Time,0.1%				0.2		us
	Overload Recovery Time	$V_{IN}\cdot Gain\geq V_S$			0.35		us
NOISE							
e_n	Input Voltage Noise Density	$f = 1KHz$	25°C		9.5		$\frac{nV}{\sqrt{Hz}}$
		$f = 10KHz$	25°C		6.5		$\frac{nV}{\sqrt{Hz}}$
ENABLE/SHUTDOWN(CD8541,CD8542)							
$I_{Q(OFF)}$	Supply Current in Shutdown		25°C		<1		uA
T_{OFF}			25°C		3		us
T_{ON}			25°C		20		us
V_L	Shut Down		25°C	V-		(V-)+0.8	V
V_H	Amplifier Is Active		25°C	(V-)+ 2		V+	V

Typical Characteristics

At $T_A = +25^\circ\text{C}$, $V_S = 5\text{V}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, $V_{OUT} = V_S/2$, unless otherwise noted.







Application Notes

The CDV721, CDV722, CDV724, CDV721S, CDV722S are high precision, rail-to-rail operational amplifiers that can be run from a single-supply voltage 2.5V to 5.5V ($\pm 1.25V$ to $\pm 2.75V$). Supply voltages higher than 7V (absolute maximum) can permanently damage the amplifier.

Rail-to-rail input and output swing significantly increases dynamic range, especially in low-supply applications.

Good layout practice mandates use of a 0.1uF capacitor place closely across the supply pins.

CDV721S/CDV722S ENABLE FUNCTION

The CDV721S/CDV722S includes a shutdown mode. Under logic control, the amplifiers can be switched from normal mode to a standby current of 1uA. When the Enable pin is connected to high, the amplifier is active. Connecting Enable low disables the amplifier, and places the amplifier, and place the output in a high-impedance state.

Layout Guidelines

Attention to good layout practices is always recommended. Keep traces short. When possible, use a PCB ground plane with surface-mount components placed as close to the device pins as possible. Place a 0.1uF capacitor closely across the supply pins.

These guidelines should be applied throughout the analog circuit to improve performance and provide benefits such as reducing the EMI susceptibility.

Instrumentation Amplifier

In the three-op amp, instrumentation amplifier configuration shown in Figure2.

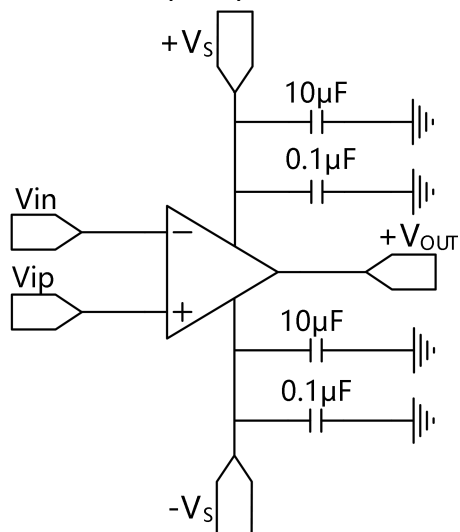


Figure 1. Amplifier with Bypass Capacitors

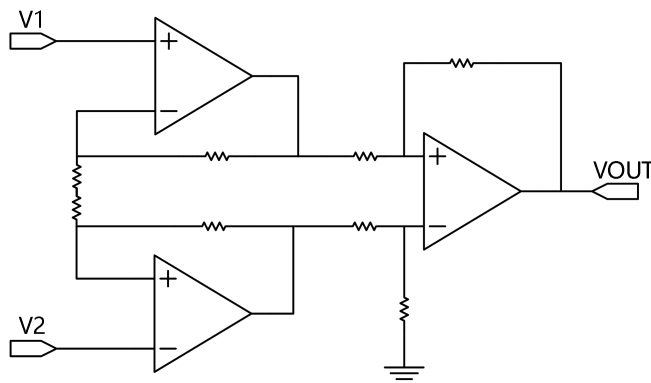
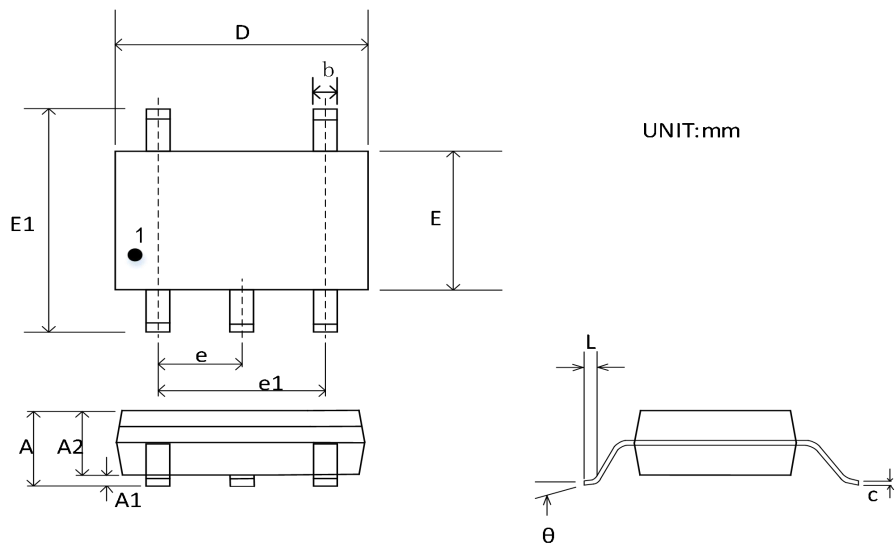


Figure2. Amplifier instrumentation amplifier

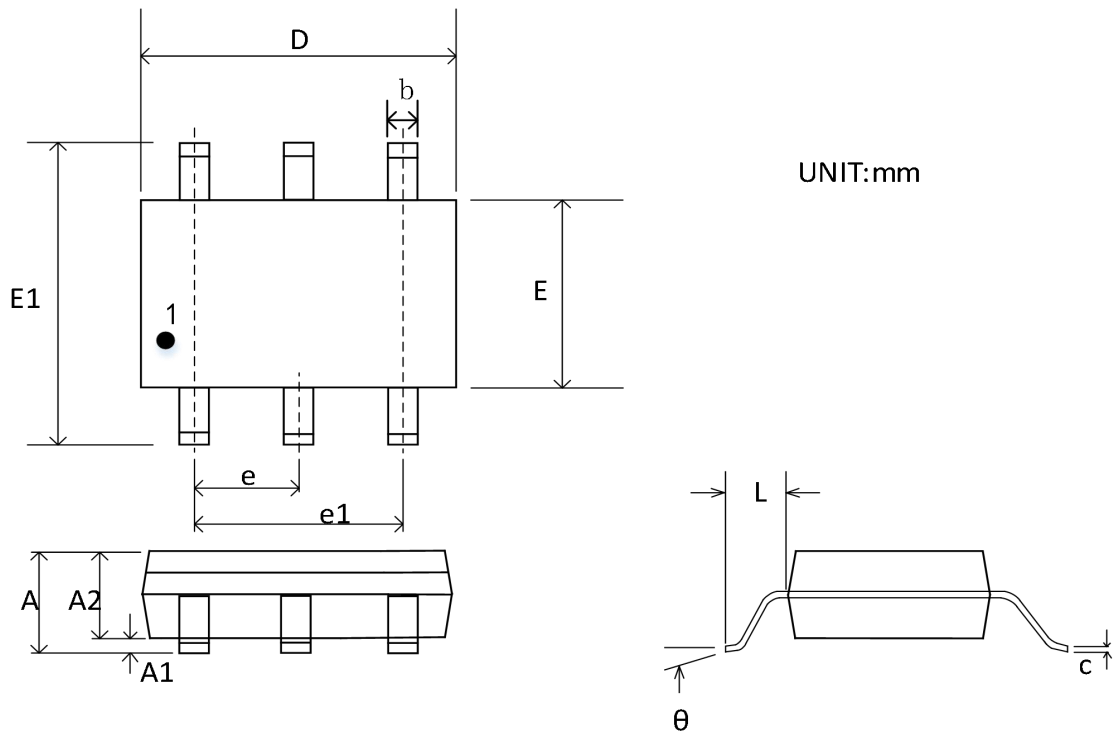
Package Outline Dimensions

SOT23-5



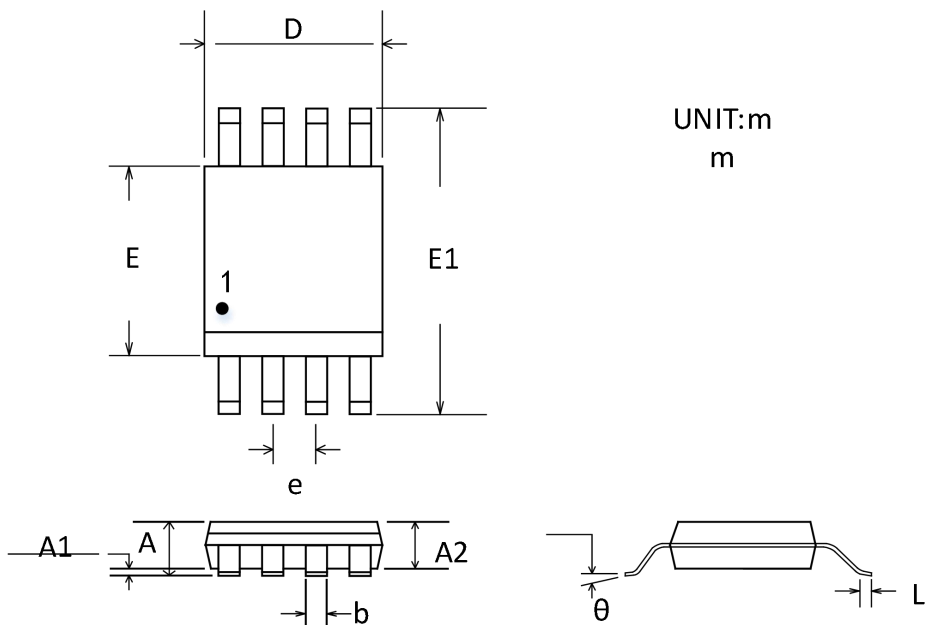
Symbol	Dimensions In Millimeters	
	Min	Max
A	--	1.450
A1	--	0.150
A2	0.900	1.300
b	0.300	0.500
c	0.080	0.220
D	2.900 BSC	
E	1.600 BSC	
E1	2.80 BSC	
e	0.950 BSC	
e1	1.900 BSC	
L	0.300	0.600
θ	0°	8°

SOT23-6

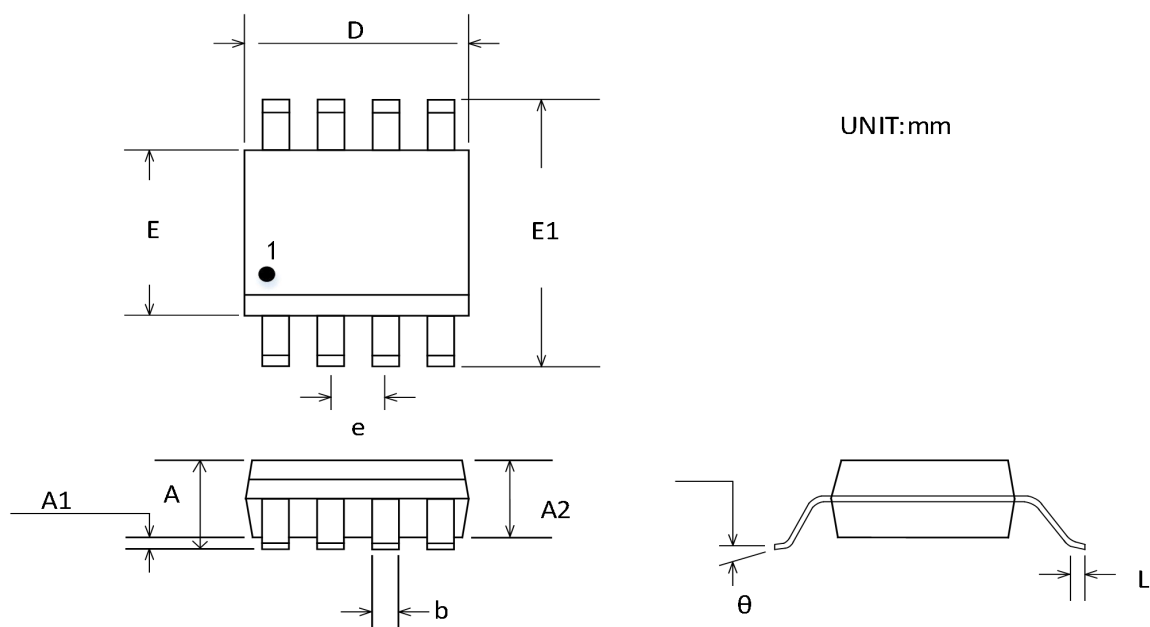


Symbol	Dimensions In Millimeters	
	Min	Max
A	1.050	1.250
A1	0.000	0.100
A2	1.050	1.150
b	0.300	0.500
C	0.100	0.200
D	2.820	3.020
E	1.500	1.700
E1	2.650	2.950
e	0.950 BSC	
e1	1.900 BSC	0.075 BSC
L	0.300	
θ	0°	8°

MSOP-8

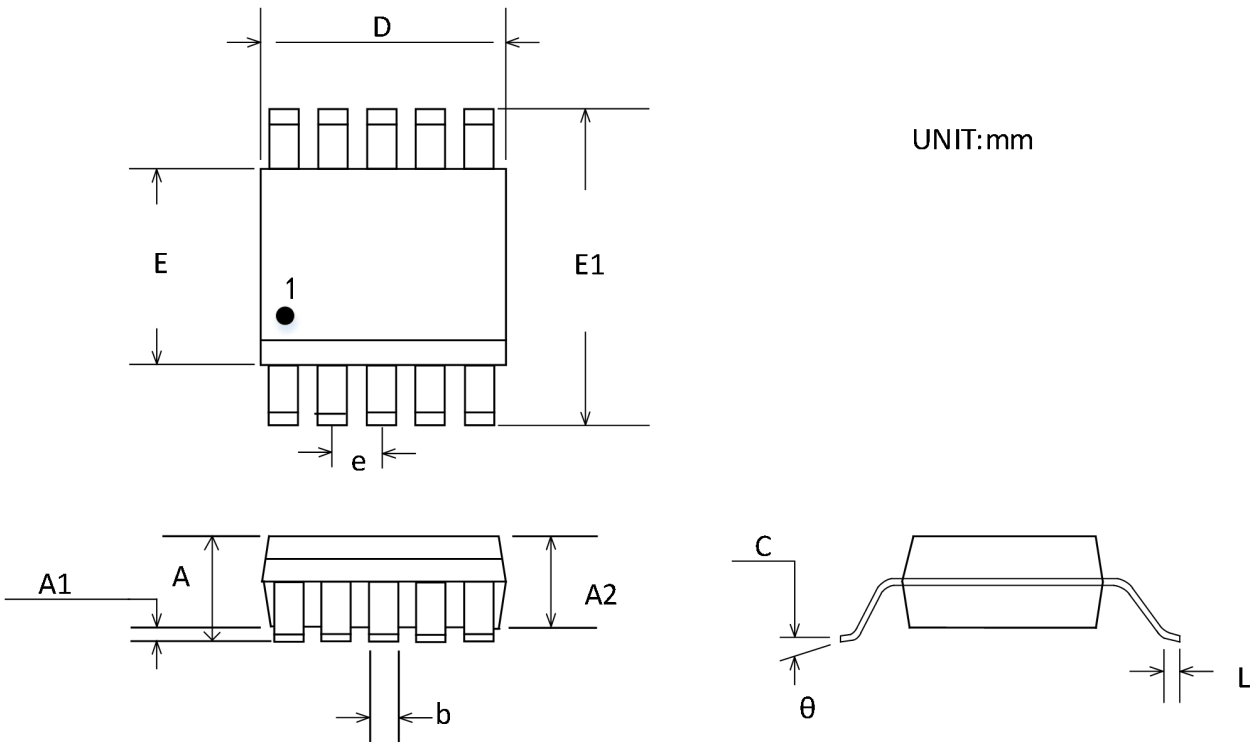


Symbol	Dimensions In Millimeters	
	Min	Max
A	0.820	1.100
A1	0.000	0.150
A2	0.750	0.950
b	0.220	0.380
D	2.800	3.200
E	2.800	3.200
E1	4.650	5.150
e	0.650 BSC	
L	0.400	0.800
θ	0°	8°



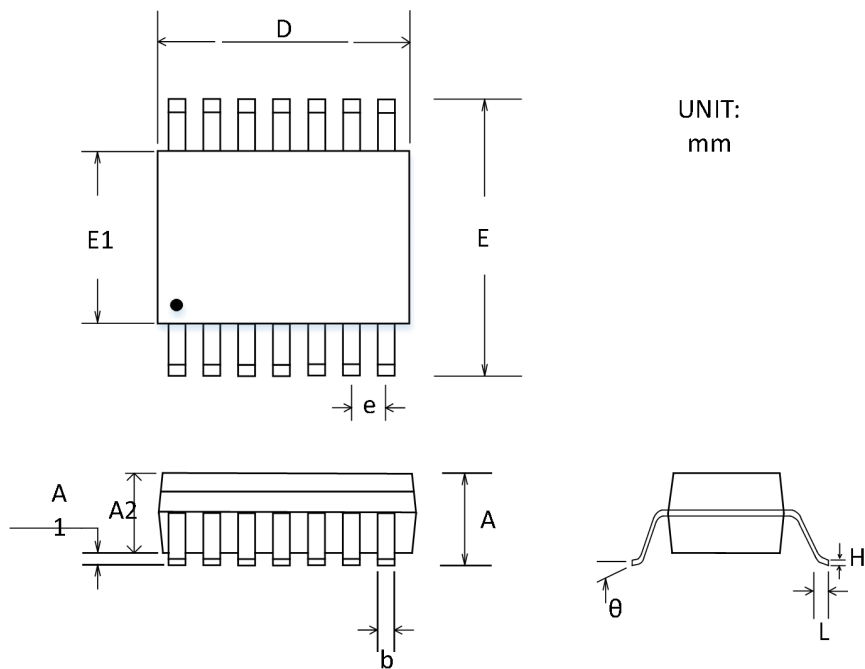
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.310	0.510
D	4.800	5.000
E	3.800	4.000
E1	5.800	6.200
e	1.270 BSC	
L	0.400	1.270
θ	0°	8°

MSOP-10



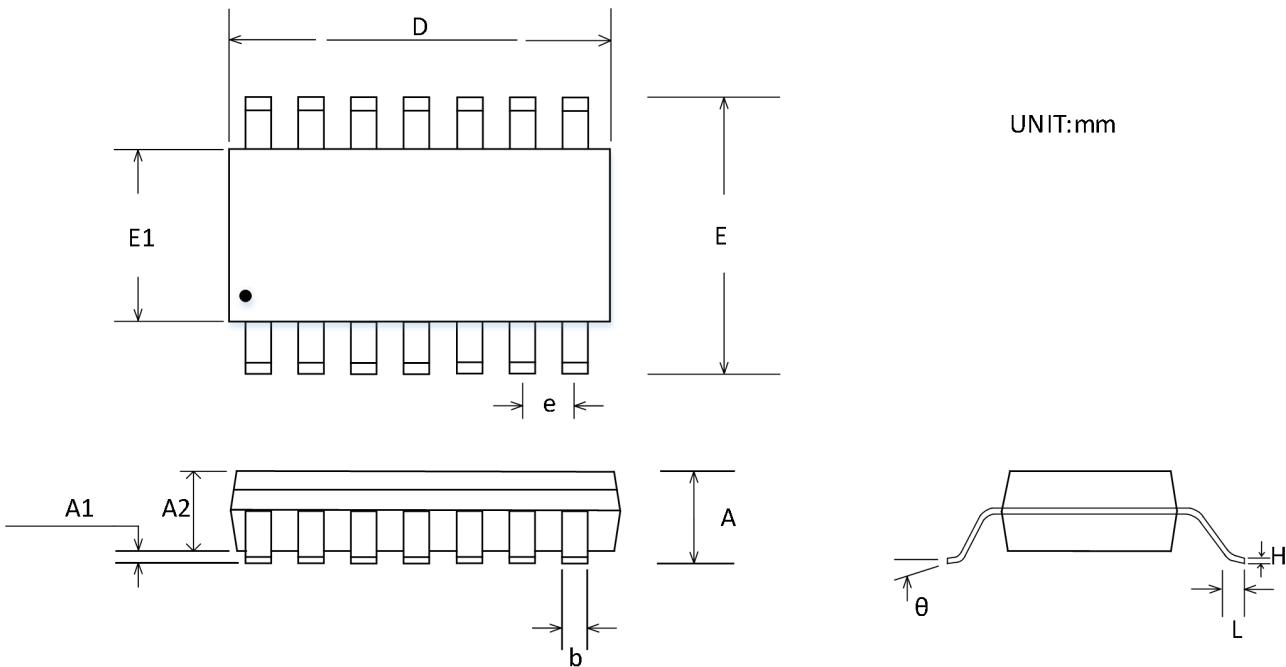
Symbol	Dimensions In Millimeters	
	Min	Max
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.180	0.280
c	0.090	0.230
D	2.900	3.100
E	2.900	3.100
E1	4.750	5.050
e	0.50 BSC	
L	0.400	0.800
θ	0°	6°

TSSOP-14



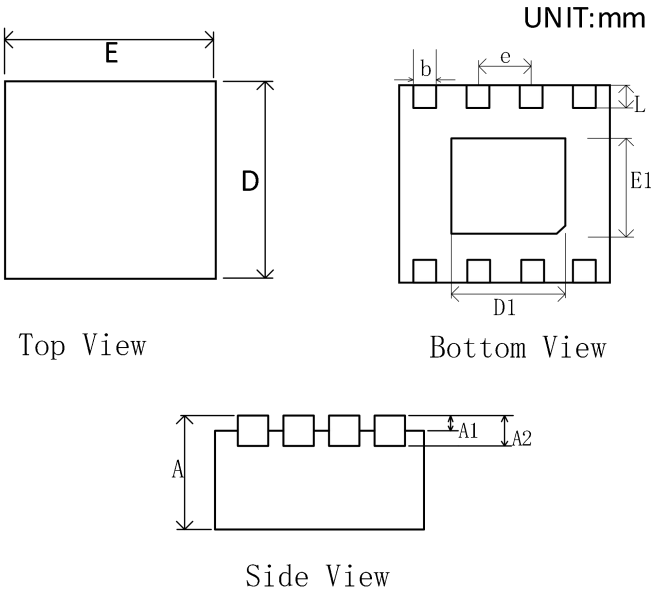
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.20MAX	
A1	0.05	0.15
A2	0.80	1.05
b	0.19	0.30
D	4.90	5.10
E	6.40BSC	
E1	4.30	4.50
e	0.65BSC	
H	0.09	0.20
L	0.45	0.75
θ	0°	8°

SOP-14



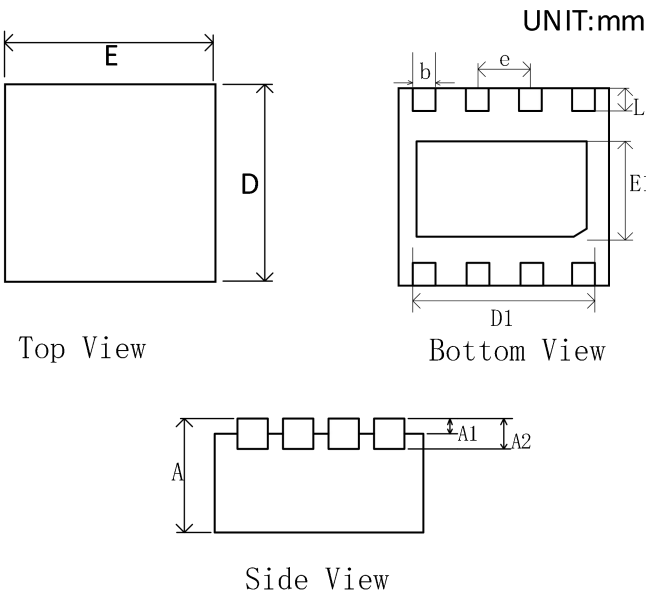
Symbol	Dimensions In Millimeters	
	Min	Max
A	1.35	1.75
A1	0.10	0.25
A2	1.25	1.50
b	0.31	0.51
D	8.55	8.75
E	5.80	6.20
E1	3.80	4.00
e	1.27BSC	
H	0.17	0.25
L	0.40	1.27
θ	0°	8°

TDFN-2x2-8



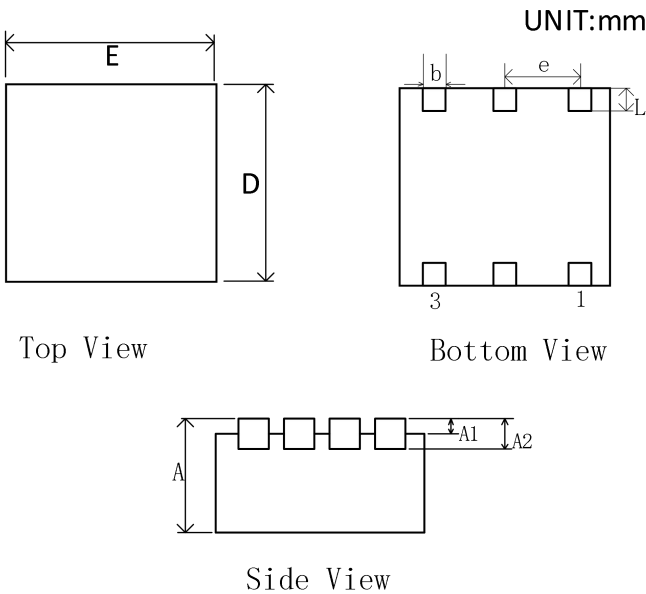
Symbol	Dimensions In Millimeters	
	Min	Max
A	0.700	0.800
A1	0.000	0.050
A2	0.203 TYP	
b	0.180	0.300
D	1.900	2.100
D1	1.100	1.300
E	1.900	2.100
E1	0.600	0.800
e	0.500 TYP	
L	0.250	0.450

TDFN-3×3-8



Symbol	Dimensions In Millimeters	
	Min	Max
A	0.700	0.800
A1	0.000	0.050
A2	0.203 TYP	
b	0.250	0.350
D	2.900	3.100
D1	2.350	2.450
E	2.900	3.100
E1	1.650	1.750
e	0.650 TYP	
L	0.370	0.470

TDFN2x2-6



Symbol	Dimensions In Millimeters	
	Min	Max
A	0.700	0.800
A1	0.000	0.050
A2	0.203 TYP	
b	0.250	0.350
D	1.900	2.100
E	1.900	2.100
e	0.650 TYP	
L	0.250	0.400

Package/Ordering Information

MODEL	TEMPERATURE	PACKAGE DESCRIPTION	PACKAGE OPTION
CDV721AS8	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 2500
CDV721AS8-RL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 3000
CDV721AS8-REEL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 4000
CDV721AST5	-40°C~125°C	SOT23-5	Tape and Reel, 3000
CDV721BST5	-40°C~125°C	SOT23-5	Tape and Reel, 3000
CDV721AMS8	-40°C~125°C	MSOP-8	Tape and Reel, 3000
CDV721ATDE6	-40°C~125°C	TDFN2x2-6	Tape and Reel, 3000
CDV721SAS8	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 2500
CDV721SAS8-RL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 3000
CDV721SAS8-REEL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 4000
CDV721SAT6	-40°C~125°C	SOT23-6	Tape and Reel, 3000
CDV722AS8	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 2500
CDV722AS8-RL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 3000
CDV722AS8-REEL	-40°C~125°C	SOIC-8(SOP8)	Tape and Reel, 4000
CDV722AMS8	-40°C~125°C	MSOP-8	Tape and Reel, 3000
CDV722ATDE8	-40°C~125°C	TDFN2x2-8	Tape and Reel, 3000
CDV722ATDC8	-40°C~125°C	TDFN3x3-8	Tape and Reel, 3000
CDV722SAS10	-40°C~125°C	SOIC-10(SOP-10)	Tape and Reel, 2500
CDV722SAS10-RL	-40°C~125°C	SOIC-10(SOP-10)	Tape and Reel, 3000
CDV722SAS10-REEL	-40°C~125°C	SOIC-10(SOP-10)	Tape and Reel, 4000
CDV724AS14	-40°C~125°C	SOIC-14(SOP14)	Tape and Reel, 2500
CDV724AS14-RL	-40°C~125°C	SOIC-14(SOP14)	Tape and Reel, 3000
CDV724AS14-REEL	-40°C~125°C	SOIC-14(SOP14)	Tape and Reel, 4000
CDV724ATS14	-40°C~125°C	TSSOP-14	Tape and Reel, 2500
CDV724ATS14-RL	-40°C~125°C	TSSOP-14	Tape and Reel, 3000
CDV724ATS4-REEL	-40°C~125°C	TSSOP-14	Tape and Reel, 4000

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	