CoreadDvices
承芯微电子

CDV321_CDV358_CDV324

Low-power, general-purpose operational amplifier

Version: Rev 1.0.0 Date: 2025-6-3

Features

- High gain bandwidth : 1.1MHz
- Rail-to-rail input and output 0.8mV typical VOS
- Input voltage range : -0.1V to +5.6V with Vs = 5.5V
- Supply range : +2.5V to +5.5V
- Shutdown : CDV321S/CDV358S
- Specified up to +125°C
- Micro size packages : SOT23-5, SOT23-6

Application

- Sensors
- Photo diode Amplification
- Active Filters
- Test Equipment
- Driving A/D Converters

Description

The CDV321, CDV358, CDV324, CDV321S, CDV358S 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 (1.1MHz) and slew rate of 0.5V/us. The op-amps are unity gain stable and feature an ultra-low input bias current.

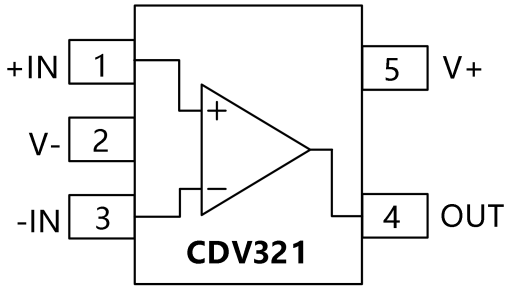
The devices are ideal for sensor interfaces, active filters and portable applications. The CDV321S, CDV358S include a shutdown mode. Under logic control, the amplifiers can be switched from normal operation to a standby current that is less than 1uA.The CDV321, CDV358, CDV324, CDV321S, CDV358S families 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.

Chinese version:CDV321_CDV358_CDV324

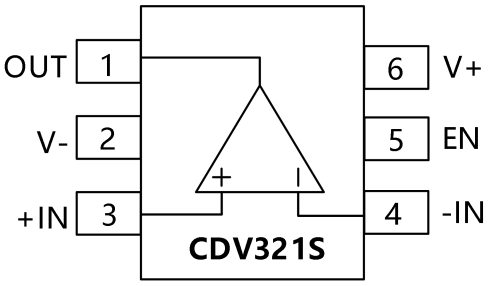
Contents

Chinese version:CDV321_CDV358_CDV324

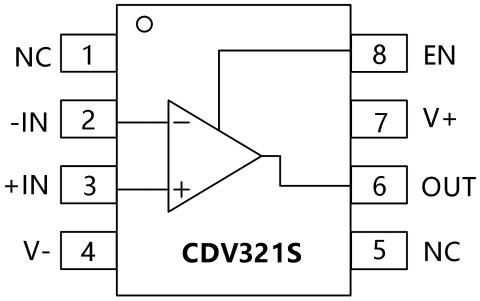
Pin Configurations



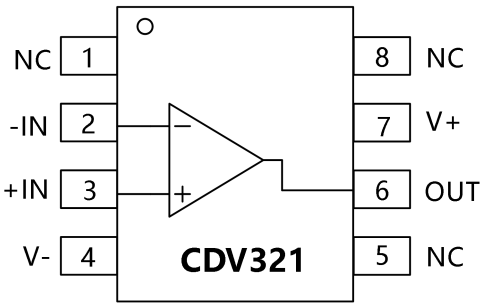
SOT23-5（AST5）



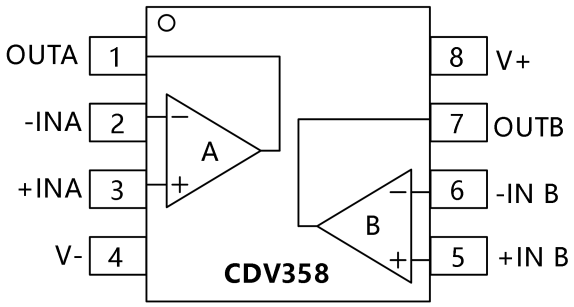
SOT23-6



SOIC-8(SOP8)

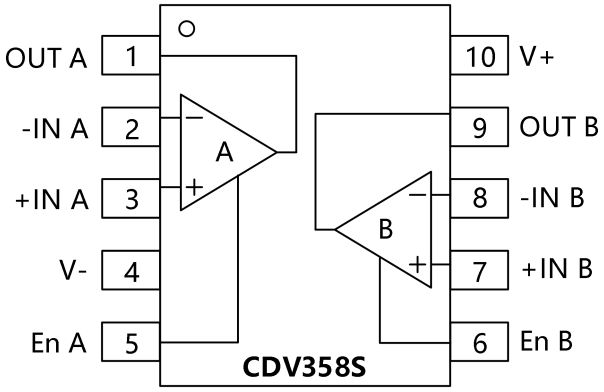


SOIC-8(SOP8),MSOP-8

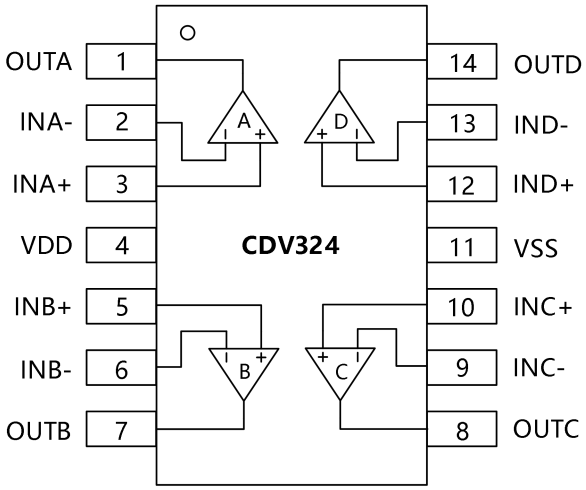


SOIC-8(SOP8),MSOP-8

Chinese version:CDV321_CDV358_CDV324



MSOP-10



SOIC-14(SOP14),TSSOP-14

Absolute Maximum Ratings

Condition	Min	Max
Power Supply Voltage (V_{DD} to VSS)	-0.5V	+7.5V
Analog Input Voltage (IN+ or IN-)	VSS-0.5V	V_{DD}+0.5V
PDB Input Voltage	VSS-0.5V	+7V
Operating Temperature Range	-40℃	+125℃
Junction Temperature	+160℃	
Storage Temperature Range	-65℃	+150℃
Lead Temperature (soldering, 10sec)	+260℃	
Package Thermal Resistance (T_A=+25℃)		
SOT23-5, SOT23-6	200°C/W	
MSOP-10, SOIC-8	150°C/W	
SOIC-14, TSSOP-14	100°C/W	

ESD Susceptibility	
HBM	5KV
MM	400V

Electrical characteristics

(At T_A = +25℃, Vs=5V, R_L = 10kΩ connected to V_S/2, and V_{OUT} = V_S/2, unless otherwise noted.)

PARAMETER		CONDITIONS	TJ	CDV321, CDV358, CDV324, CDV321S, CDV358S			UNIT
				MIN	TYP	MAX	
POWER SUPPLY							
V_S	Operating Voltage Range		25℃	2.5		5.5	V
I_Q	Quiescent Current/Amplifier		25℃		60	80	uA
PSRR	Power-Supply Rejection Ratio	V_S=2.5V to 5.5V, V_{CM}=(V-)+0.5V	25℃	62	85		dB
			-40℃ to 125℃	58			
INPUT							
V_{OS}	Input Offset Voltage		25℃		0.8	4.5	mV
V_{OS} TC	Input Offset Voltage Average Drift	-40℃ to 125℃			2.9		uV/℃
I_B	Input Bias Current		25℃		1	10	pA
I_{OS}	Input Offset Current		25℃		1	10	pA
V_{CM}	Common-Mode Voltage Range	V_S= 5.5V	25℃	-0.1		5.6	V
CMRR	Common-Mode Rejection Ratio	V_S= 5.5V, V_{CM}=-0.1V to 4V	25℃	65	80		dB
			-40℃ to 125℃	62			
		V_S= 5.5V, V_{CM}=-0.1V to 5.6V	25℃	57	75		
			-40℃ to 125℃	55			
OUTPUT							
A_{OL}	Open-Loop Voltage Gain	R_L=2KΩ, V_O=0.15V to 4.85V	25℃	75	95		dB
			-40℃ to 125℃	72			
		R_L=10KΩ, V_O=0.05V to 4.95V	25℃	85	100		
			-40℃ to 125℃	82			
	Output Swing From Rail	R_L=2KΩ	25℃		26		mV
		R_L=10KΩ			8		

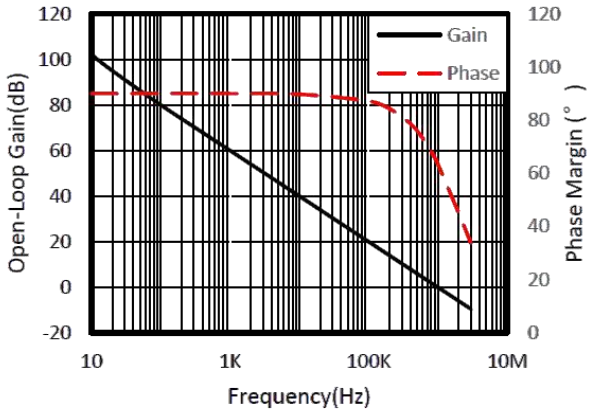
Chinese version:CDV321_CDV358_CDV324

I_{OUT}	Output Short-Circuit Current		25℃		54		mA
FREQUENCY RESPONSE							
SR	Slew Rate		25℃		0.5		V/us
GBP	Gain-Bandwidth Product		25℃		1.1		MHz
PM	Phase Margin		25℃		64		°
ts	Setting Time,0.1%				1.3		us
	Overload Recovery Time	V_{IN}·Gain≥V_S			2.3		us
NOISE							
en	Input Voltage Noise Density	f = 1KHz	25℃		23		$\mathbf{nV}/\sqrt{\boldsymbol{Hz}}$
		f = 10KHz	25℃		20		$\mathbf{nV}/\sqrt{\boldsymbol{Hz}}$
ENABLE/SHUTDOWN(CDV321S,CDV358S)							
$I_{Q(OFF)}$	Supply Current in Shutdown		25℃		<1		uA
t_{OFF}			25℃		3		us
t_{ON}			25℃		20		us
V_L	Shut Down		25℃	V-		(V-)+0.8	V
V_H	Amplifier Is Active		25℃	(V-)+2		V+	V

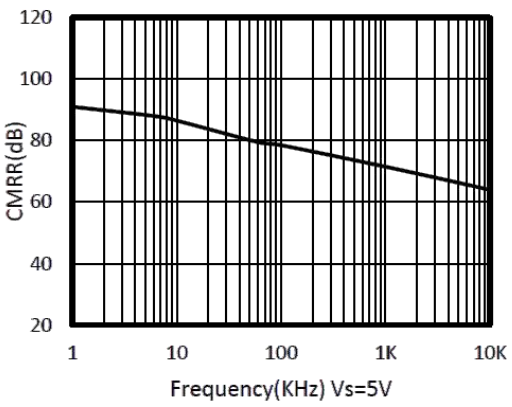
Typical Characteristics

At T_A = +25℃, V_S=5V, R_L = 10kΩ connected to V_S/2, V_{OUT} = V_S/2, unless otherwise noted.

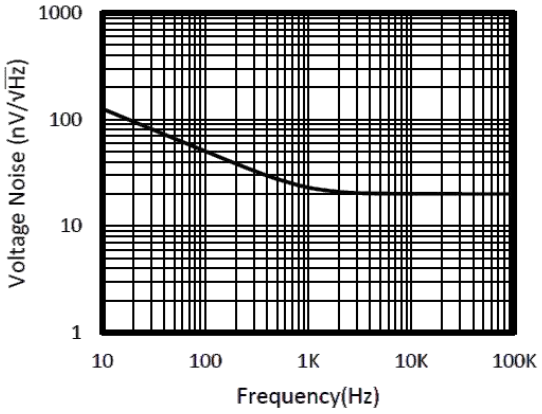
OPEN-LOOP GAIN AND PHASE vs FREQUENCY



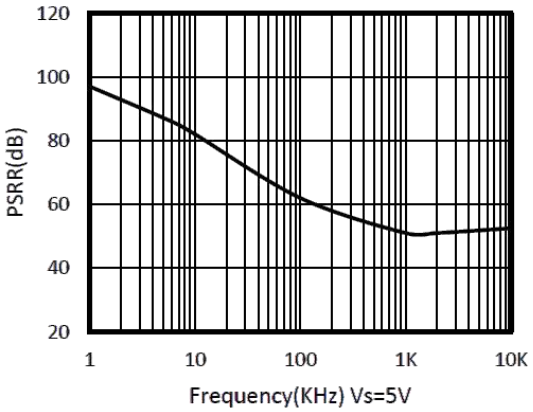
COMMON-MODE REJECTION RATIO vs FREQUENCY



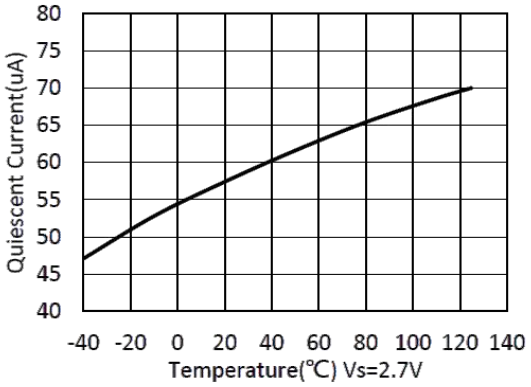
INPUT VOLTAGE NOISE SPECTRAL DENSITY vs FREQUENCY



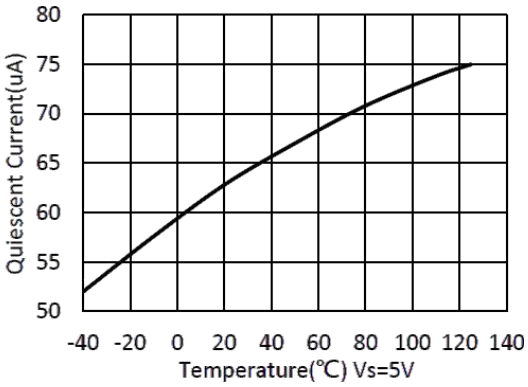
POWER-SUPPLY REJECTION RATIO vs FREQUENCY



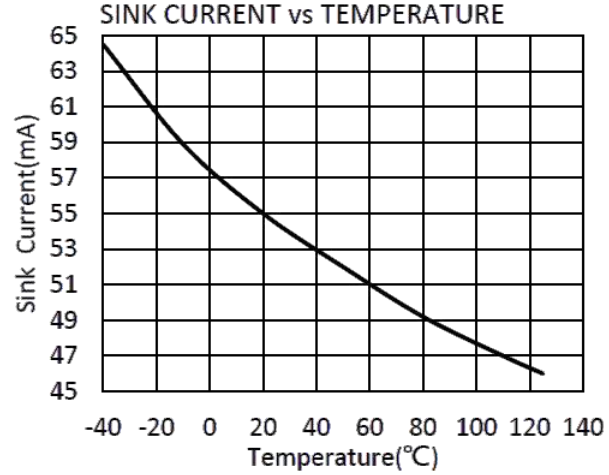
QUIESCENT CURRENT vs TEMPERATURE



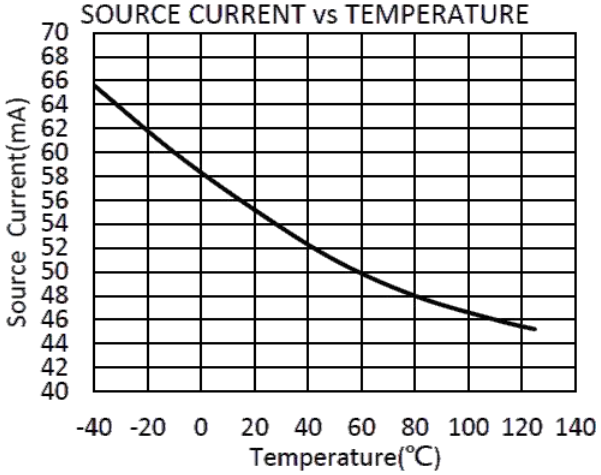
QUIESCENT CURRENT vs TEMPERATURE



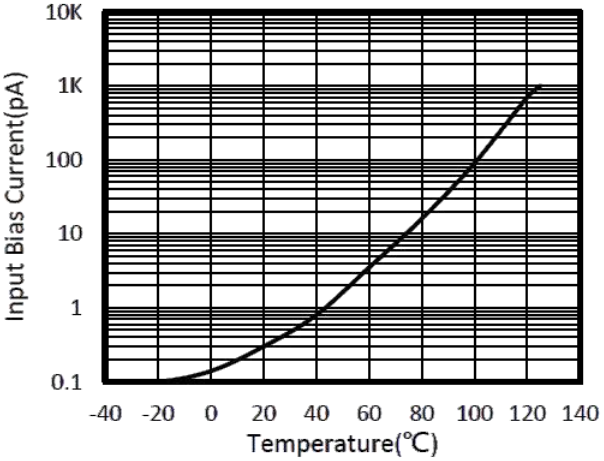
SINK CURRENT vs TEMPERATURE



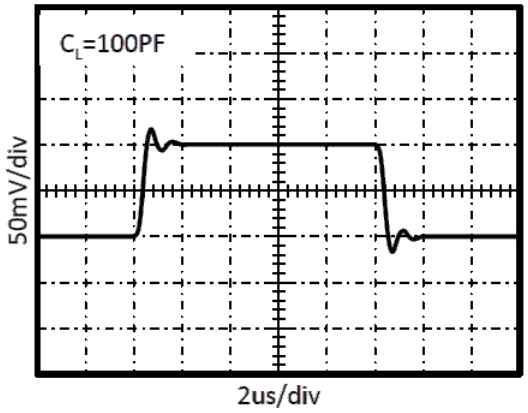
SOURCE CURRENT vs TEMPERATURE



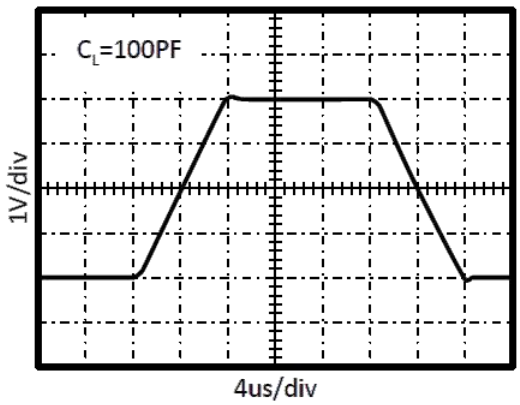
INPUT BIAS CURRENT vs TEMPERATURE



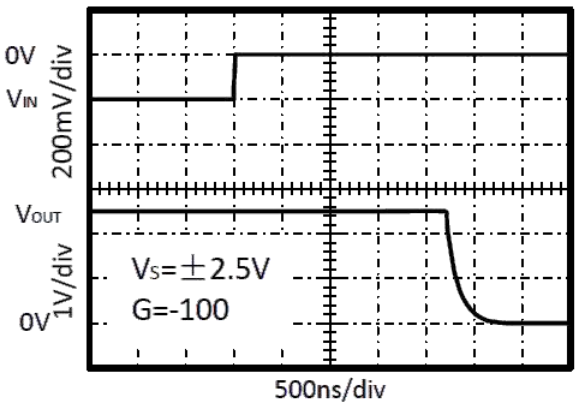
SMALL-SIGNAL STEP RESPONSE



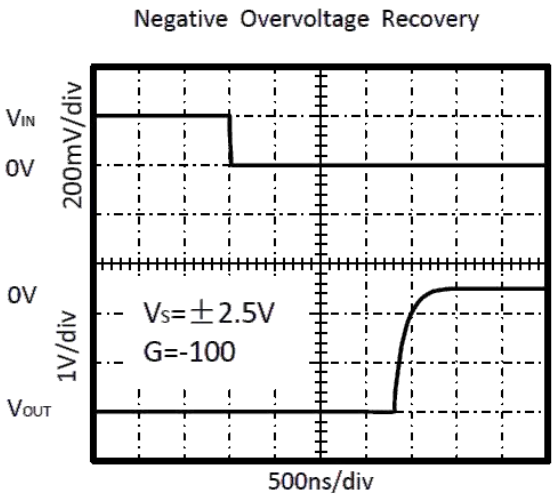
LARGE-SIGNAL STEP RESPONSE

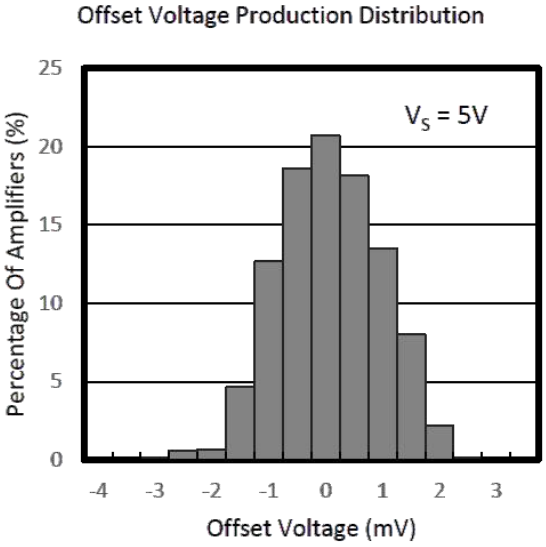


POSITIVE OVERVOLTAGE RECOVERY



Chinese version:CDV321_CDV358_CDV324





Application Notes

The CDV321, CDV358, CDV324, CDV321S, CDV358S are high precision, rail-to-rail operational amplifiers that can be run from a single-supply voltage 2.5V to 5.5V (±1.25V to ± 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.

CDV321S/CDV358S Enable Function

The CDV321S/CDV358S 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.

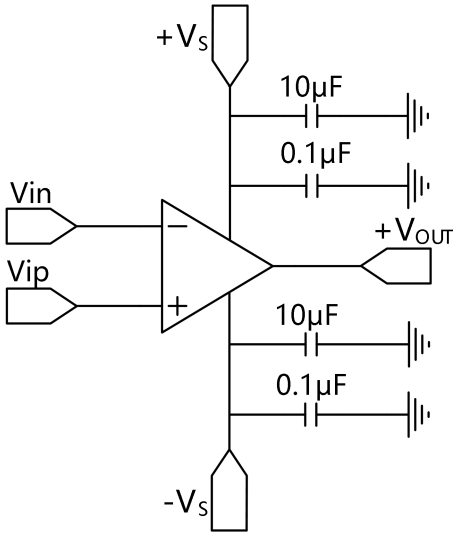


Figure 1. Amplifier with Bypass Capacitors

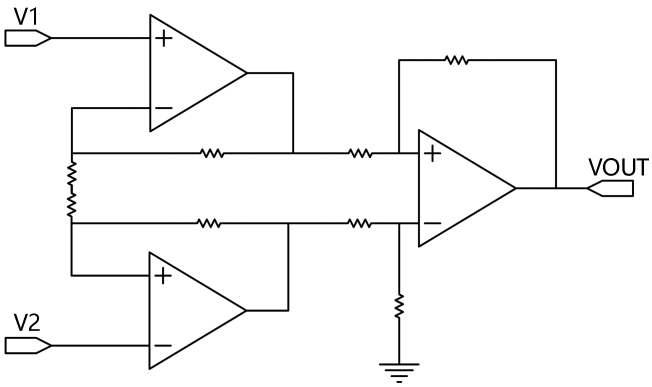
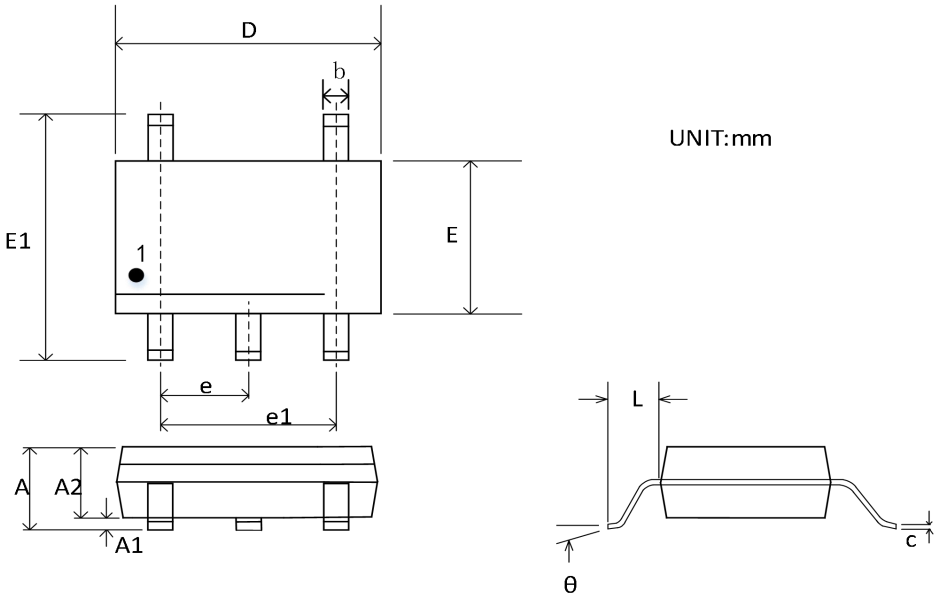


Figure2. Amplifier instrumentation amplifier

Package Outline Dimensions

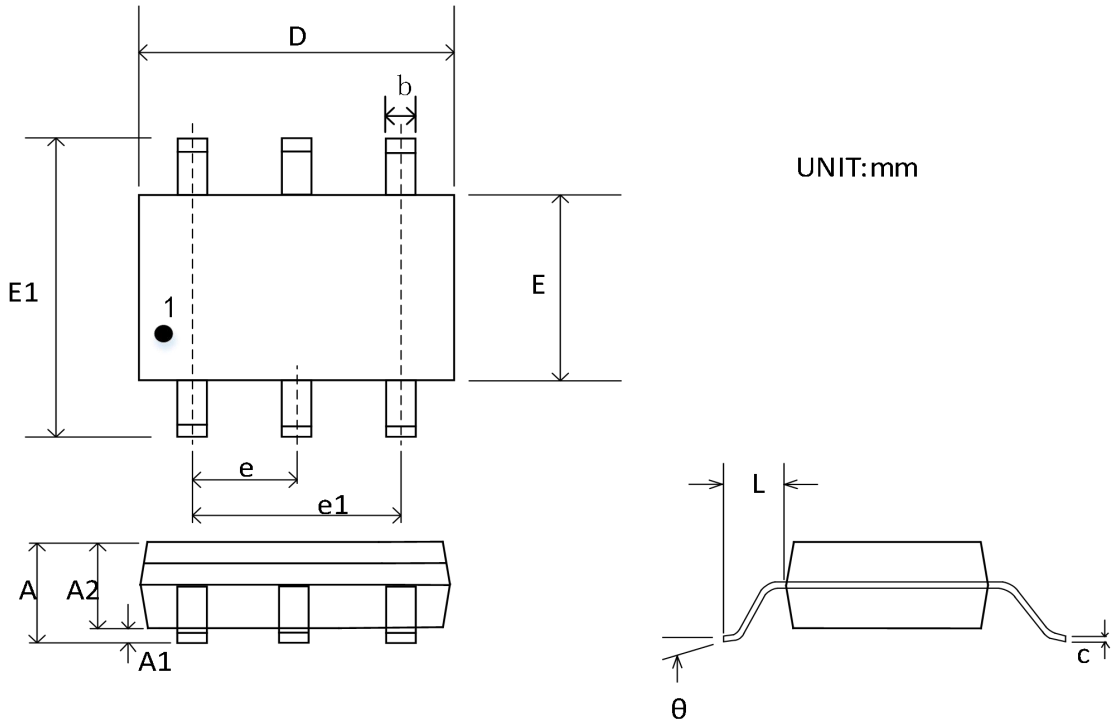
SOT23-5



Symbol	Dimensions In Millimeters	
	Min	Max
A	1.050	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	1.800	2.000
L	0.300	0.600
θ	0°	8°

Chinese version:CDV321_CDV358_CDV324

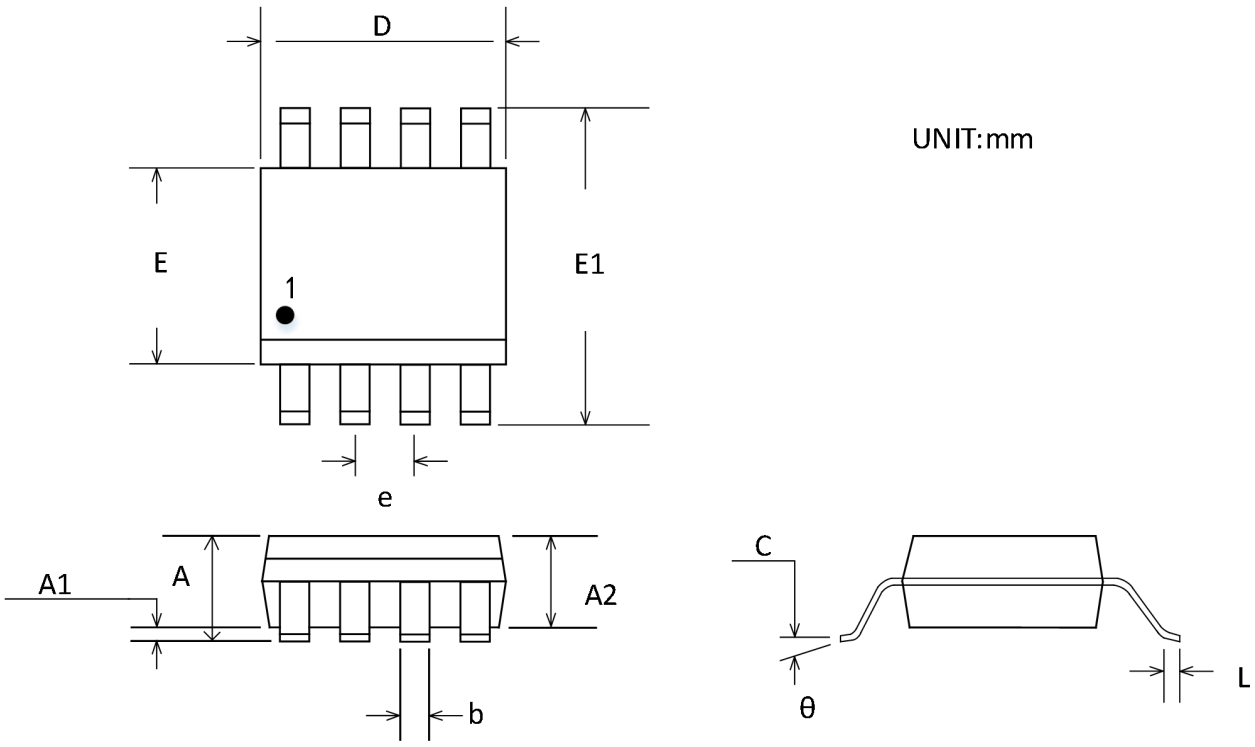
SOT23-6



UNIT:mm

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

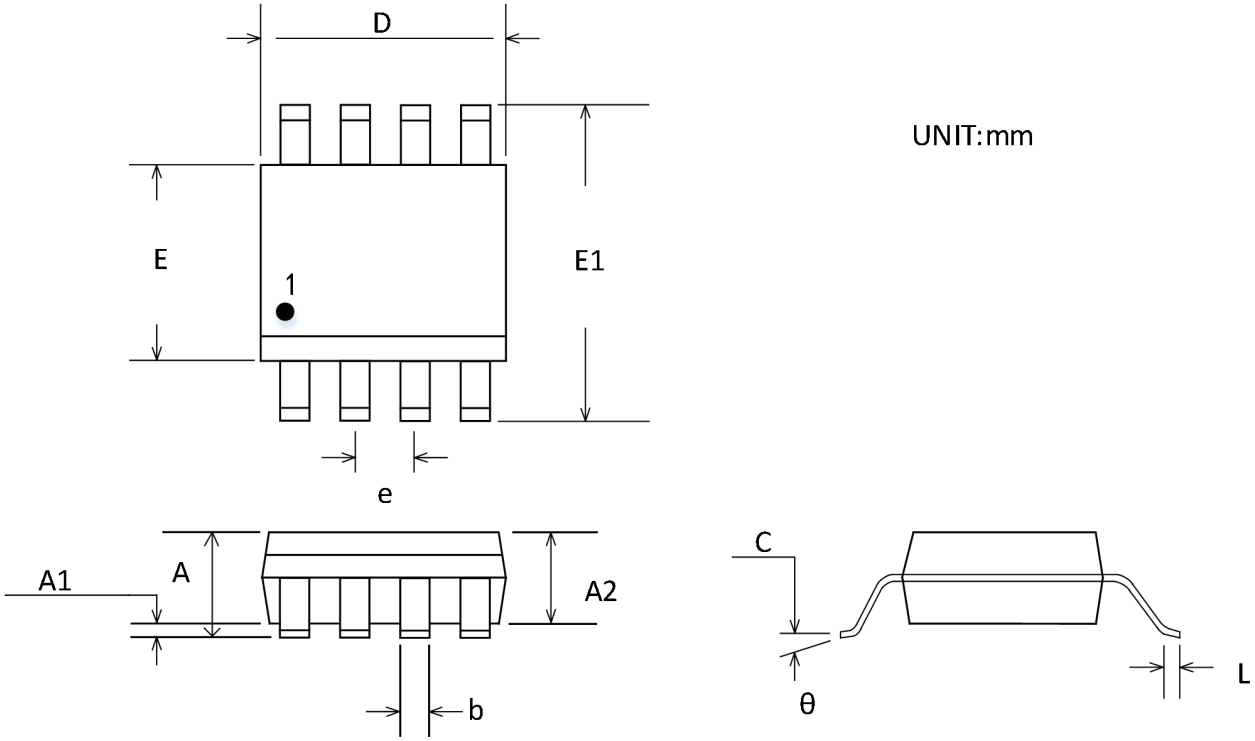


UNIT:mm

Symbol	Dimensions In Millimeters	
	Min	Max
A	0.820	1.100
A1	0.020	0.150
A2	0.750	0.950
b	0.250	0.380
c	0.090	0.230
D	2.900	3.100
E	2.900	3.100
E1	4.750	5.050
e	0.650 BSC	
L	0.400	0.800
θ	0°	6°

Chinese version:CDV321_CDV358_CDV324

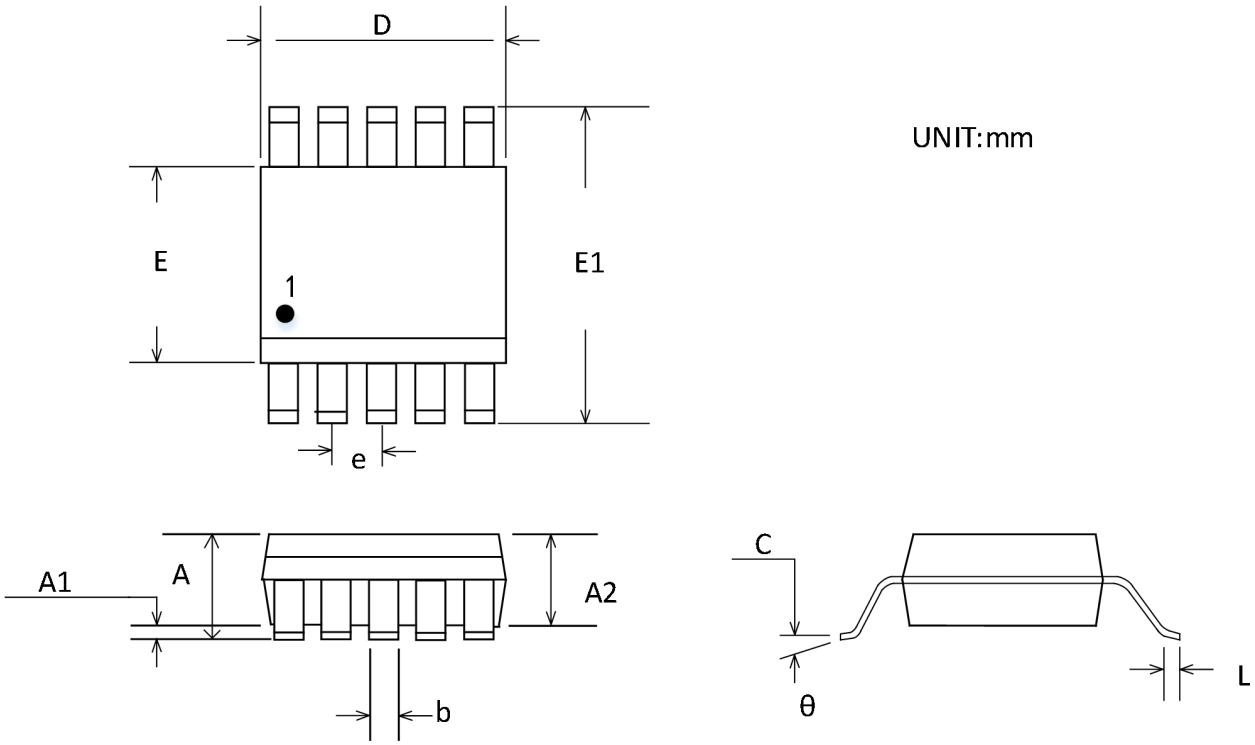
SOP-8



UNIT:mm

Symbol	Dimensions In Millimeters	
	Min	Max
A	1.350	1.750
A1	0.100	0.250
A2	1.350	1.550
b	0.330	0.510
c	0.170	0.250
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°

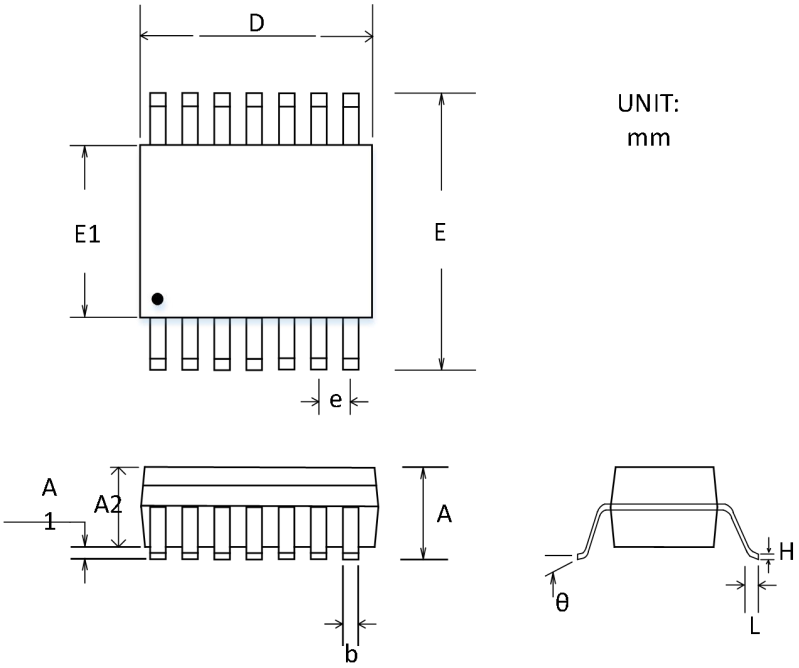
MSOP-10



UNIT:mm

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°

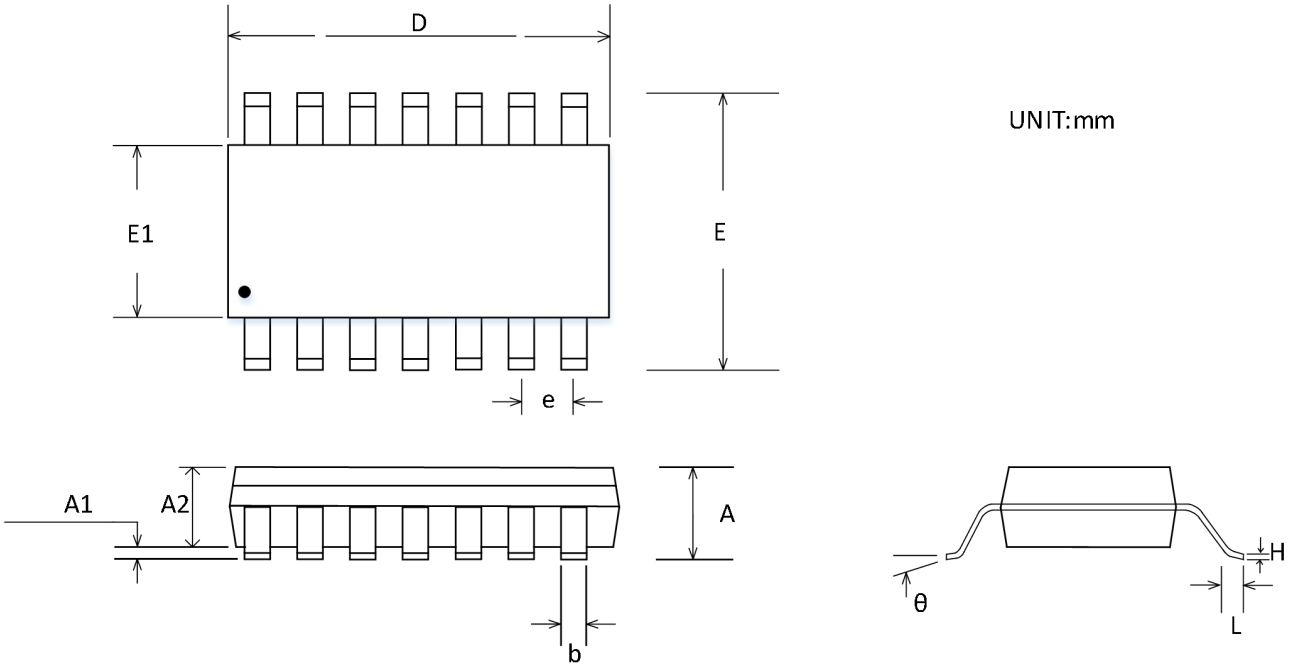
TSSOP-14



UNIT:
mm

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



UNIT:mm

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
CDV321AS8	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 2500
CDV321AS8-RL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 3000
CDV321AS8-REEL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 4000
CDV321AST5	-40℃~125℃	SOT23-5	Tape and Reel, 3000
CDV321AMS8	-40℃~125℃	MSOP-8	Tape and Reel, 3000
CDV321SAS8	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 2500
CDV321SAS8-RL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 3000
CDV321SAS8-REEL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 4000
CDV321SAST6	-40℃~125℃	SOT23-6	Tape and Reel, 3000
CDV358AS8	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 2500
CDV358AS8-RL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 3000
CDV358AS8-REEL	-40℃~125℃	SOIC-8(SOP8)	Tape and Reel, 4000
CDV358AMS8	-40℃~125℃	MSOP-8	Tape and Reel, 3000
CDV358AMS	-40℃~125℃	MSOP-10	Tape and Reel, 3000
CDV324AS14	-40℃~125℃	SOIC-14(SOP14)	Tape and Reel, 2500
CDV324AS14-RL	-40℃~125℃	SOIC-14(SOP14)	Tape and Reel, 3000
CDV324AS14-REEL	-40℃~125℃	SOIC-14(SOP14)	Tape and Reel, 4000
CDV324ATS14	-40℃~125℃	TSSOP-14	Tape and Reel, 2500
CDV324ATS14-RL	-40℃~125℃	TSSOP-14	Tape and Reel, 3000
CDV324ATS14-REEL	-40℃~125℃	TSSOP-14	Tape and Reel, 4000

Chinese version:CDV321_CDV358_CDV324

Revision Log

Version	Revision date	Change content	Reason for Change	Modified by	Reviewed By	Note
V1.0	2025.6.3	Initial version	Regular update	WW	LYL	