

DIO202x

190μA, 3MHz RRIO CMOS Amplifier

Features

- Rail-to-Rail Input and Output
- $\pm 1\text{mV}$ Typical offset (V_{OS})
- V_{OSMAX} Specificity: $\pm 4.9\text{mV}$
- Low Distortion
- Gain Bandwidth Product: 3MHz
- Wide supply range: 2.5V to 5.5V
- 190μA/Amplifier typical supply current
- Slew rate: 1.7V/μs
- Small size packaging best for portable applications.
- DIO2021: Available in SOT23-5
DIO2022: Available in SOIC-8
DIO2024: Available in SOIC-14 and TSSOP-14

Descriptions

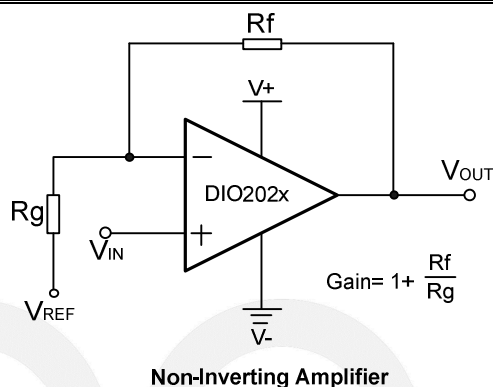
The DIO202x is a rail-to-rail I/O operational amplifier which allows low load impedances to be driven. With a 3MHz unity-gain frequency and low noise, low distortion and high output current capability, the DIO202x provides excellent choice for high quality systems. The input common-mode voltage range includes ground, and the maximum input offset voltage is $\pm 1\text{mV}$ (guaranteed). They are also capable of comfortably driving large capacitive loads.

DIO202x is offered in RoHS or Green package and ESD (HBM) 8kV. It is specified over the extended -40 to +125°C

Applications

- Portable Equipment
- Active Filters
- Data Acquisition
- Portable Equipment
- Test Equipment
- Broadband Communication
- Process Control
- Audio and Video Processing

Typical Application



Ordering Information

Order Part Number	Top Marking		T_A	Package	
DIO2021ST5	YW(X)Z	RoHS or Green	-40 to +125°C	SOT23-5	Tape & Reel, 3000
DIO2022SO8	DIO2022	RoHS or Green	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO2024CS14	DIO2024	RoHS or Green	-40 to +125°C	SOIC-14	Tape & Reel, 2500
DIO2024CT14	DIO2024	RoHS or Green	-40 to +125°C	TSSOP-14	Tape & Reel, 2500

Pin Assignments

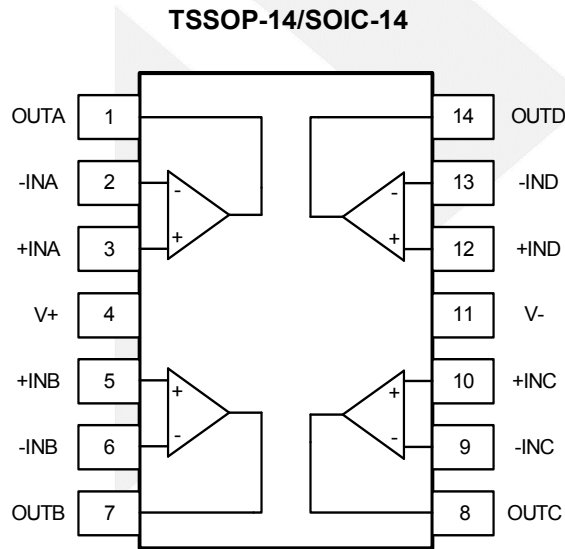
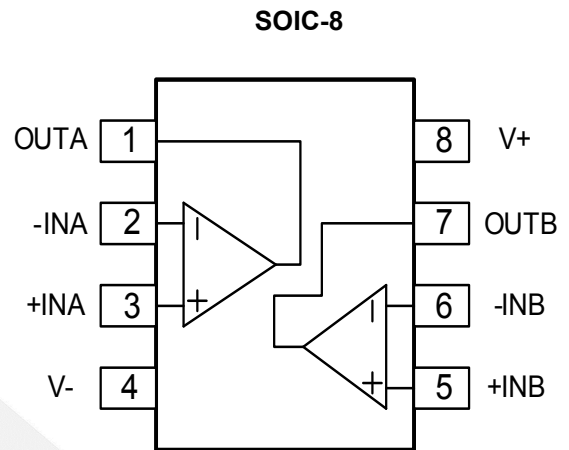
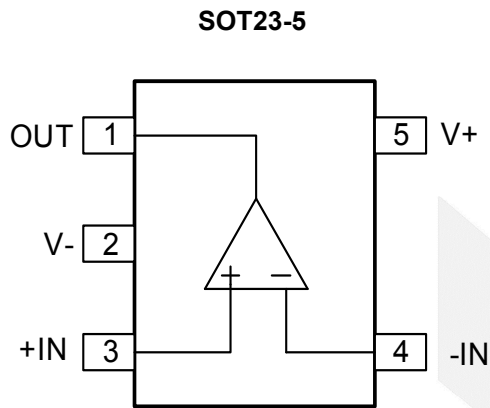


Figure 1 Pin Assignment (Top View)

Pin Description

Pin name	Description
V+	Positive supply
V-	Negative supply
+INX	Positive Input
-INX	Negative Input
OUTX	Output

Absolute Maximum Ratings

Stresses beyond those listed under “Absolute Maximum Rating” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

Parameter		Rating	Unit
Supply Voltage		7.5	V
Input Voltage		(V ₋)-0.5 to (V ₊)+0.5	V
Storage Temperature Range		-65 to 150	°C
Junction Temperature		150	°C
Lead Temperature Range		260	°C
ESD	HBM, JEDEC: JESD22-A114	8	kV
	CDM, JEDEC: JESD22-C101	2	

Recommended Operating Conditions

The Recommended Operating Conditions table defines the conditions for actual device operation to ensure optimal performance to the datasheet specifications. DIOO does not recommend exceeding them or designing to Absolute Maximum Ratings.

Parameter	Rating	Unit
Supply Voltage	2.5 to 5.5	V
Input Voltage	0 to 5	V
Operating Temperature Range	-40 to 125	°C



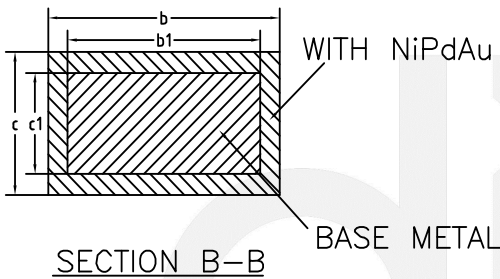
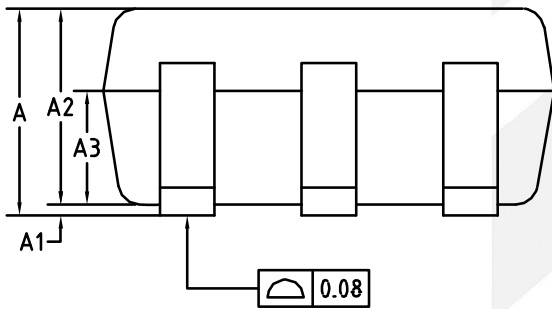
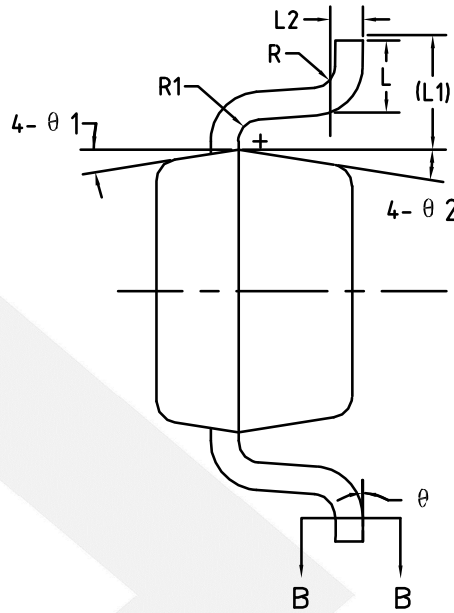
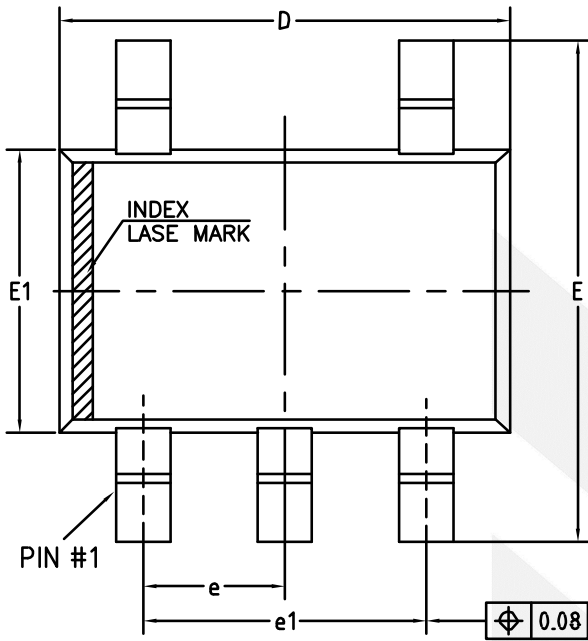
Electrical Characteristics

Typical value: $V_+=5V$, $R_L=100k\Omega$ to $V_+/2$, $T_A=25^\circ C$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
INPUT CHARACTERISTICS							
V_{OS}	Input Offset Voltage	$V_+=2.5V$ to $5.5V$	$T_A=25^\circ C$		± 1	± 4.9	mV
			$-40^\circ C \leq T_A \leq 85^\circ C$		± 1	± 5.2	mV
			$-40^\circ C \leq T_A \leq 125^\circ C$		± 1	± 5.3	mV
I_B	Input Bias Current	$-40^\circ C \leq T_A \leq 125^\circ C$, $V_+=2.5V$ to $5.5V$		1	10	pA	
I_{OS}	Input Offset Current	$-40^\circ C \leq T_A \leq 125^\circ C$, $V_+=2.5V$ to $5.5V$		1	10	pA	
V_{CM}	Common Mode Voltage Range	$V_+=5.5V$	-0.1		5.6	V	
CMRR	Common Mode Rejection Ratio	$-40^\circ C \leq T_A \leq 125^\circ C$, $V_{CM}=-0.1$ to $5.6V$, $V_+=5.5V$	80	120		dB	
A_{OL}	Open Loop Voltage Gain	$R_L=600\Omega$, $V_o=0.1$ to 4.9	90	120		dB	
$\Delta V_{OS}/\Delta T$	Input Offset Voltage Drift	$-40^\circ C \leq T_A \leq 125^\circ C$		2.5		$\mu V/^\circ C$	
OUTPUT CHARACTERISTICS							
	Output Voltage Swing from Rail	$R_L=600\Omega$ $-40^\circ C \leq T_A \leq 125^\circ C$			0.1	V	
		$R_L=10k\Omega$ $-40^\circ C \leq T_A \leq 125^\circ C$			0.015		
I_{OUT}	Output Current	$V_+=5V$		80		mA	
R_o	Closed Loop Output Impedance	$F=100kHz$, $G=+1$		3.1		Ω	
POWER SUPPLY							
PSRR	Power Supply Rejection Ration		70	80		dB	
I_S	Supply Current per Channel/Amp	$V_+=5V$, $-40^\circ C \leq T_A \leq 125^\circ C$		190	250	μA	
		$V_+=2.5V$, $-40^\circ C \leq T_A \leq 125^\circ C$		180	250		
DYNAMIC PERFORMANCE							
GBP	Gain Bandwidth Product	$R_L=10k\Omega$		3		MHz	
SR	Slew Rate	$R_L=600\Omega$, $G=1$, 2V Output Step		1.7		V/ μs	
t_s	Setting Time	$R_L=600\Omega$, $G=1$, 2V Output Step			1	μs	
NOISE PERFORMANCE							
THD	Total Harmonic Distortion	$f=10kHz$, 1V Output Step, $R_L=600\Omega$ and $100pF$		0.015		%	
e_n	Voltage Noise Density	$f=1kHz$, $V_+=5V$		27		nV/\sqrt{Hz}	
		$f=10kHz$, $V_+=5V$		18			

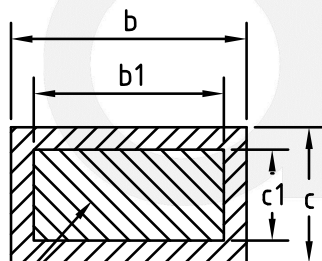
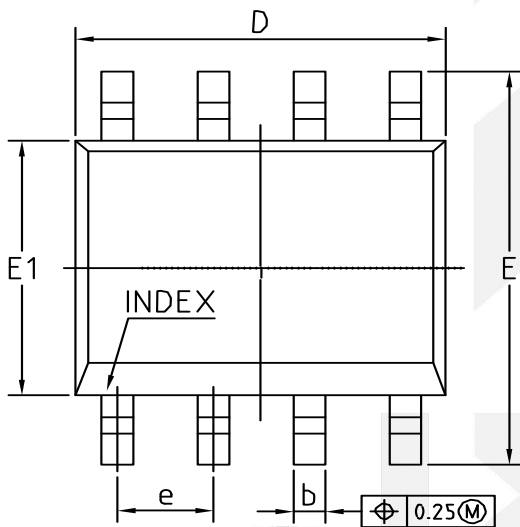
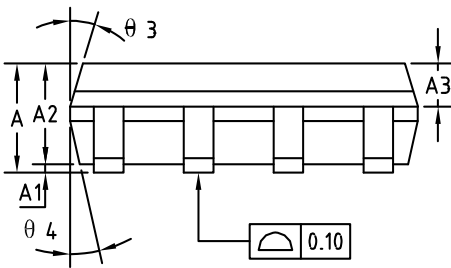
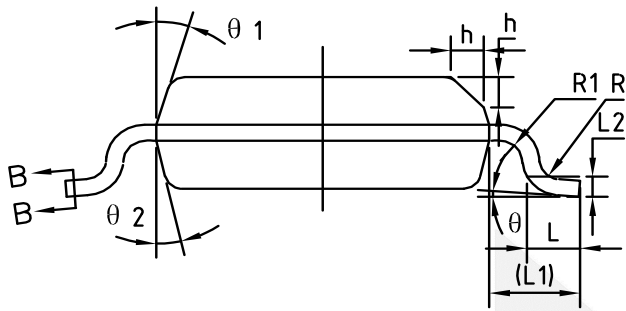
Specifications subject to change without notice.

Physical Dimensions: SOT-23-5



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	-	-	1.25
A1	0	-	0.15
A2	1.00	1.10	1.20
A3	0.60	0.65	0.70
b	0.36	-	0.50
b1	0.36	0.38	0.45
c	0.14	-	0.20
c1	0.14	0.15	0.16
D	2.826	2.926	3.026
E	2.60	2.80	3.00
E1	1.526	1.626	1.726
e	0.90	0.95	1.00
e1	1.80	1.90	2.00
L	0.35	0.45	0.60
L1	0.59REF		
L2	0.25BSC		
R	0.10	-	-
R1	0.10	-	0.25
θ	0°	-	8°
θ1	3°	5°	7°
θ2	6°	-	14°

Physical Dimensions: SOIC-8

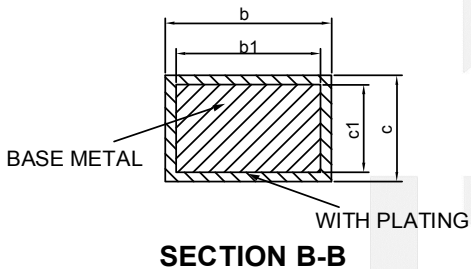
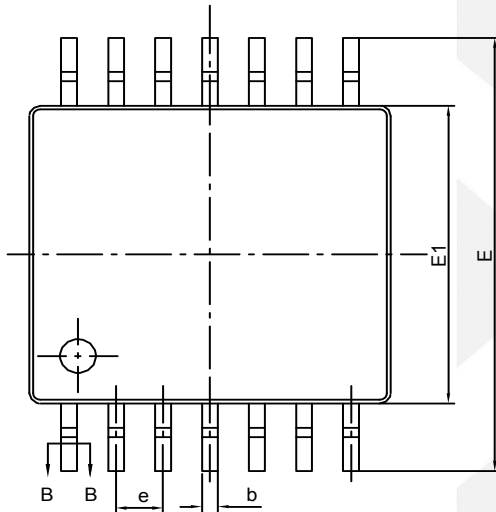
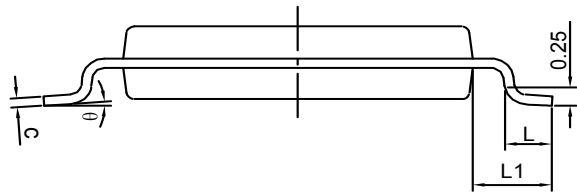
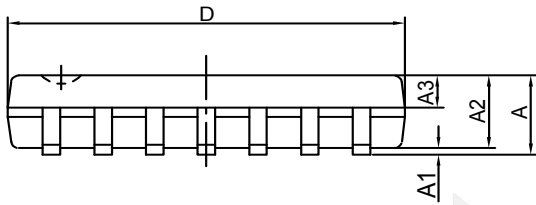


BASE METAL

SECTION B-B

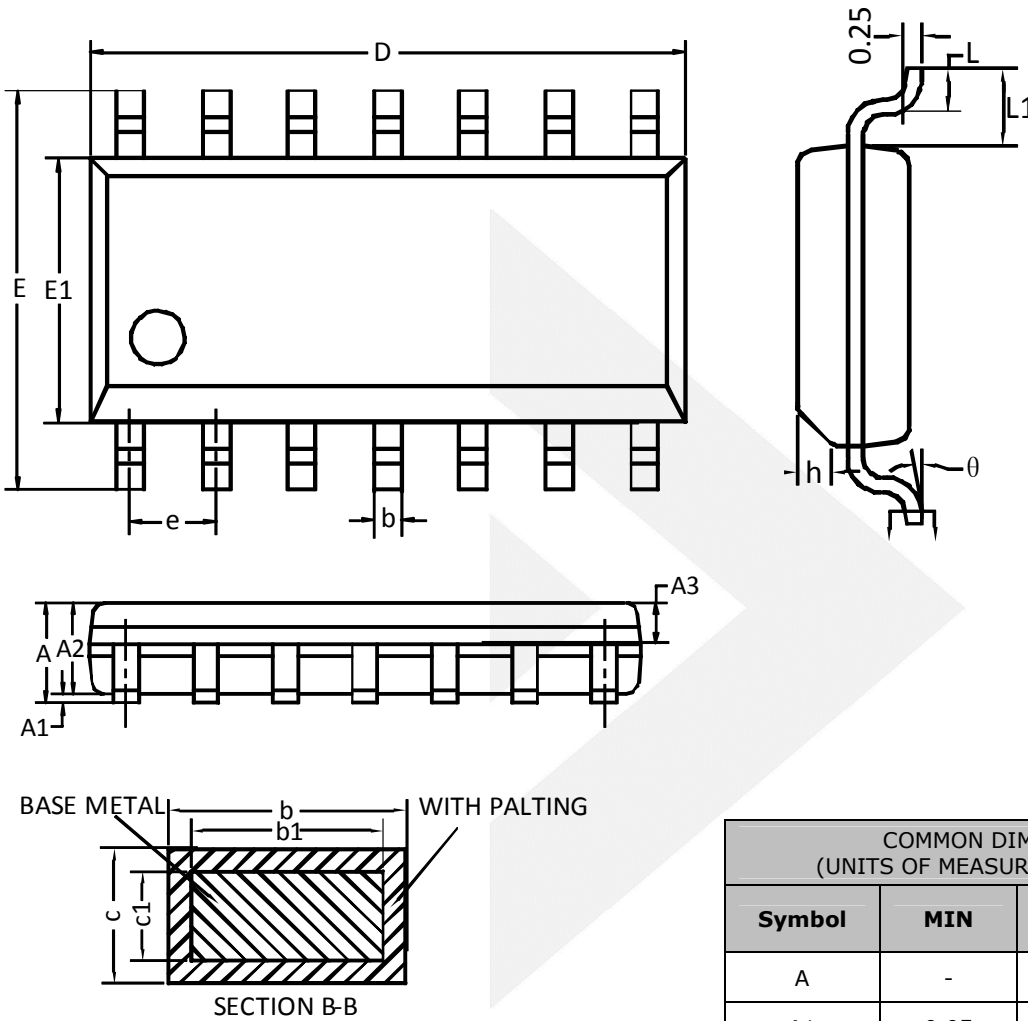
COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.17	-	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
θ	0°	-	8°
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°

Physical Dimensions: TSSOP-14



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	-	-	1.20
A1	0.05	-	0.15
A2	0.90	1.00	1.05
A3	0.39	0.44	0.49
b	0.20	-	0.30
b1	0.19	0.22	0.25
c	0.13	-	0.19
c1	0.12	0.13	0.14
D	4.86	4.96	5.06
E1	4.30	4.40	4.50
E	6.20	6.40	6.60
e	0.65BSC		
L	0.45	-	0.75
L1	1.00BSC		
∅	0°	-	8°
L/F 载体尺寸 (mil)	79*79		90*110
	118*153		

Physical Dimensions: SOIC-14



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	-	-	1.75
A1	0.05	-	0.225
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39	-	0.47
b1	0.38	0.41	0.44
c	0.20	-	0.24
c1	0.19	0.20	0.21
D	8.55	8.65	8.75
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27BSC		
h	0.25	-	0.50
L	0.50	-	0.80
L1	1.05REF		
θ	0°	-	8°

CONTACT US

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