

## DIO2361A

### Ultra Low Vos, Low Power Amplifier

#### Features

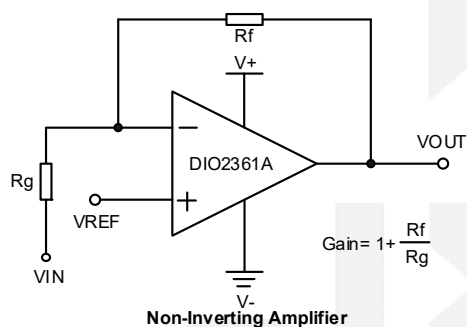
- Ultra low  $V_{OS}$ : DIO2361AA: 10 $\mu$ V(Max)  
DIO2361AB: 20 $\mu$ V(Max)  
DIO2361A0: 40 $\mu$ V(Max)  
DIO2361AM: 65 $\mu$ V(Max)
- Low Power: 17.0 $\mu$ A(typ.)
- Unity Gain Stable
- Gain Bandwidth Product: 300kHz(typ.)
- Wide supply range: 1.8V to 5.5V
- Available in SOT23-5 and SC70-5 packages
- Temperature Range:
  - Industrial: -40°C to 85°C
  - Extended: -40°C to 125°C

#### Descriptions

DIO2361A is an ultra low  $V_{OS}$  operational amplifier, with rail-to-rail CMOS input/output and single/dual channels selectable. DIO2361A has a gain-bandwidth product of 300kHz(typ.), wide operating supply voltage from 1.8V to 5.5V and broad output voltage swing.

DIO2361A consumes ultra low power, with 17.0 $\mu$ A(typ.) of bias current, which makes DIO2361A be ideal for battery powered device, temperature-sense device, etc.

#### Typical Applications



#### Applications

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

## Ordering Information

Order Part Number	Top Marking		T <sub>A</sub>	Package	
DIO2361AASC5	W61A	Green or RoHS	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO2361AAST5	W61A	Green or RoHS	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO2361ABSC5	W61A	Green or RoHS	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO2361ABST5	W61A	Green or RoHS	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO2361A0SC5	W61A	Green or RoHS	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO2361A0ST5	W61A	Green or RoHS	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO2361AMSC5	W61A	Green or RoHS	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO2361AMST5	W61A	Green or RoHS	-40 to 125°C	SOT23-5	Tape & Reel, 3000

## Ordering Information Complimentary Note

Ordering Code = Part No. + Package Code

SC5: stands for SC70-5  
ST5: stands for SOT23-5

DIO2361AA  
DIO2361AB  
DIO2361A0  
DIO2361AM

## Pin Assignments

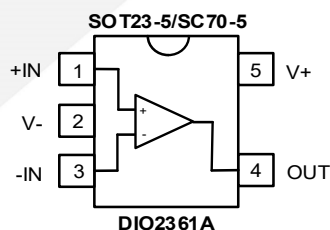


Figure 1 Top View

## Pin Description

Pin name	Description
V+	Positive supply
V-	Negative supply
+IN	Positive Input
-IN	Negative Input
OUT	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 ( $V+$ – $V-$ )		7	V
Input Voltage		( $V-$ )-0.3V to ( $V+$ ) 0.3V	V
Difference Input Voltage		$ V+ - V- $	V
Storage Temperature Range		-65 to 150	°C
Junction Temperature		150	°C
Lead Temperature Range		260	°C
ESD	HBM, JEDEC: JESD22-A114	8	kV

## 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		1.8 to 5.5	V
Input Voltage		0 to 5	V
Operating Temperature Range		-40 to 125	°C

### Electrical Characteristics

Typical value:  $V_{CC}=5V$ ,  $R_L=1M\Omega$  to  $V_{CC}/2$ ,  $V_{CM}=1/2V_{CC}$ ,  $T_A = 25^\circ C$ , unless otherwise specified.

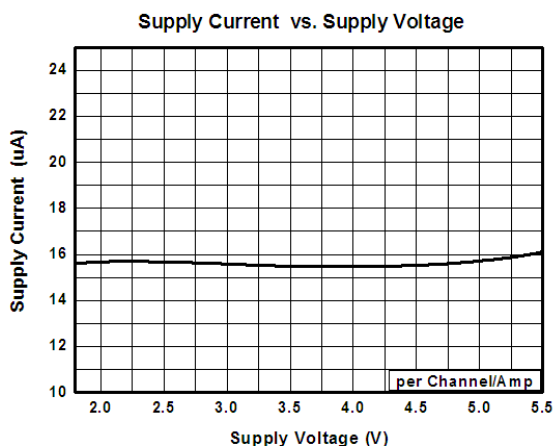
Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
INPUT CHARACTERISTICS						
V <sub>OS</sub>	Input Offset Voltage	V+=1.8V to 5.5V	DIO2361AA	-10	10	μV
			DIO2361AB	-20	20	
			DIO2361A0	-40	40	
			DIO2361AM	-65	65	
I <sub>B</sub>	Input Bias Current	V+=1.8V to 5.5V		1		pA
I <sub>OS</sub>	Input Offset Current	V+=1.8V to 5.5V		1		pA
V <sub>CM</sub>	Common Mode Voltage Range		-0.1		(V+) +0.1	V
CMRR	Common Mode Rejection Ratio	-40°C≤T <sub>A</sub> ≤125°C,		130		dB
A <sub>OL</sub>	Open Loop Voltage Gain	R <sub>L</sub> =50kΩ, V <sub>O</sub> = 0.1 to (V+)-0.1	80	110		dB
ΔV <sub>OS</sub> /ΔT	Input Offset Voltage Drift	-40°C≤T <sub>A</sub> ≤125°C		0.05		μV/°C
OUTPUT CHARACTERISTICS						
V <sub>OH</sub>	Output Voltage High	R <sub>L</sub> =50kΩ -40°C≤T <sub>A</sub> ≤125°C		4.992		V
V <sub>OL</sub>	Output Voltage Low	R <sub>L</sub> =50kΩ -40°C≤T <sub>A</sub> ≤125°C		8		mV
I <sub>SC</sub>	Output Short Circuit Current	Source I <sub>SC</sub> , V+=5V		34		mA
		Sink I <sub>SC</sub> , V+=5V		34		
POWER SUPPLY						
PSRR	Power Supply Rejection Ration		100			dB
I <sub>S</sub>	Supply Current per Channel/Amp	-40°C≤T <sub>A</sub> ≤125°C		17	27	μA
DYNAMIC PERFORMANCE						
GBP	Gain Bandwidth Product	C <sub>L</sub> =100pF, R <sub>L</sub> =1MΩ		300		kHz
SR	Slew Rate	G=1, 2V Output Step		160		V/ms
t <sub>s</sub>	Setting Time	G=1, 2V Output Step		1		ms
Θ <sub>m</sub>	Phase Margin			62		Deg
t <sub>r</sub>	Overload Recovery Time			40		μs
NOISE PERFORMANCE						
THD	Total Harmonic Distortion	f=1kHz, 4V <sub>pp</sub> , R <sub>L</sub> =5kΩ,		0.33		%

$e_n$	Voltage Noise Density	$f=1\text{kHz}$	70	$\text{nV}/\sqrt{\text{Hz}}$
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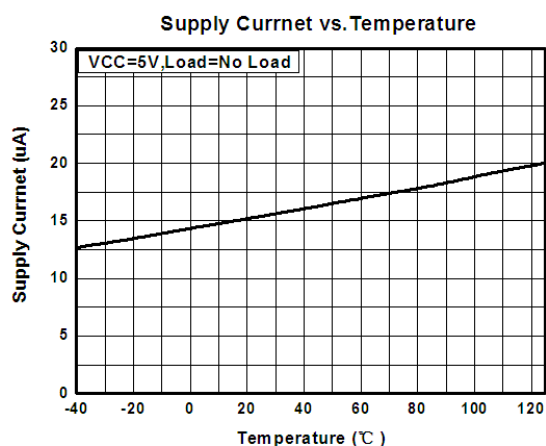
Specifications subject to change without notice.

## Typical Performance Characteristics

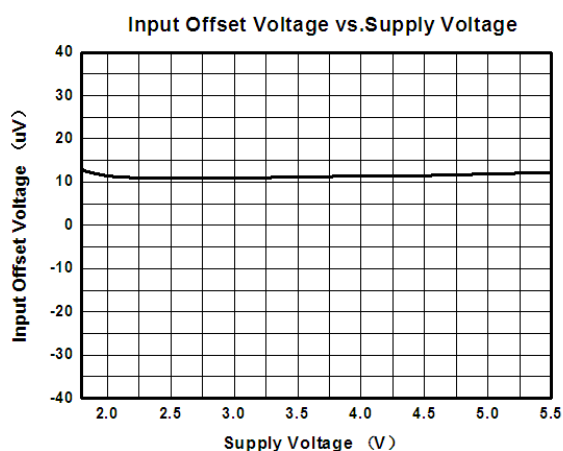
**$I_s$  vs.  $V_{CC}$**



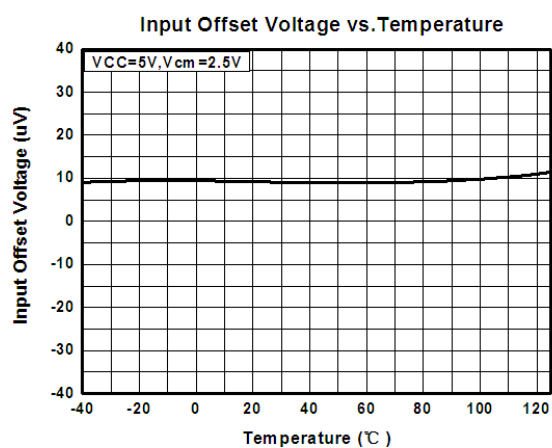
**$I_s$  vs. Temperature**



**$V_{os}$  vs.  $V_{CC}$**

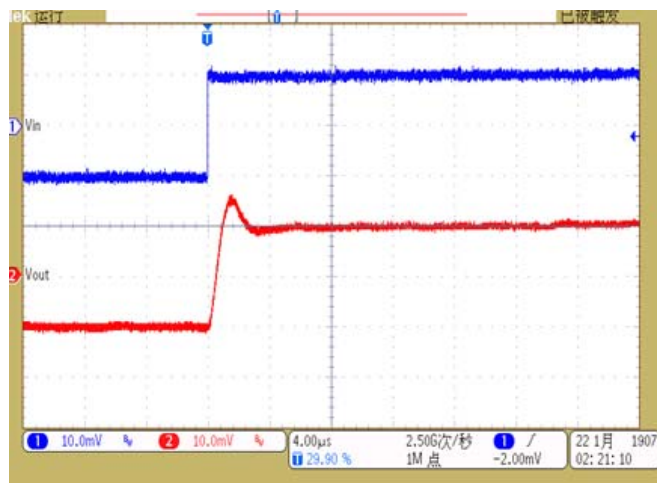


**$V_{os}$  vs. Temperature**

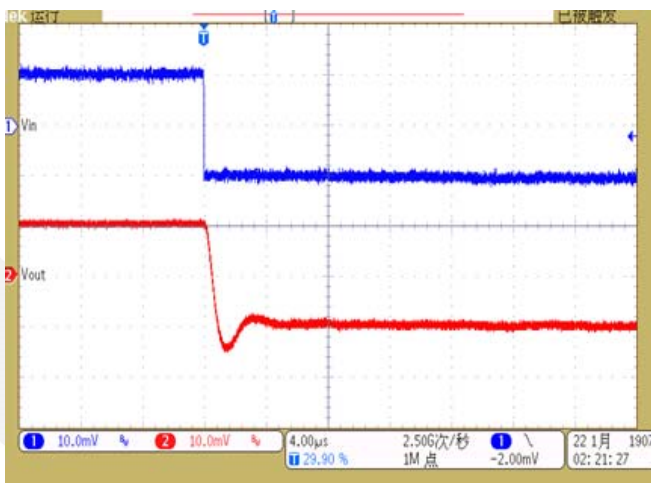


## Typical Performance Characteristics (Continue)

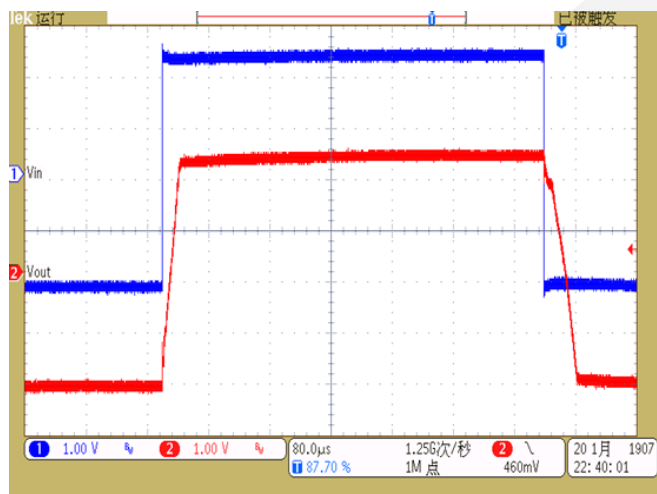
**Small-signal Response**  
( $V_{CC}=5V$ ,  $C_L=200pF$ )



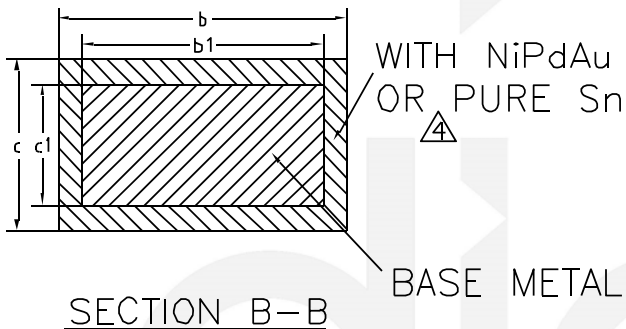
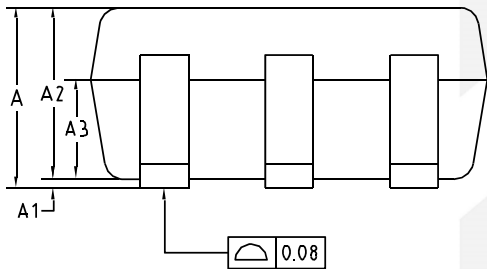
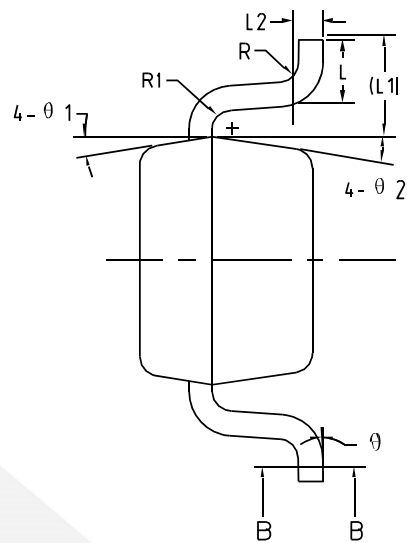
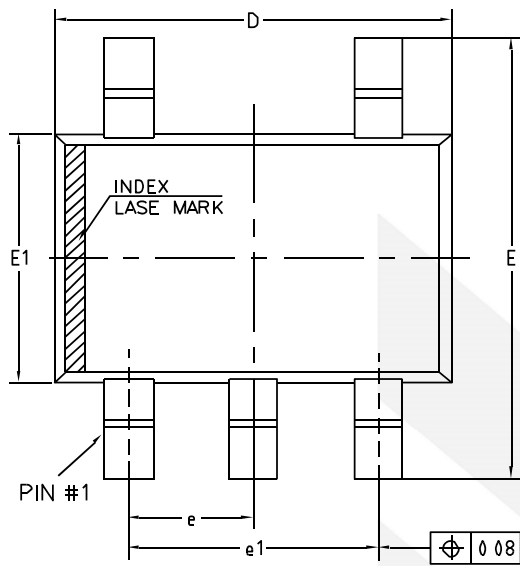
**Small-signal Response**  
( $V_{CC}=5V$ ,  $C_L=200pF$ )



**Large-signal Response**  
( $V_{CC}=5V$ ,  $R_L=5.1k\Omega$ )

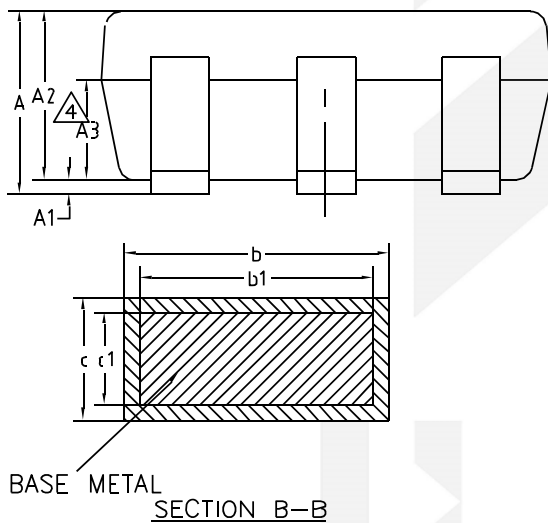
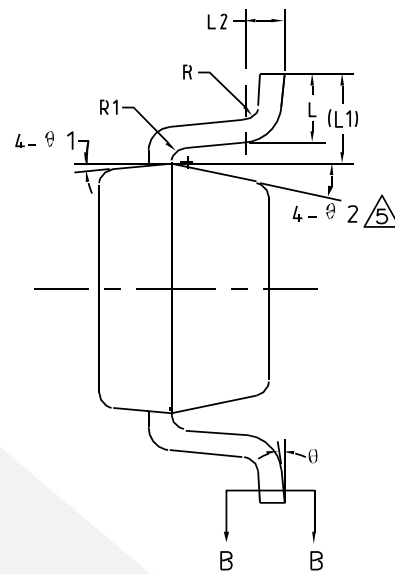
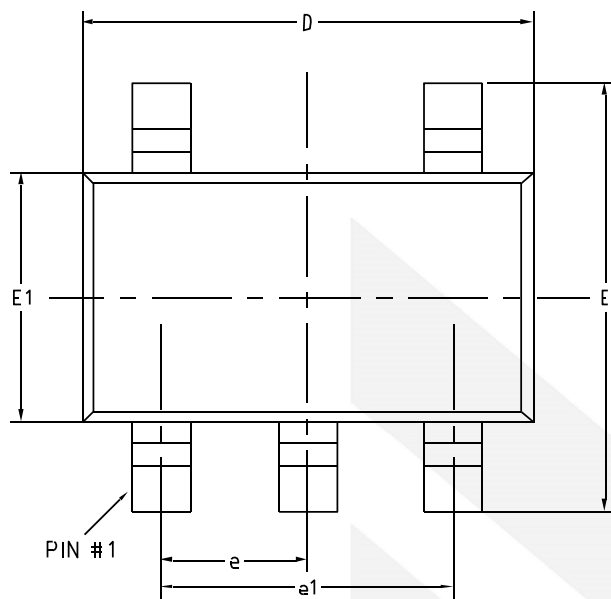


### Physical Dimensions: SC70-5



COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	MIN	NOM	MAX
A	0.85	-	1.05
A1	0	-	0.10
A2	0.80	0.90	1.00
A3	0.47	0.52	0.57
b	0.23	-	0.33
b1	0.22	0.25	0.28
c	0.12	-	0.18
c1	0.115	0.13	0.14
D	2.02	2.07	2.12
E	2.20	2.30	2.40
E1	1.25	1.30	1.35
e	0.65BSC		
e1	1.30BSC		
L	0.28	0.33	0.38
L1	0.50REF		
L2	0.15BSC		
R	0.10	-	-
R1	0.10	-	0.25
θ	0°	-	8°
θ1	6°	9°	12°
θ2	6°	9°	12°

## Physical Dimensions: SOT23-5



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°



## CONTACT US

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