

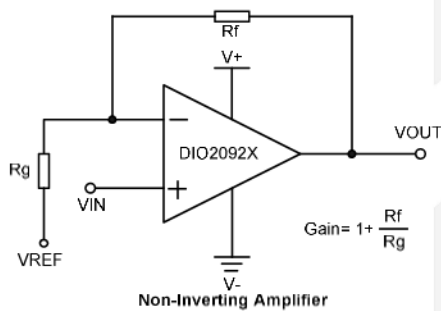
DIO20921/1D/2/4

4μA, Rail-to-Rail Input/ Output Low Power Amplifier

Features

- Ultra low power: 4μA per channel
- Unity Gain Stable
- Gain Bandwidth Product: 150kHz
- Wide supply range: 1.8V to 5.5V
- Available in SOT23-5, SOT23-6, SOIC-8, MSOP-8, SOP-14 and TSSOP-14 packages
- Temperature Range:
 - Industrial: -40°C to +85°C
 - Extended: -40°C to +125°C

Typical Applications



Descriptions

DIO2092x is a family of ultra low power operational amplifier, with rail-to-rail CMOS input/output and single/dual channels selectable. DIO2092x family has a gain-bandwidth product of 150kHz, wide operating supply voltage from 1.8V to 5.5V and broad output voltage swing.

DIO2092x consumes ultra low power, with each channel 4μA of bias current, which makes DIO2092x be ideal for battery powered device, temperature-sense device, etc.

The DIO2092x operational amplifier family is available in single (DIO20921/1D), and dual (DIO20922), and quad (DIO20924) configurations. Furthermore, the DIO20921 is offered in the 5-lead SOT23 package. All types of amplifiers are fully specified over the extended -40°C to +125°C temperature range.

Applications

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

Ordering Information

Order Part Number	Top Marking		T _A	Package	
DIO20921ST5	W921	Green or RoHS	-40 to +125°C	SOT23-5	Tape & Reel, 3000
DIO20921SO8	D20921	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20921MP8	D20921	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20921DST6	W92D	Green or RoHS	-40 to +125°C	SOT23-6	Tape & Reel, 3000
DIO20921DSO8	D20921D	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20921DMP8	D20921D	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20922SO8	D20922	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20922MP8	D20922	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20924CS14	D20924	Green or RoHS	-40 to +125°C	SOP-14	Tape & Reel, 2500
DIO20924TP14	D20924	Green or RoHS	-40 to +125°C	TSSOP-14	Tape & Reel, 2500

Pin Assignments

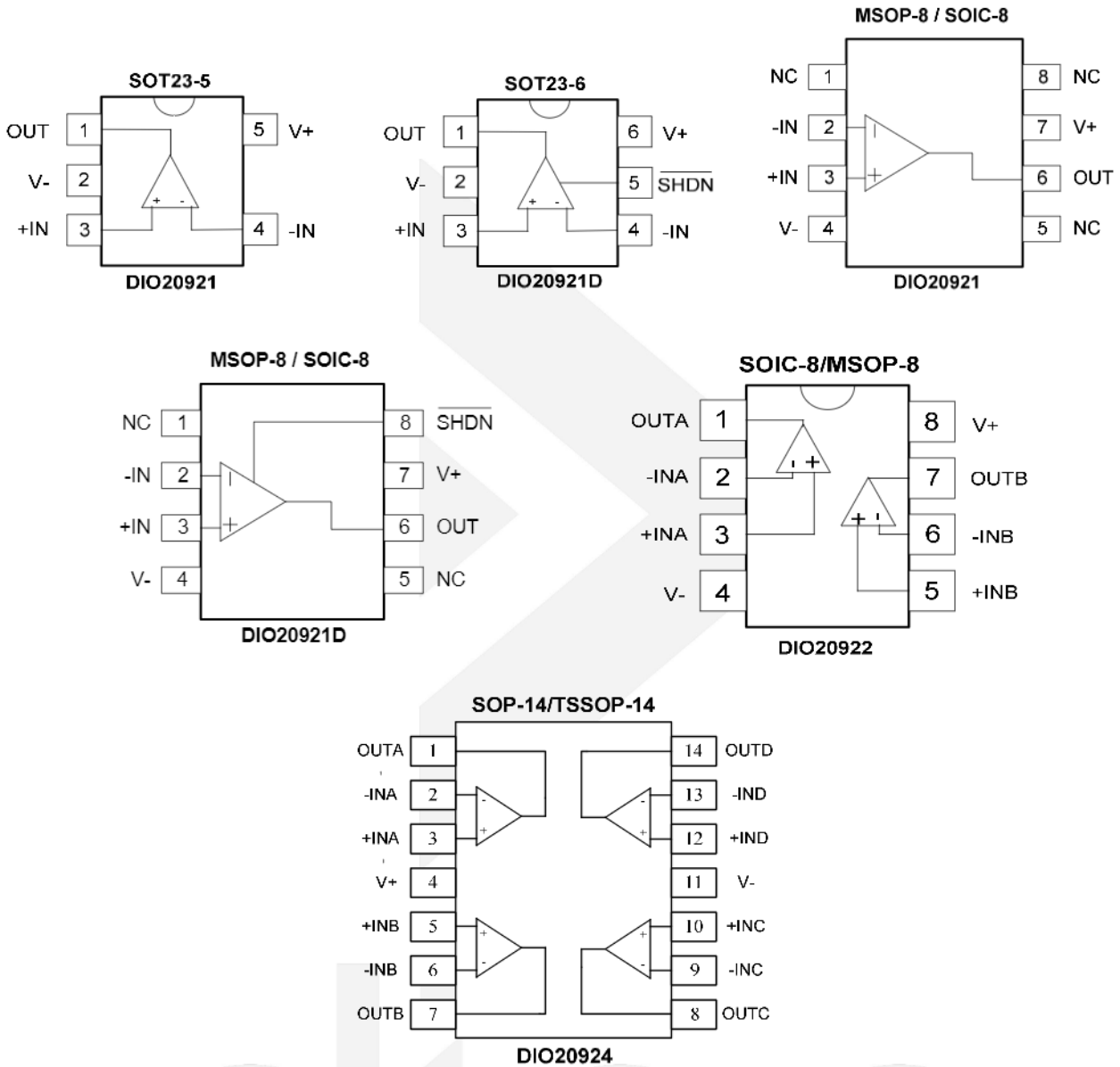


Figure 1 Top View

Pin Description

Pin name	Description
V+	Positive supply
V-	Negative supply
+INX	Positive Input
-INX	Negative Input
OUTX	Output
SHDN	Active Low Shutdown

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



Electrical Characteristics

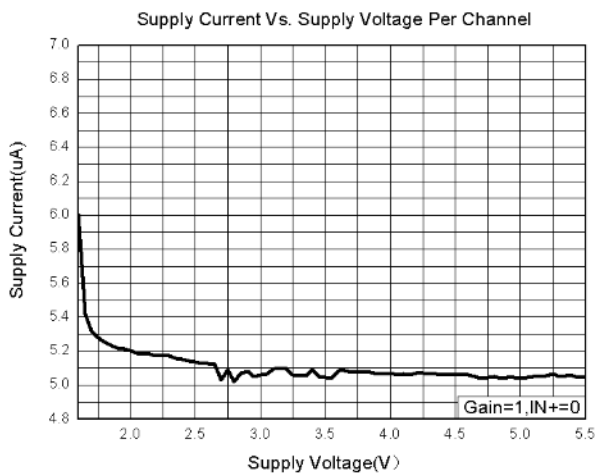
Typical value: $V_{+}=5V$, $R_L=100k\Omega$ to $V_{+}/2$, $V_{CM}=1/2V_{+}$, $T_A = 25^{\circ}C$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
INPUT CHARACTERISTICS						
V_{OS}	Input Offset Voltage	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$, $V_{+}=1.8V$ to $5.5V$	-5		+5	mV
I_B	Input Bias Current	$V_{+}=1.8V$ to $5.5V$		1		pA
I_{OS}	Input Offset Current	$V_{+}=1.8V$ to $5.5V$		1		pA
V_{CM}	Common Mode Voltage Range		-0.1		(V_{+}) +0.1	V
CMRR	Common Mode Rejection Ratio	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$,		130		dB
A_{OL}	Open Loop Voltage Gain	$R_L=100k\Omega$, $V_O=0.1$ to $(V_{+})-0.1$	70	105		dB
$\Delta V_{OS}/\Delta T$	Input Offset Voltage Drift	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$		± 5		$\mu V/^{\circ}C$
OUTPUT CHARACTERISTICS						
V_{OH}	Output Voltage High	$R_L=100k\Omega$ $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		4.995		V
V_{OL}	Output Voltage Low	$R_L=100k\Omega$ $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		5		mV
I_{SC}	Output Short Circuit Current	Source I_{SC} , $V_{+}=5V$		24		mA
		Sink I_{SC} , $V_{+}=5V$		24		
POWER SUPPLY						
PSRR	Power Supply Rejection Ration		100			dB
I_Q	Supply Current per Channel/Amp	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$		4		μA
$I_{Q(off)}$	Supply Current in Shutdown	$V_{SHDN}=0V$		3		nA
I_{SHDN}	Shutdown Pin Current			-10		pA
I_{LEAK}	Output Leakage Current in Shutdown	$V_{SHDN}=0V$		3.6		pA
V_{IL}	SHDN Input Low Voltage	Disable			0.5	V
V_{IH}	SHDN Input High Voltage	Enable	1.1			V
DYNAMIC PERFORMANCE						
GBP	Gain Bandwidth Product	$C_L=100pF$		150		kHz
SR	Slew Rate	$G=1$, 2V Output Step		70		V/ms
t_s	Setting Time	$G=1$, 2V Output Step		20		μs
Θ_m	Phase Margin			60		Deg
t_r	Overload Recovery Time			166		μs
NOISE PERFORMANCE						
THD	Total Harmonic Distortion	$f=100Hz$, $4V_{PP}$, $R_L=100k\Omega$,		0.09		%
e_n	Voltage Noise Density	$f=1kHz$		103		nV/\sqrt{Hz}

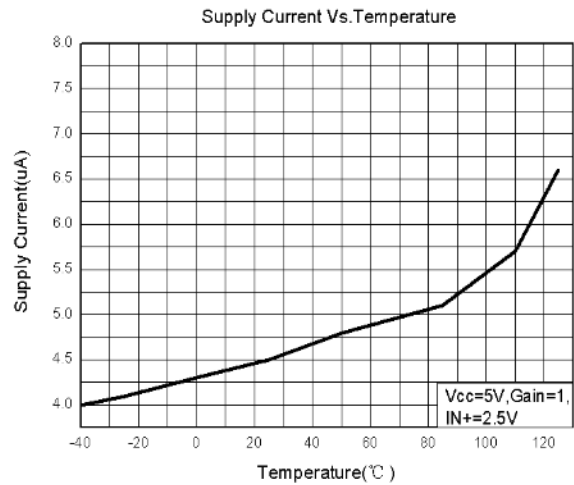
Specifications subject to change without notice.

Typical Performance Characteristics

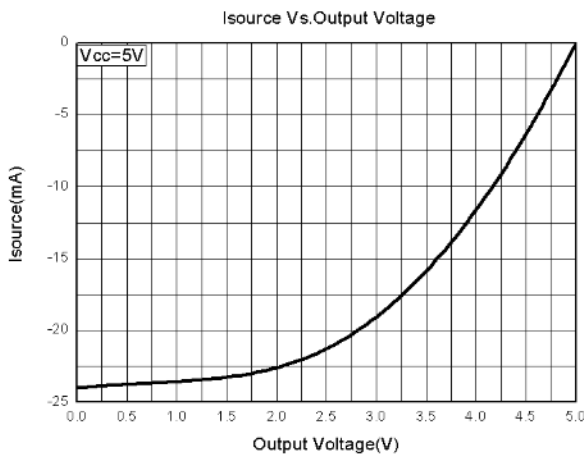
Supply Current vs. Supply Voltage Per Channel



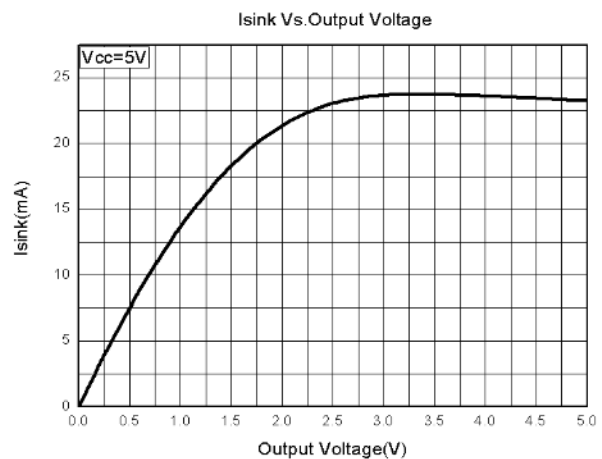
Supply Current vs. Temperature



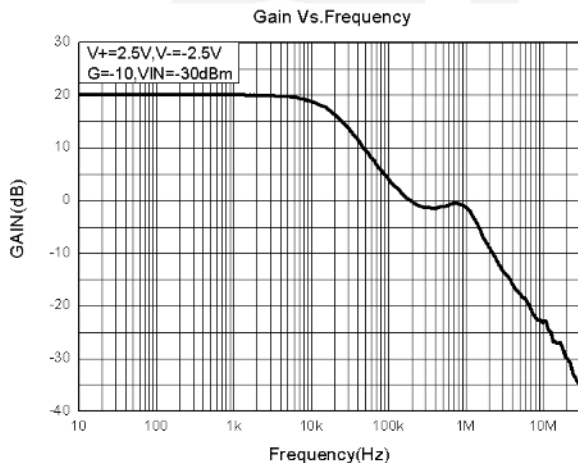
I_{SOURCE} vs. Output Voltage



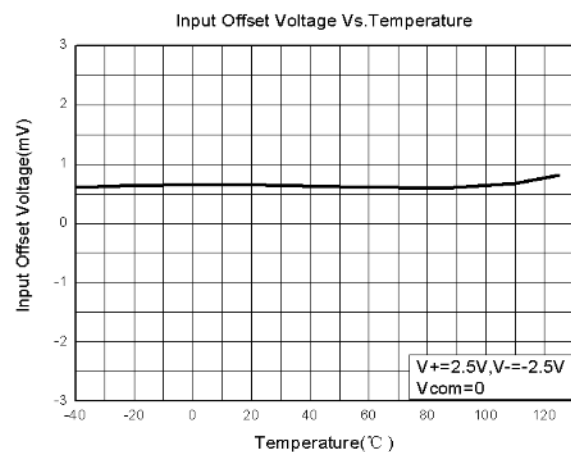
I_{SINK} vs. Output Voltage



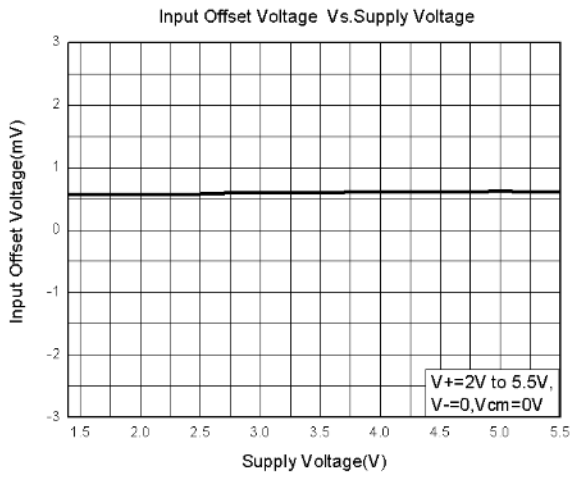
Gain vs. Frequency



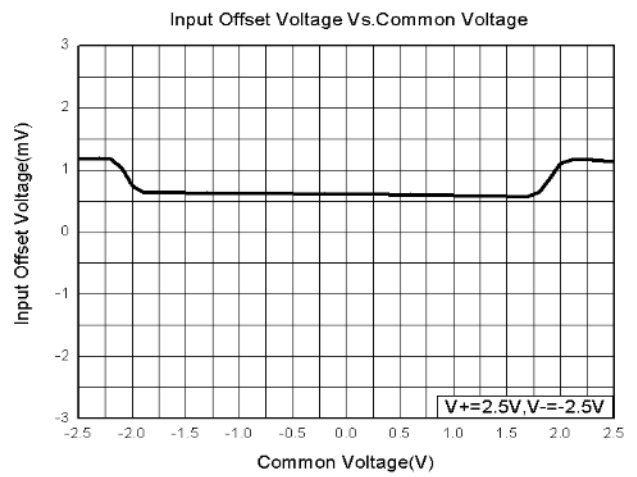
Input Offset Voltage vs. Temperature



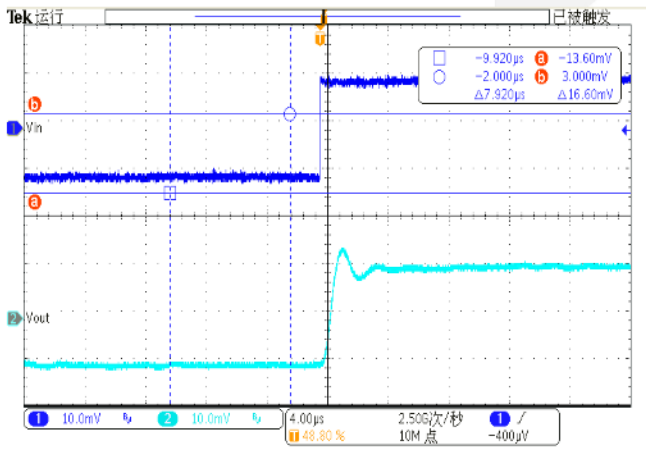
Input Offset Voltage vs. Supply Voltage



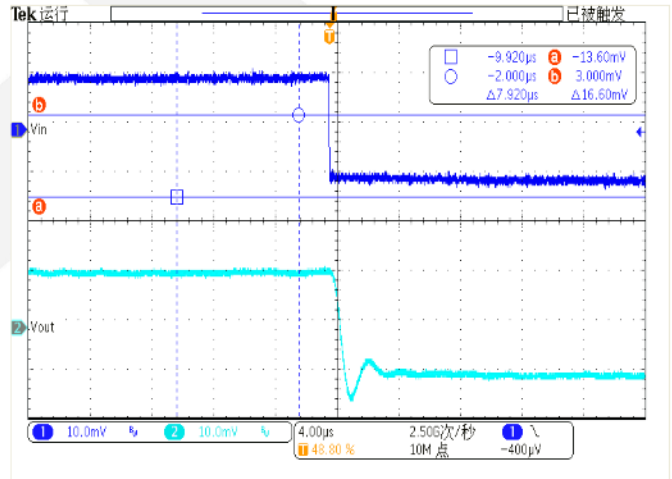
Input Offset Voltage vs. Common Voltage



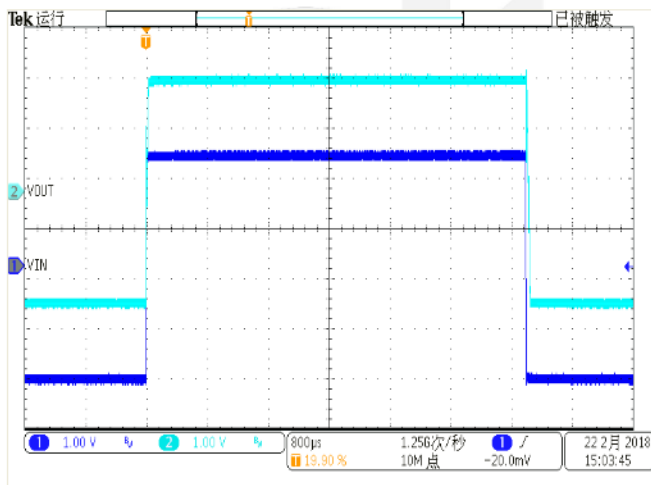
Small-Signal Response (V+=5V, C_L=200pF)



Small-Signal Response (V+=5V, C_L=200pF)



Large-Signal Response (V+=5V, R_L=1MΩ)



CONTACT US

Dioo is a professional design and sales corporation for high-quality and performance analog semiconductors. The company focuses on industry markets, such as, cell phone, handheld products, laptop, and medical equipment and so on. Dioo's product families include analog signal processing and amplifying, LED drivers and charger IC. Go to <http://www.dioo.com> for a complete list of Dioo product families.

For additional product information, or full datasheet, please contact with our Sales Department or Representatives.

