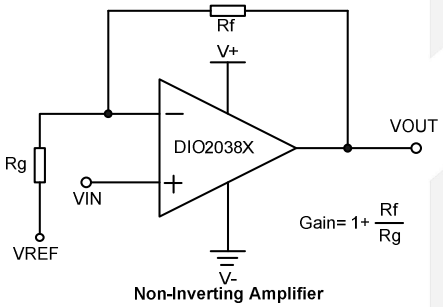
DIO20381/1D/2/4

380nA，Rail-to-Rail Input/ Output Low Power Amplifier

Features

- Ultra low power: 380nA per channel
- Unity Gain Stable
- Gain Bandwidth Product: 5kHz
- Wide supply range: 1.4V 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



Non-Inverting Amplifier

Descriptions

DIO2038x is a family of ultra low power operational amplifier, with rail-to-rail CMOS input/output and single/dual channels selectable. DIO2038x family has a gain-bandwidth product of 5kHz, wide operating supply voltage from 1.4V to 5.5V and broad output voltage swing.

DIO2038x consumes ultra low power, with each channel 380nA of bias current, which makes DIO2038x be ideal for battery powered device, temperature-sense device, etc.

The DIO2038x operational amplifier family is available in single (DIO20381/1D), and dual (DIO20382), and quad (DIO20384) configurations. Furthermore, the DIO20381 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	
DIO20381ST5	W381	Green or RoHS	-40 to +125°C	SOT23-5	Tape & Reel, 3000
DIO20381SO8	D20381	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20381MP8	D20381	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20381DST6	W38D	Green or RoHS	-40 to +125°C	SOT23-6	Tape & Reel, 3000
DIO20381DSO8	D20381D	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20381DMP8	D20381D	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20382SO8	D20382	Green or RoHS	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO20382MP8	D20382	Green or RoHS	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO20384CS14	D20384	Green or RoHS	-40 to +125°C	SOP-14	Tape & Reel, 2500
DIO20384TP14	D20384	Green or RoHS	-40 to +125°C	TSSOP-14	Tape & Reel, 2500

Pin Assignments

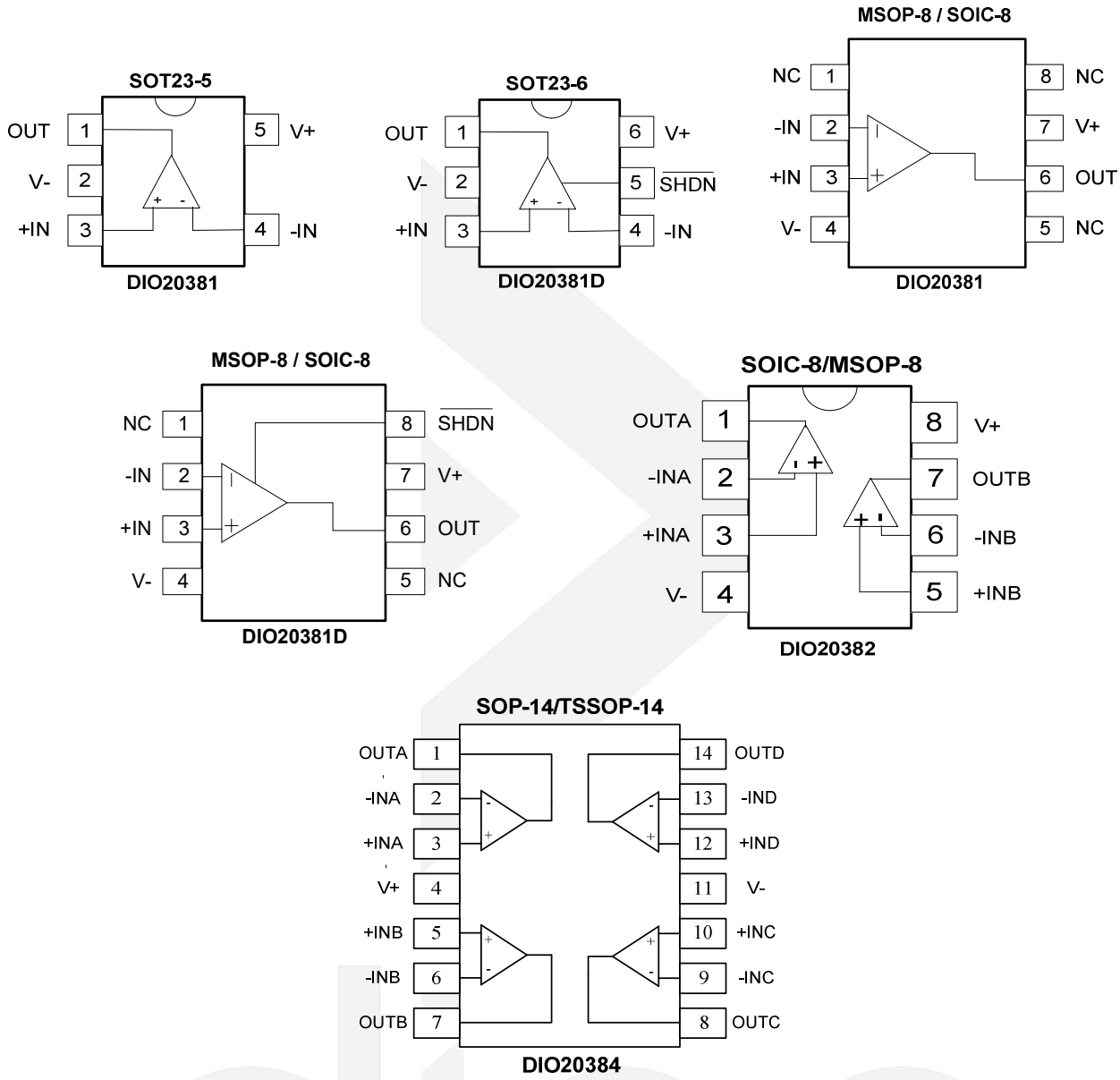


Figure 1 Top View

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 maxim 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	1.4 to 5.5	V
Input Voltage	0 to 5	V
Operating Temperature Range	-40 to 125	°C

Electrical Characteristics

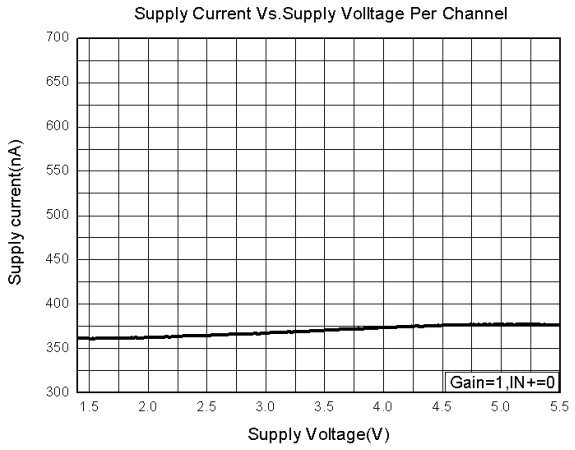
Typical value: V+=5V, R_L=1MΩ to V+/2, V_{CM}=1/2V+, T_A = 25°C, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
INPUT CHARACTERISTICS						
V_{OS}	Input Offset Voltage	-40°C≤T_A≤125°C, V+=1.2V to 5.5V	-3		+3	mV
I_B	Input Bias Current	V+=1.2V to 5.5V		1		pA
I_{OS}	Input Offset Current	V+=1.2V to 5.5V		1		pA
V_{CM}	Common Mode Voltage Range		-0.1		(V+) +0.1	V
CMRR	Common Mode Rejection Ratio	-40°C≤T_A≤125°C,	80			dB
A_{OL}	Open Loop Voltage Gain	R_L=50kΩ, V_O= 0.1 to (V+)-0.1	70	87		dB
$\Delta V_{OS}/\Delta_T$	Input Offset Voltage Drift	-40°C≤T_A≤125°C		±5		μV/°C
OUTPUT CHARACTERISTICS						
V_{OH}	Output Voltage High	R_L=50kΩ -40°C≤T_A≤125°C		4.992		V
V_{OL}	Output Voltage Low	R_L=50kΩ -40°C≤T_A≤125°C		3		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		80			dB
I_Q	Supply Current per Channel/Amp	-40°C≤T_A≤125°C		380	1000	nA
$I_{Q(off)}$	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=60pF		5		kHz
SR	Slew Rate	G=1, 2V Output Step		1.5		V/ms
t_S	Setting Time	G=1, 2V Output Step		150		μs
Θm	Phase Margin			60		Deg
tr	Overload Recovery Time			110		μs
NOISE PERFORMANCE						
e_n	Voltage Noise Density	f=1kHz		125		nV/√Hz

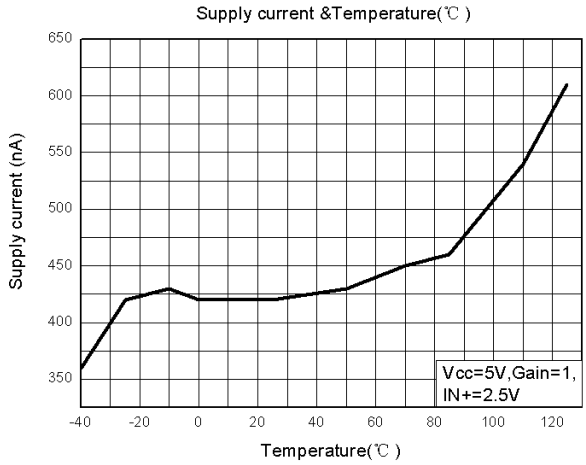
Specifications subject to change without notice.

Typical Performance Characteristics

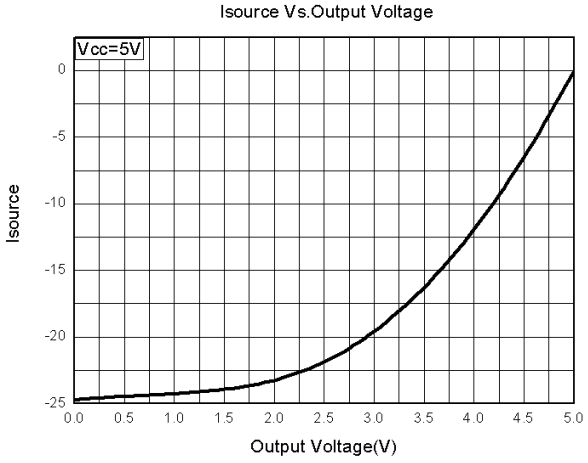
Supply Current vs. Supply Voltage Per Channel



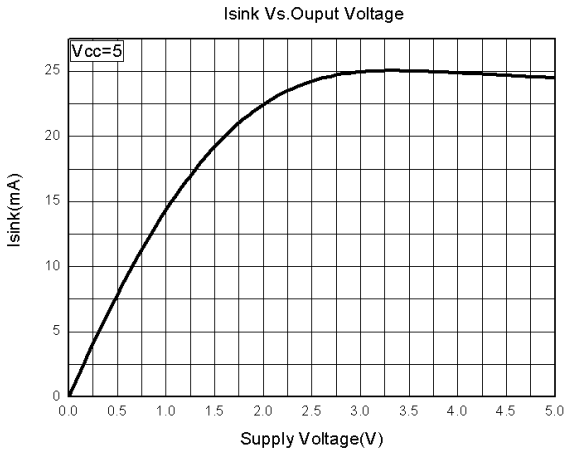
Supply Current vs. Temperature



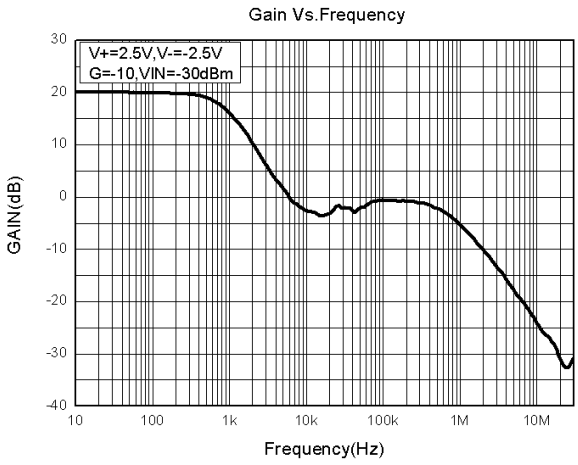
I_{SOURCE} vs. Output Voltage



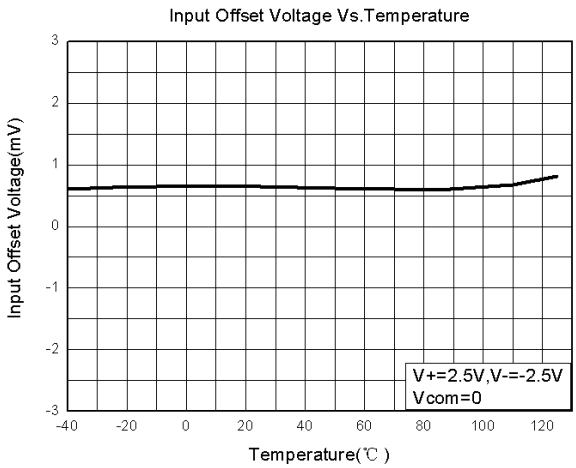
I_{SINK} vs. Output Voltage



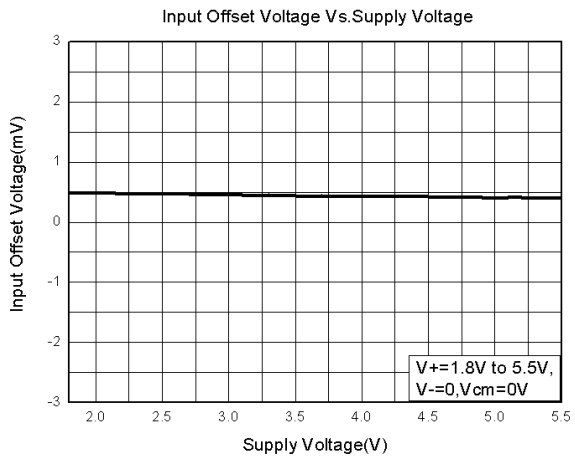
Gain vs. Frequency



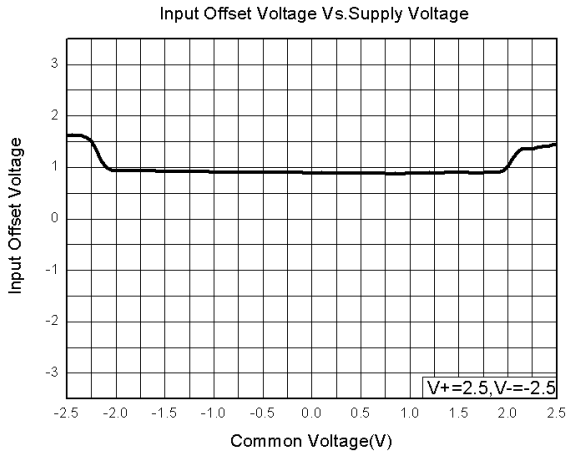
Input Offset Voltage vs. Temperature



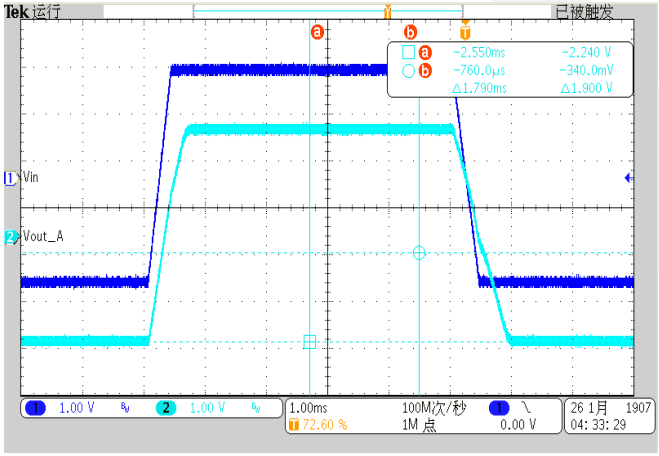
Input Offset Voltage vs. Supply Voltage



Input Offset Voltage vs. Supply Voltage



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.

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