

## DIO32051/32051A/32052/32054

### 0.5MHz, 24 $\mu$ A, Rail-to-Rail I/O CMOS Amplifier

#### Features

- Rail-to-Rail Input and Output
  - Maxim offset ( $V_{OS}$ ):  
DIO32051/32051A/32052/32054 @  $\pm 3\text{mV}$
  - Unity Gain Stable
  - Gain Bandwidth Product: 0.5MHz
  - Very low input bias currents: 5pA
  - Wide supply range: 1.8V to 5.5V
  - Input Voltage Range: 0V to 5V
  - Ultra low power: 24 $\mu$ A per channel
  - Compact Package best for portable applications
- DIO32051: SOT23-5 and SC70-5  
DIO32051A: SOT23-5 and SC70-5  
DIO32052: SOIC-8 and MSOP-8  
DIO32054: SOIC-14 and TSSOP-14

#### Descriptions

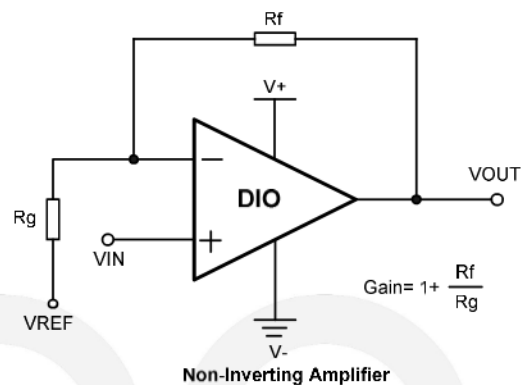
DIO32051/32051A (single), DIO32052 (dual), DIO32054 (quad) are rail-to-rail CMOS operational amplifiers with ultra low offset. Features include wide input common-mode voltage range and broad output voltage swing with operating supply voltage from 1.8V to 5.5V. Products are fully specified over the extended  $-40$  to  $+125^{\circ}\text{C}$  temperature range.

DIO32051/32051A/32052/32054 series provides 0.5MHz bandwidth consuming ultra low current of 24 $\mu$ A per channel. Very low input bias currents of 5pA enable them ideal for integrators, photodiode amplifiers, and piezoelectric sensors.

#### Applications

- ASIC Input or Output Amplifier
- Sensor Interface
- Piezo Electric Transducer Amplifier
- Medical Instrumentation
- Audio Output
- Portable Systems
- Smoke Detectors
- Notebook PC
- Battery-Powered equipment

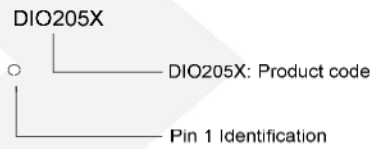
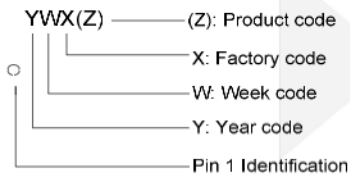
#### Typical Application



## Ordering Information

Order Part Number	Top Marking		T <sub>A</sub>	Package	
DIO32051ST5	YWXT	RoHS or Green	-40 to +125°C	SOT23-5	Tape & Reel, 3000
DIO32051SC5	YWXT	RoHS or Green	-40 to +125°C	SC70-5	Tape & Reel, 3000
DIO32051AST5	YWXU	RoHS or Green	-40 to +125°C	SOT23-5	Tape & Reel, 3000
DIO32051ASC5	YWXU	RoHS or Green	-40 to +125°C	SC70-5	Tape & Reel, 3000
DIO32052MP8	DIO2052	RoHS or Green	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO32052SO8	DIO2052	RoHS or Green	-40 to +125°C	SOIC-8	Tape & Reel, 2500
DIO32054SO14	DIO2054	RoHS or Green	-40 to +125°C	SOIC-14	Tape & Reel, 2500
DIO32054TP14	DIO2054	RoHS or Green	-40 to +125°C	TSSOP-14	Tape & Reel, 2500

## Marking Definition



## Pin Assignments

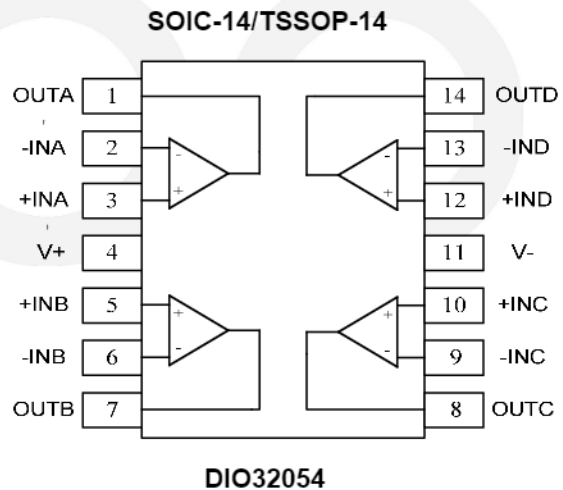
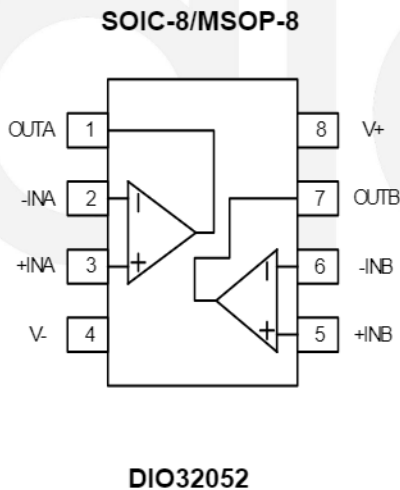
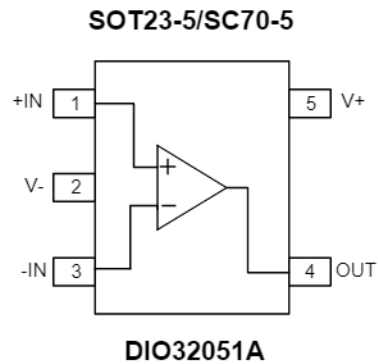
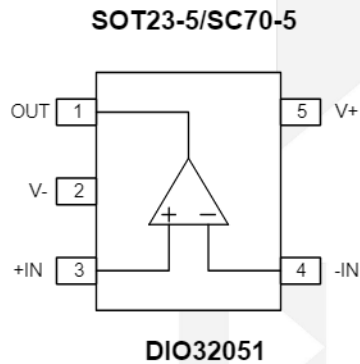


Figure 1 Pin Assignment

## 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	V
Input Voltage	(V <sub>-</sub> )-0.5 to 7	V
Storage Temperature Range	-65 to 150	°C
Junction Temperature	150	°C
Lead Temperature Range	260	°C
ESD	HBM, JEDEC: JESD22-A114	8
	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 V+	V
Operating Temperature Range	-40 to 125	°C

## Electrical Characteristics

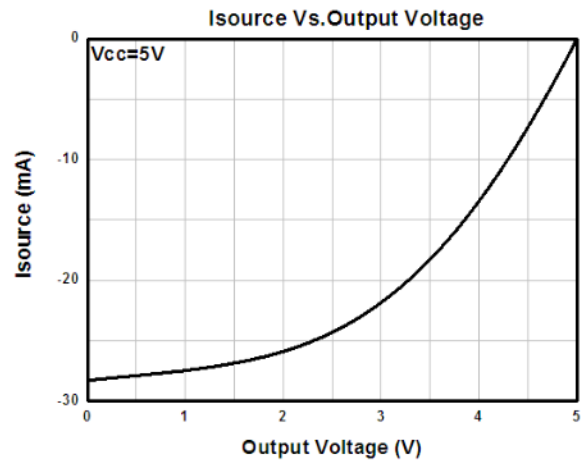
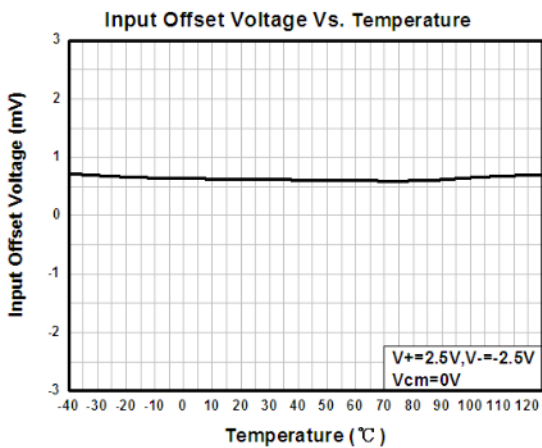
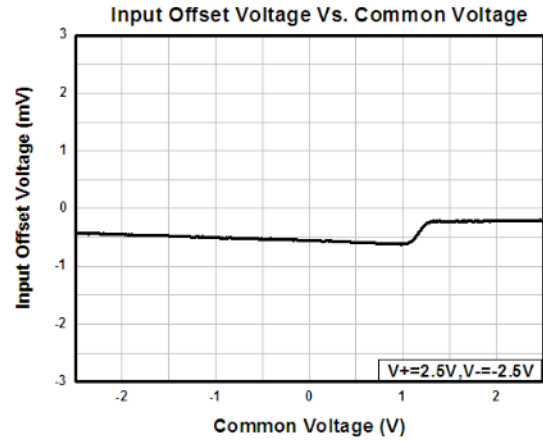
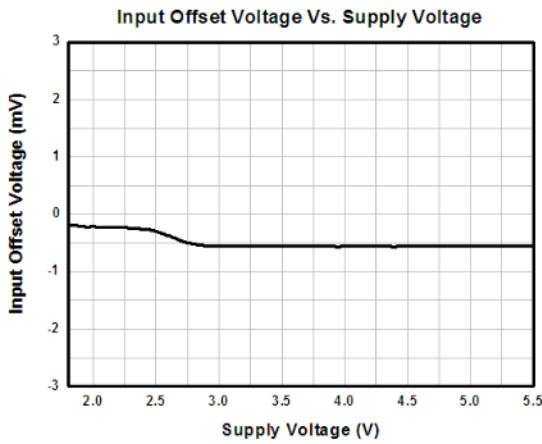
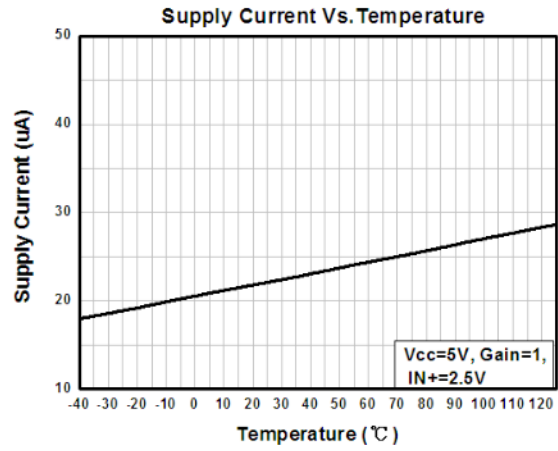
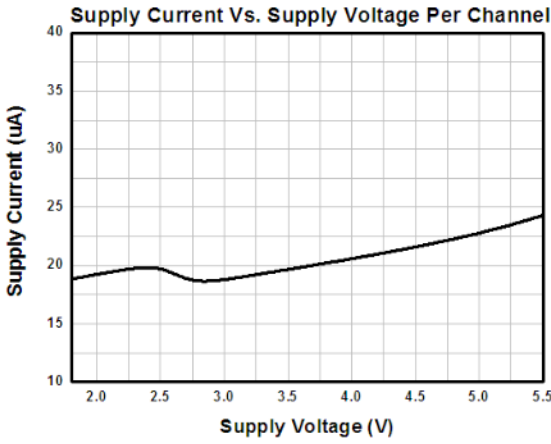
Typical value:  $V_{+}=5V$ ,  $R_L=100k\Omega$  to  $V_{+}/2$ ,  $T_A = 25^{\circ}C$ , unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>INPUT CHARACTERISTICS</b>						
$V_{OS}$	Input Offset Voltage	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$ , $V_{+}=1.8V$ to $5V$	-3	0	3	mV
$I_B$	Input Bias Current	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$ , $V_{+}=1.8V$ to $5V$		5		pA
$I_{OS}$	Input Offset Current	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$ , $V_{+}=1.8V$ to $5V$		5		pA
$V_{CM}$	Common Mode Voltage Range		0.1		( $V_{+}$ ) +0.1	V
CMRR	Common Mode Rejection Ratio	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$ , $V_{CM}=-0.1$ to $(V_{+})+0.1$		75		dB
$A_{OL}$	Open Loop Voltage Gain	$R_L=5k\Omega$ , $V_O=0.1$ to $(V_{+})-0.1$	80	102		dB
		$R_L=200k\Omega$ , $V_O=0.1$ to $(V_{+})-0.1$	100	128		
5	Input Offset Voltage Drift	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$			2.5	$\mu V/^{\circ}C$
<b>OUTPUT CHARACTERISTICS</b>						
$V_{OH}$	Output Voltage High	$V_{+}=5V$ , $R_L=100k\Omega$ , $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		4.995		V
		$V_{+}=1.8V$ , $R_L=100k\Omega$ , $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		1.79		
$V_{OL}$	Output Voltage Low	$V_{+}=5V$ , $R_L=100k\Omega$ , $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		5		mV
		$V_{+}=1.8V$ , $R_L=100k\Omega$ , $-40^{\circ}C \leq T_A \leq 125^{\circ}C$		5		
$I_{SC}$	Output Short Circuit Current	Source $I_{SC}$ , $V_{+}=5V$		28		mA
		Sink $I_{SC}$ , $V_{+}=5V$		28		
<b>POWER SUPPLY</b>						
PSRR	Power Supply Rejection Ration		65	85		dB
$I_S$	Supply Current per Channel/Amp	$-40^{\circ}C \leq T_A \leq 125^{\circ}C$		24		$\mu A$
<b>DYNAMIC PERFORMANCE</b>						
GBP	Gain Bandwidth Product	$R_L=100k\Omega$ , $C_L=100pF$		0.5		MHz
SR	Slew Rate	$G=1$ , 2V Output Step		0.29		$V/\mu s$
$t_s$	Setting Time	$G=1$ , 2V Output Step		4		$\mu s$
<b>NOISE PERFORMANCE</b>						
THD	Total Harmonic Distortion	$f=10kHz$ , 2V Output Step, $R_L=10k\Omega$		0.02		%
$e_n$	Voltage Noise Density	$f=1kHz$		66		$nV/\sqrt{Hz}$
		$f=10kHz$		54		

Specifications subject to change without notice.

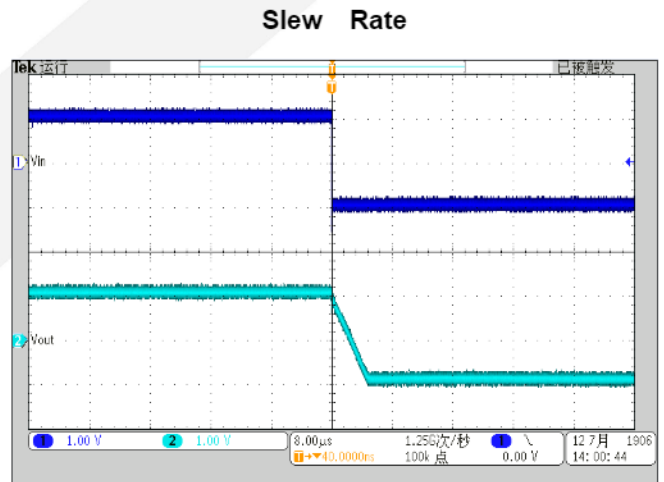
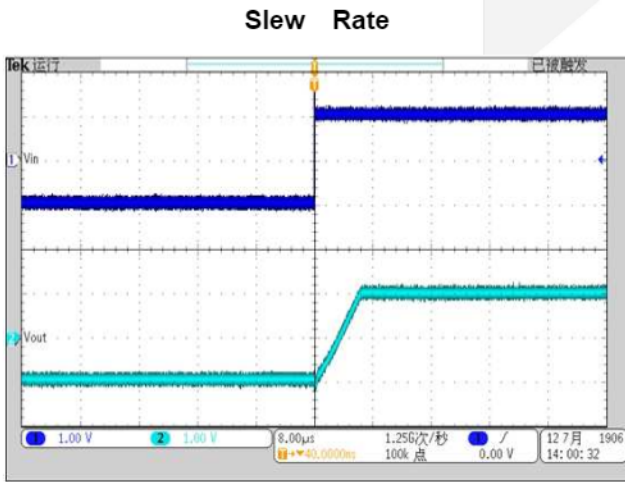
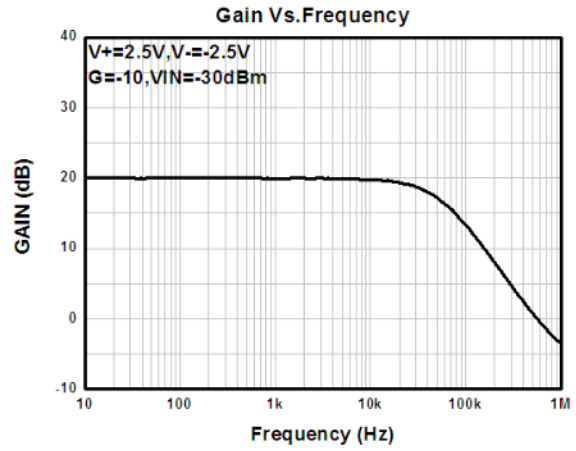
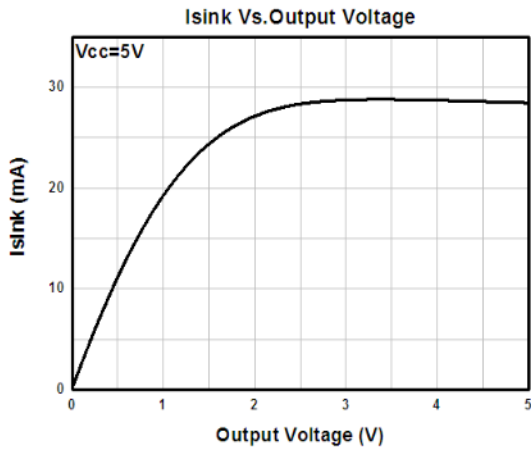
## Typical Performance Characteristics

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



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## 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.

