DIO85571

350 µA, 6 MHz, Rail-to-Rail I/O CMOS Operational Amplifier

Description

The DIO85571 is an amplifier with very low noise, low voltage, and low power operational. The DIO85571 has a high gain-bandwidth product of 6 MHz, a slew rate of 3.6 V/µs, and a quiescent current of 350 µA/amplifier at 5 V typically.

The DIO85571 is designed to provide optimal performance in low voltage and low noise systems. All these chips provide rail-to-rail output swing into heavy loads. The input common-mode voltage range includes ground, and the maximum input offset voltage is 3.5 mV for the DIO85571.

They are specified over the extended industrial temperature range (-40°C to +125°C). The operating range is from 2.5 V to 5.5 V.

Features

- Supply voltage range: 2.5 V to 5.5 V
- Low supply current: 350 µA typically
- Rail-to-rail input and output
- 6 MHz high gain-bandwidth product
- High slew rate: 3.6 V/µs
- Settling time to 0.1% with 2 V step: 0.6 µs
- Package: SOT23-5

Applications

- Audio output
- Sensor interface
- Active filters
- A/D converters
- Cellular and cordless phones
- Laptops and PDAs
- Photodiode amplification
- Battery-powered instrumentation

Ordering Information

Part Number	Top Marking	RoHS	T_A	Package	
DIO85571ST5	E7AYW	Green	-40 to +125°C	SOT23-5	Tape & Reel, 3000

If you encounter any issue in the process of using the device, please contact our customer service at marketing@dioo.com or phone us at (+86)-21-62116882. If you have any improvement suggestions regarding the datasheet, we encourage you to contact our technical writing team at docs@dioo.com. Your feedback is invaluable for us to provide a better user experience.

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1. Pin Assignment and Functions

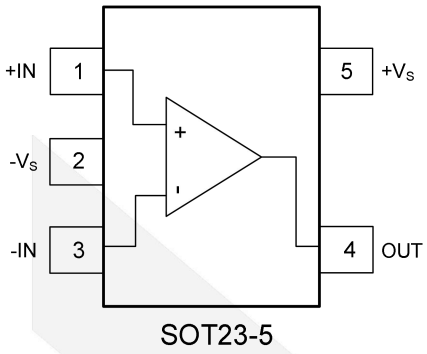


Figure 1. SOT23-5 (Top view)

Pin No.	Pin Name	Description
1	+IN	Positive input
2	$-V_S$	Negative supply
3	-IN	Negative input
4	OUT	Output
5	$+V_S$	Positive supply

2. Absolute Maximum Ratings

Exceeding the maximum ratings listed under Absolute Maximum Ratings when designing is likely to damage the device permanently. Do not design to the maximum limits because long-time exposure to them might impact the device's reliability. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V_{CC}	Supply voltage	7.5	V
V_{IN}	Input voltage	(V-)-0.5 to (V+)+0.5	V
T_{STG}	Storage temperature range	-65 to 150	°C
T_J	Junction temperature	150	°C
T_L	Lead temperature range	260	°C

3. Recommended Operating Condition

Recommended operating conditions are specified to ensure optimal performance to the datasheet specifications. The ratings are obtained over an operating free-air temperature range unless otherwise specified.

Symbol	Parameter	Rating	Unit
V_{CC}	Supply voltage	2.5 to 5.5	V
V_{IN}	Input voltage	0 to 5	V
T_A	Operating temperature range	-40 to 125	°C

4. ESD Ratings

When a statically-charged person or object touches an electrostatic discharge sensitive device, the electrostatic charge might be drained through sensitive circuitry in the device. If the electrostatic discharge possesses sufficient energy, damage might occur to the device due to localized overheating.

Model	Condition	Value	Unit
HBM	JEDEC: JESD22-A114	8	kV
CDM	JEDEC: JESD22-C101	2	

5. Electrical Characteristics

Typical value: V+ = 5 V, V_{CM} = 1/2V_{CC}, R_L = 100 Ω to V+/2, T_A = 25°C, unless otherwise specified.

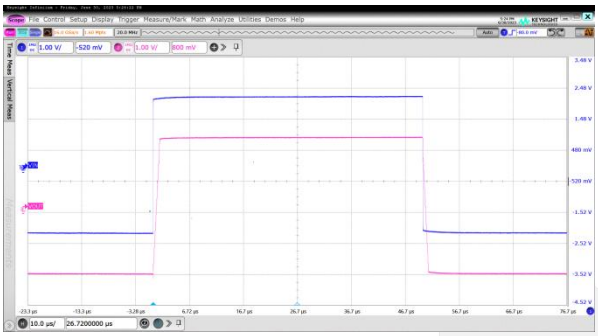
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Input characteristics						
V_{OS}	Input offset voltage	T_A = 25°C	-3.5	0.7	3.5	mV
I_B	Input bias current	V+ = 2.5 V to 5.5 V		10		pA
I_{OS}	Input offset current	V+ = 2.5 V to 5.5 V		10		pA
V_{CM}	Common mode voltage range	V+ = 5.5 V	-0.1		5.6	V
CMRR	Common mode rejection ratio	-40°C ≤ T_A ≤ 125°C, Vs = 5.5 V, V_{CM} = -0.1 V to 4 V	75	90		dB
		-40°C ≤ T_A ≤ 125°C, V_S = 5.5 V, V_{CM} = -0.1 V to 5.6 V	66	90		dB
A_{OL}(2)	Open loop voltage gain	R_L = 600 Ω, V_O = 0.15 V to 4.85 V	92	100		dB
		R_L = 10 KΩ, V_O = 0.05 V to 4.95 V	100	110		dB
$\Delta V_{OS}/\Delta T$	Input offset voltage drift	-40°C ≤ T_A ≤ 125°C		2.7		μV/°C
Output characteristics						
	Output voltage swing from rail	R_L = 600 Ω, -40°C ≤ T_A ≤ 125°C			0.1	V
		R_L = 10 kΩ, -40°C ≤ T_A ≤ 125°C			0.015	
I_{OUT}	Output current	V+ = 5 V		80		mA
Power supply						
	Operating voltage range		2.5		5.5	V
PSRR	Power supply rejection ration		70	94		dB
I_S	Supply current	V+ = 2.5 V ,T_A = 25°C, no load		320		μA
		V+ = 5 V ,T_A = 25°C, no load		350		
Dynamic performance						
GBP	Gain bandwidth product	R_L = 10 kΩ		6		MHz
SR	Slew rate	R_L = 600 Ω, G = 1, 2 V output step		3.6		V/μs
t_S	Settling time	R_L = 600 Ω, G = 1, 2 V output step		0.6	1	μs
Noise performance						
THD	Total harmonic distortion	f = 10 kHz, 1 V output step, R_L = 600 Ω and 100 pF		0.015		%
e_n	Voltage noise density	f = 1 kHz, V+ = 5 V		55		nV/√Hz
		f = 10 kHz, V+ = 5 V		19		

Note:

(1) Specification subject to change without notice.

(2) Guaranteed by design.

6. Typical Characteristics



V+ = 2.5 V, V- = -2.5 V, G = 1,
R_L = 1 MΩ, V_{IN} = 4.5 Vpp at 10 kHz, 0 V Bias

Figure 2. Signal step response

V+ = 2.5 V, V- = -2.5 V, G = 1, C_L = 100 pF,
R_L = 1 MΩ, V_{IN} =20 m Vpp at 100 Hz, 0 V Bias

Figure 3. Small-signal response

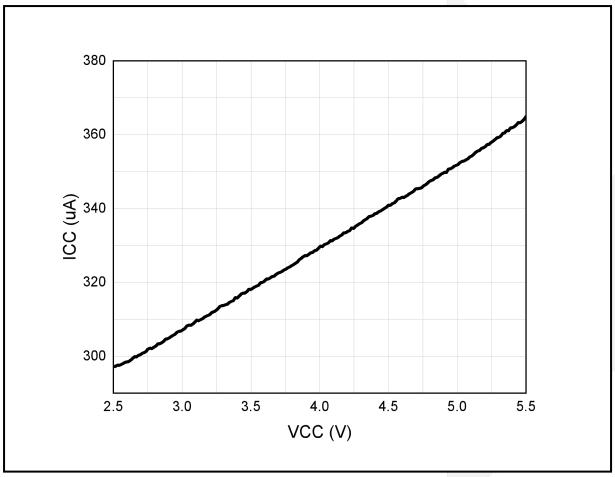


Figure 4. Standby current vs. Supply voltage

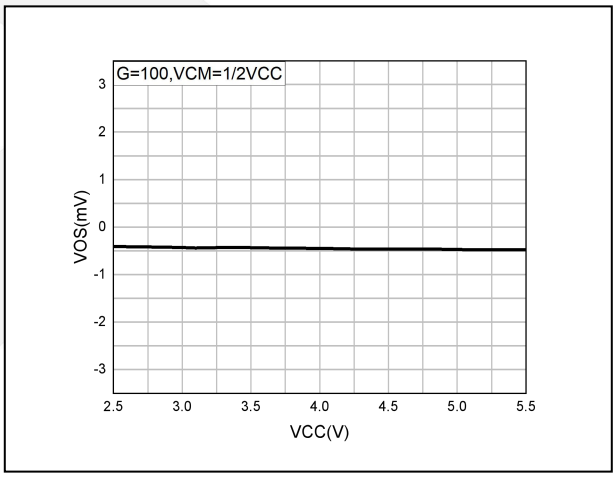


Figure 5. V_{OS} vs. V_{CC}

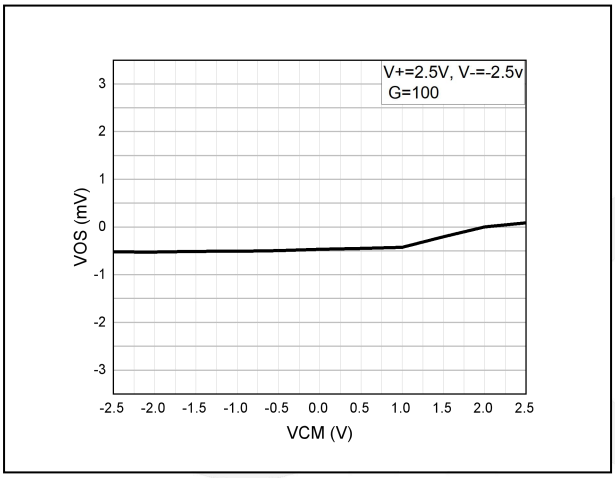


Figure 6. V_{OS} vs. V_{CM}

7. Typical Application

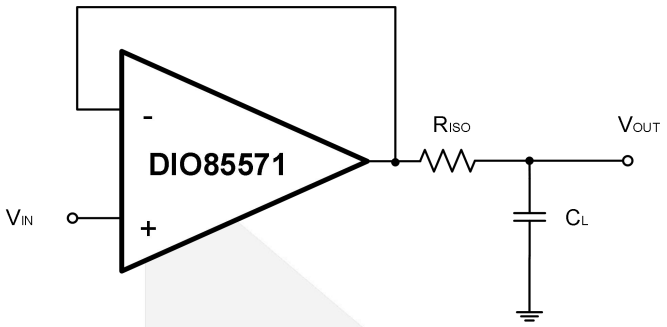


Figure 7. Indirectly driving heavy capacitive load

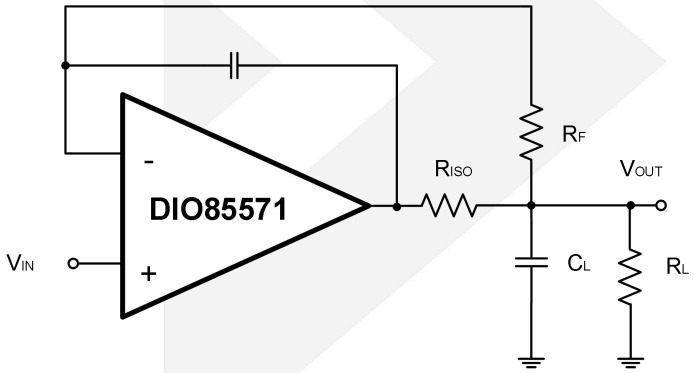


Figure 8. Indirectly driving heavy capacitive load with DC accuracy

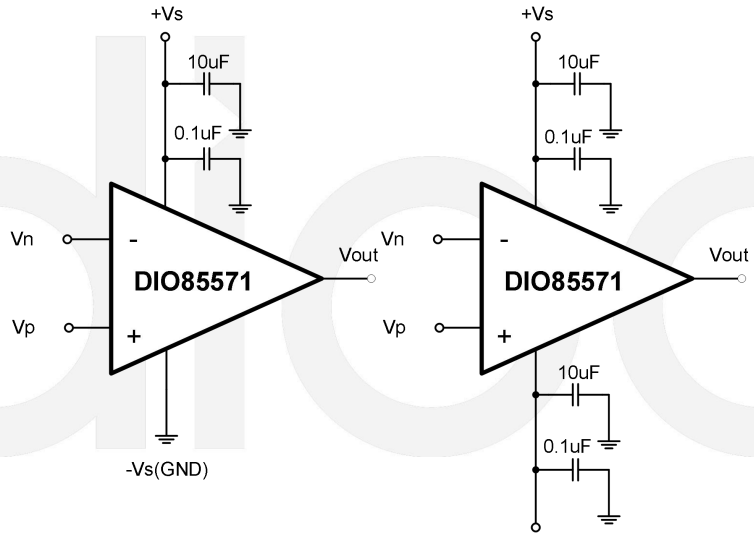
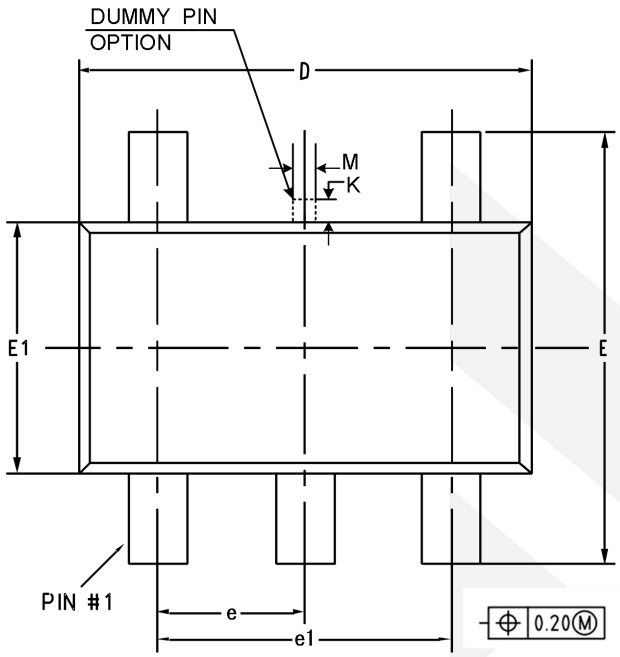
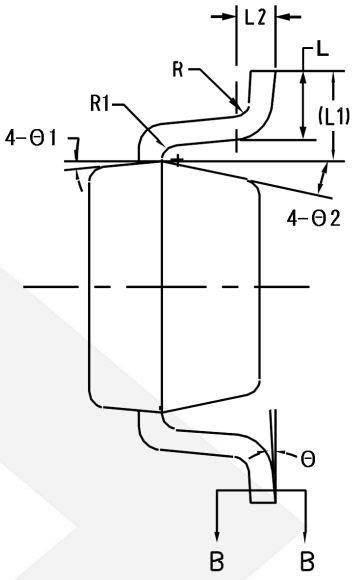
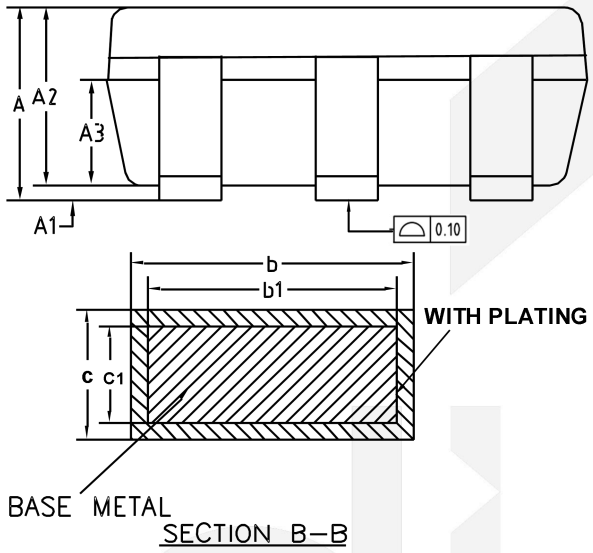


Figure 9. Amplifier with bypass capacitors

8. 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	-	0.45
b1	0.35	0.38	0.41
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
K	0	-	0.25
L	0.30	0.40	0.60
L1	0.59 REF		
L2	0.25 BSC		
M	0.10	0.15	0.25
R	0.05	-	0.20
R1	0.05	-	0.20
θ	0°	-	8°
θ1	8°	10°	12°
θ2	10°	12°	14°

Disclaimer

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