

DIO32358

1.4 MHz, 60 μ A, Rail-to-Rail I/O CMOS Amplifier

Features

- Rail-to-rail input and output
- Maxim offset (V_{OS}): 6 mV
- Unity gain stable
- Gain bandwidth product: 1.4 MHz
- Very low input bias currents: 5 pA
- Wide supply range: 2.0 V to 5.5 V
- Input voltage range: 0 V to +5 V
- Ultra low power: 60 μ A per channel
- Small size packaging best for portable applications, available in SOIC-8 and MSOP-8

Applications

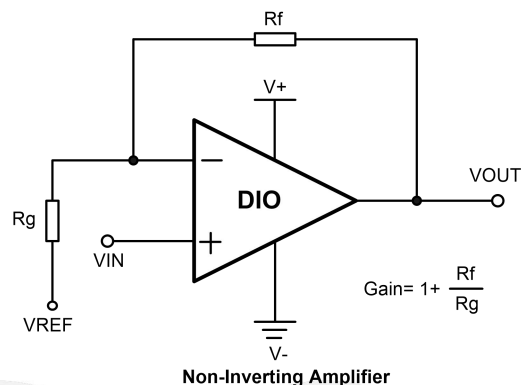
- ASIC input or output amplifier
- Sensor interface
- Piezo electric transducer amplifier
- Medical instrumentation
- Audio output
- Portable systems
- Smoke detectors
- Notebook PC
- Battery-powered equipment

Descriptions

The DIO32358 is a rail-to-rail CMOS operational amplifier with ultra-low offset. Features include wide input common-mode voltage range and broad output voltage swing with operating supply voltage from 2.0 V to 5.5 V. Products are fully specified over the extended -40 to $+125^{\circ}\text{C}$ temperature range.

The DIO32358 provides 1.4 MHz bandwidth consuming ultra-low current of 60 μ A per channel. Very low input bias currents of 5 pA enable it to be ideal for integrators, photodiode amplifiers, and piezoelectric sensors.

Typical Application



Ordering Information

Order Part Number	Top Marking	RoHS	T _A	Package	
DIO32358MP8	DIO2358	RoHS or Green	-40 to +125°C	MSOP-8	Tape & Reel, 3000
DIO32358SO8	DIO2358	RoHS or Green	-40 to +125°C	SOIC-8	Tape & Reel, 2500

Pin Assignments

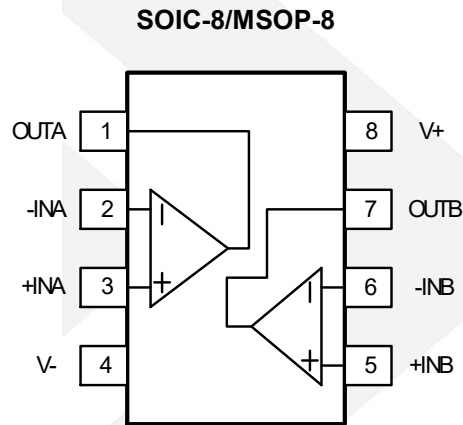


Figure 1 Pin Assignment

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 ₋)-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	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	2.0 to 5.5	V
Input voltage	0 to 5	V
Operating temperature range	-40 to 125	°C

Electrical Characteristics

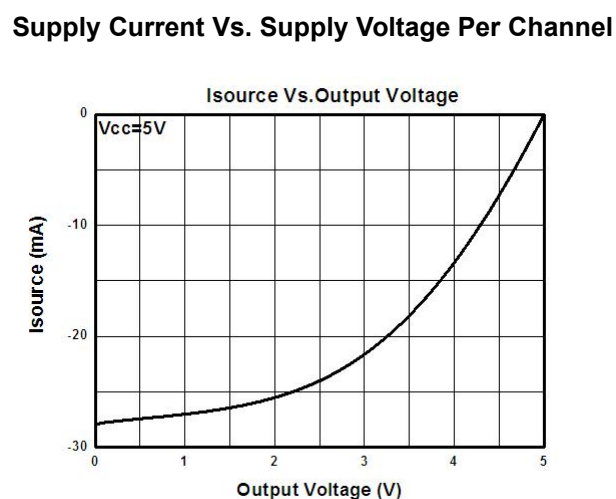
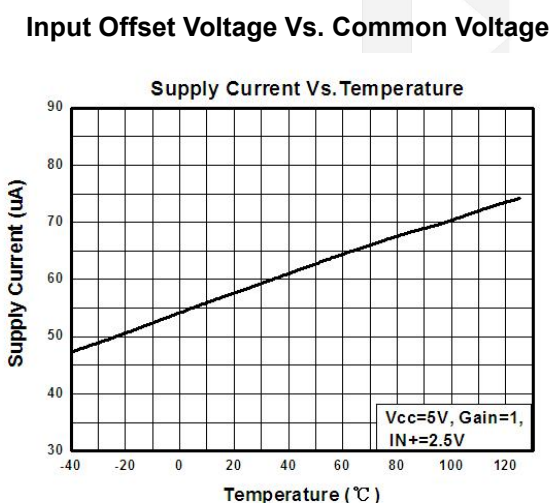
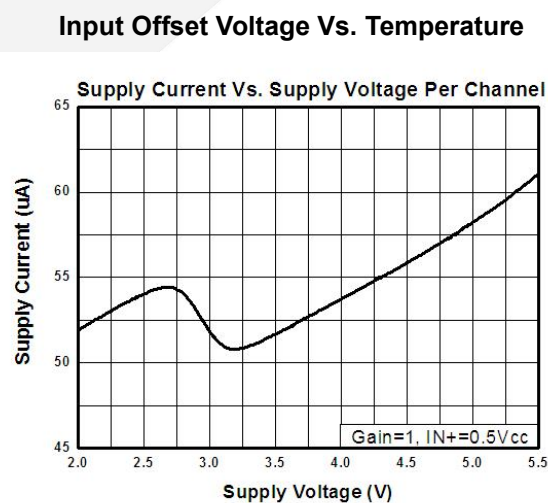
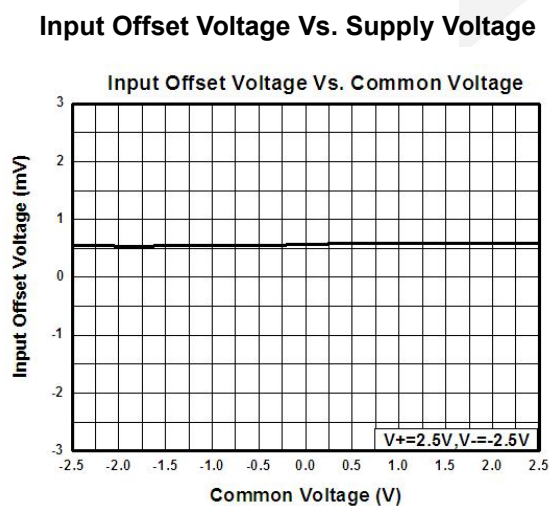
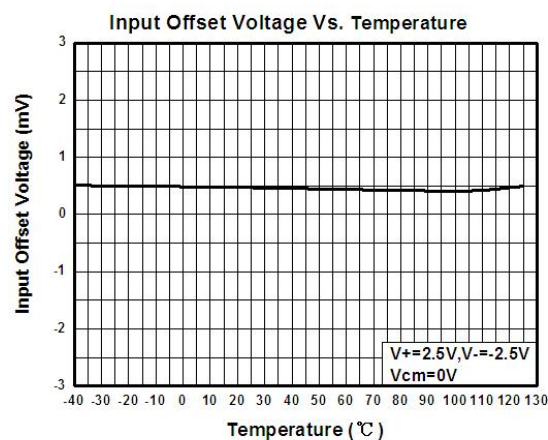
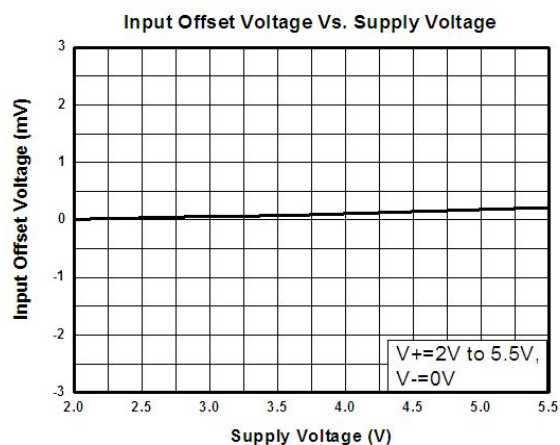
Typical value: $V_+ = 5\text{ V}$, $R_L = 100\text{ k}\Omega$ to $V_+/2$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Input characteristics						
V _{OS}	Input offset voltage	-40°C ≤ T _A ≤ 125°C, V ₊ = 2 V to 5 V	0	3	6	mV
I _B	Input bias current	-40°C ≤ T _A ≤ 125°C, V ₊ = 2 V to 5 V		5		pA
I _{OS}	Input offset current	-40°C ≤ T _A ≤ 125°C, V ₊ = 2 V to 5 V		5		pA
V _{CM}	Common mode voltage range		0.1		(V ₊) +0.1	V
CMRR	Common mode rejection ratio	-40°C ≤ T _A ≤ 125°C, V _{CM} = -0.1 to (V ₊) +0.1		75		dB
A _{OL}	Open loop voltage gain	R _L = 5 kΩ, V _O = 0.1 to (V ₊) -0.1	80	100		dB
		R _L = 200 kΩ, V _O = 0.1 to (V ₊) -0.1	90	110		
ΔV _{OS} /ΔT	Input offset voltage drift	-40°C ≤ T _A ≤ 125°C			5	μV/°C
Output characteristics						
V _{OH}	Output voltage high	V ₊ = 5 V, R _L = 100 kΩ, -40°C ≤ T _A ≤ 125°C		4.995		V
		V ₊ = 2.0 V, R _L = 100 kΩ, -40°C ≤ T _A ≤ 125°C		1.958		
V _{OL}	Output voltage low	V ₊ = 5 V, R _L = 100 kΩ, -40°C ≤ T _A ≤ 125°C		5		mV
		V ₊ = 2.0 V, R _L = 100 kΩ, -40°C ≤ T _A ≤ 125°C		5		
I _{SC}	Output short circuit current	Source I _{SC} , V ₊ = 5 V		40		mA
		Sink I _{SC} , V ₊ = 5 V		40		
Power supply						
PSRR	Power supply rejection ration		65	85		dB
I _S	Supply current per channel/amp	-40°C ≤ T _A ≤ 125°C		60		μA
Dynamic performance						
GBP	Gain bandwidth product	R _L = 100 kΩ, C _L = 100 pF		1.4		MHz
SR	Slew rate	G = 1, 2 V Output step		0.6		V/μs
t _s	Setting time	G = 1, 2 V Output step		2.4		μs
Noise performance						
THD	Total harmonic distortion	f = 10 kHz, 2 V Output step, R _L = 10 kΩ		0.019		%
e _n	Voltage noise density	f = 1 kHz		45		nV/√Hz
		f = 10 kHz		35		

Specifications subject to change without notice.

Typical Performance Characteristics

All typical value are at $V_+ = 2.5\text{ V}$, $V_- = -2.5\text{ V}$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

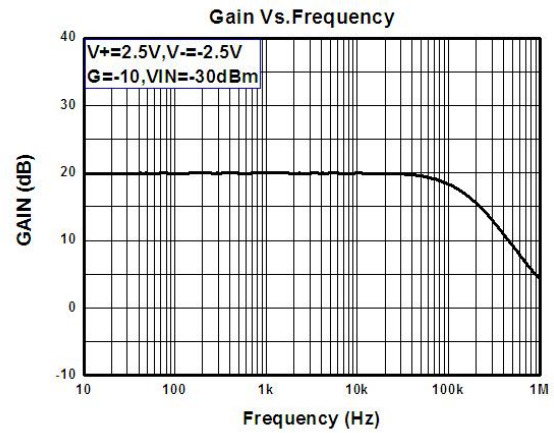
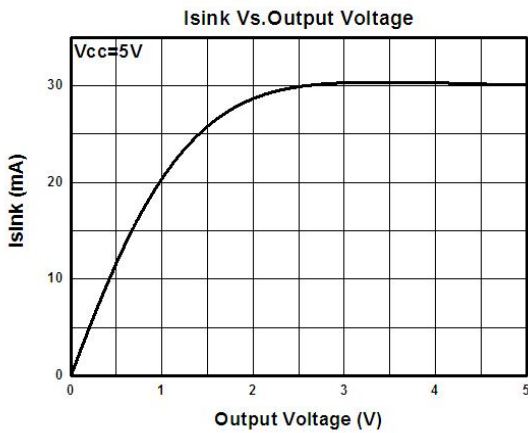


Supply Current Vs. Temperature

Isource Vs. Output Voltage

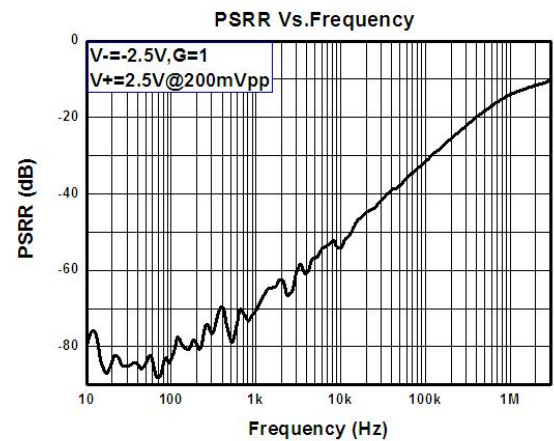
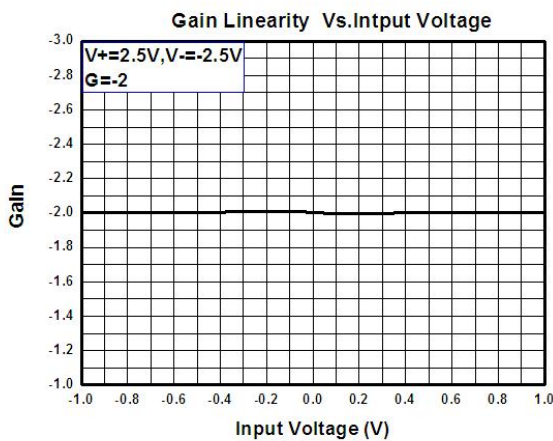
Typical Performance Characteristics(continued)

All typical value are at $V_+ = 2.5$ V, $V_- = -2.5$ V, $T_A = 25^\circ\text{C}$, unless otherwise specified.



Isink Vs. Output Voltage

Gain Vs. Frequency



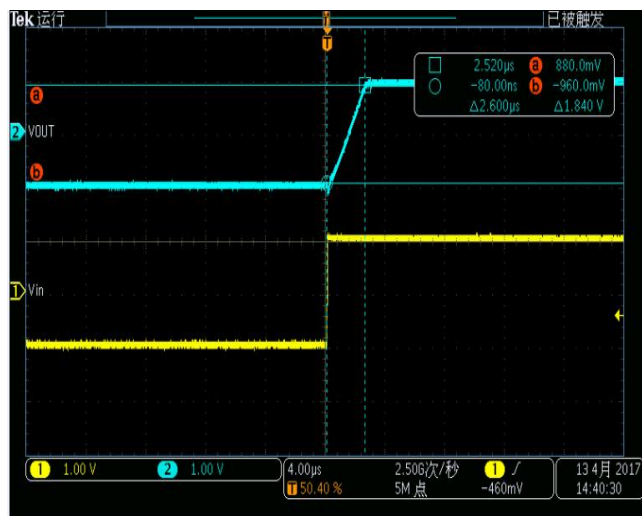
Gain Linearity Vs. Input Voltage

PSRR Vs. Frequency

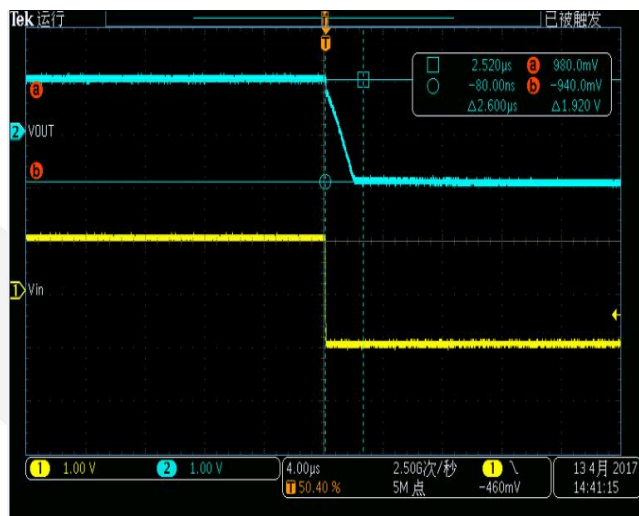
Typical Performance Characteristics(continued)

All typical value are at $V^+ = 2.5\text{ V}$, $V^- = -2.5\text{ V}$, $G = 1$, $R_L = 1\text{ M}\Omega$, $T_A = 25^\circ\text{C}$, unless otherwise specified.

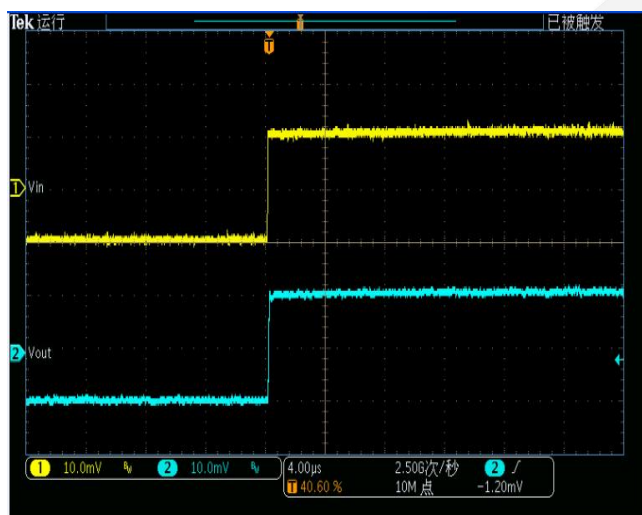
1.4 MHz, 60 μA , Rail-to-Rail I/O CMOS Amplifier



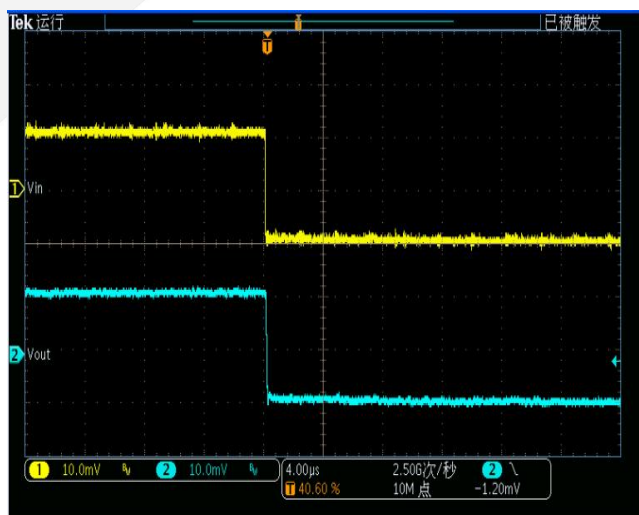
Slew Rate



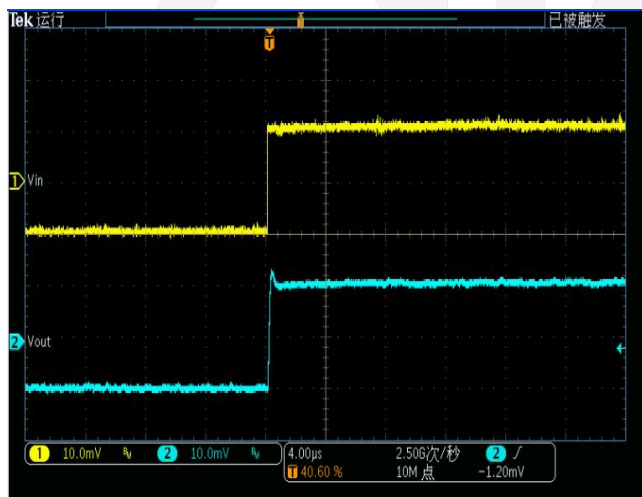
Slew Rate



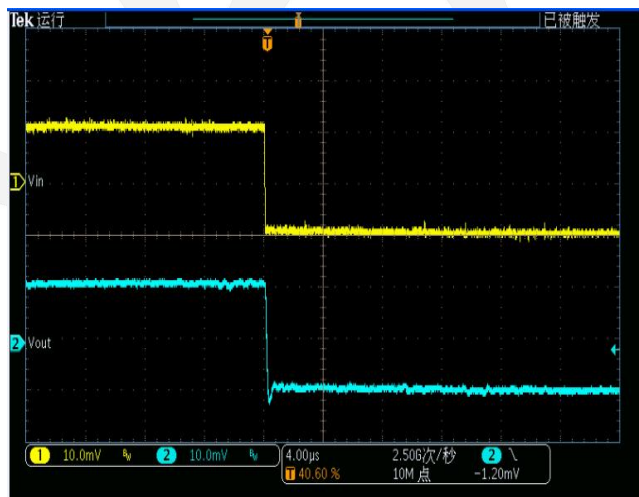
Small-Signal Response ($C_L = \text{No Load}$)



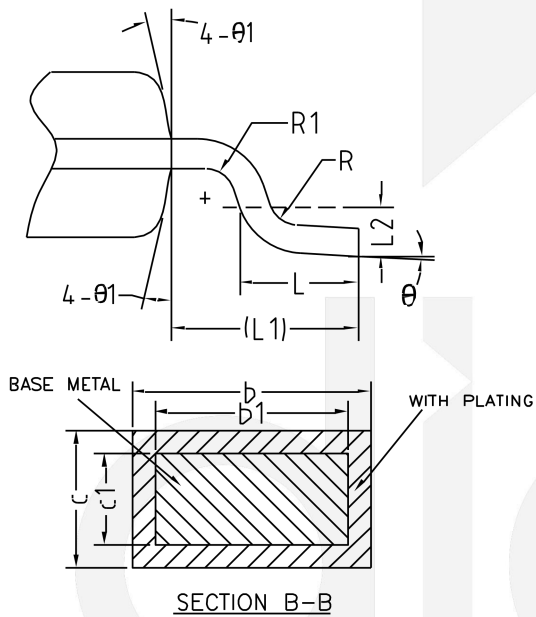
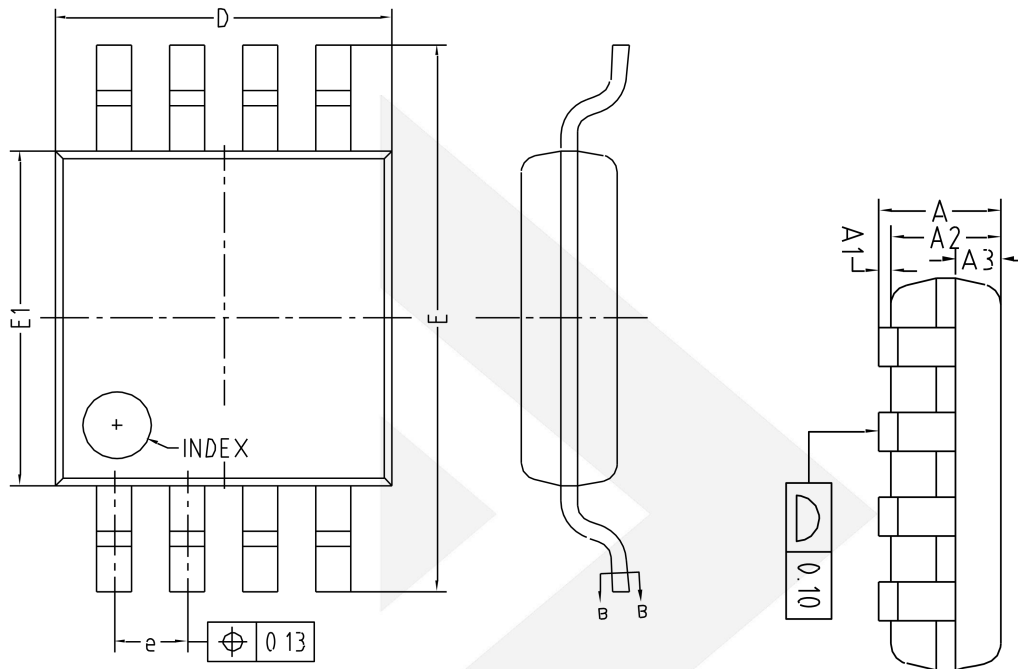
Small-Signal Response ($C_L = \text{No Load}$)



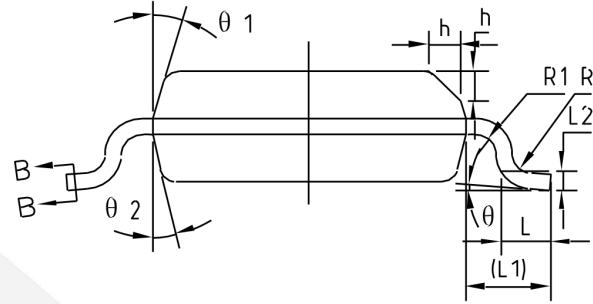
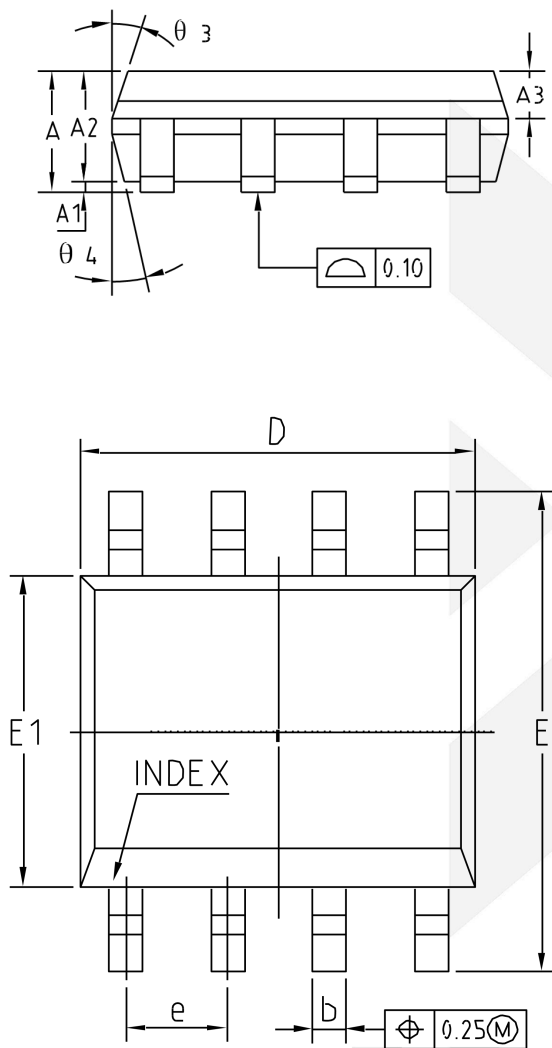
Small-Signal Response ($C_L = 200\text{ pF}$)



Small-Signal Response ($C_L = 200\text{ pF}$)

Physical Dimensions: MSOP-8


COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	Min	Nom	Max
A	-	-	1.10
A1	0	-	0.15
A2	0.75	0.85	0.95
A3	0.25	0.35	0.39
b	0.28	-	0.37
b1	0.27	0.30	0.33
c	0.15	-	0.20
c1	0.14	0.15	0.16
D	2.90	3.00	3.10
E	4.70	4.90	5.10
E1	2.90	3.00	3.10
e	0.55	0.65	0.75
L	0.45	0.60	0.80
L1	0.95 REF		
L2	0.25 BSC		
R	0.07	-	-
R1	0.07	-	-
θ	0°	-	8°
θ1	9°	12°	15°

Physical Dimensions: SOIC-8


COMMON DIMENSIONS (UNITS OF MEASURE=MILLIMETER)			
Symbol	Min	Nom	Max
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	-	0.51
b1	0.37	0.42	0.47
c	0.17	-	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.27 BSC		
L	0.45	0.60	0.80
L1	1.04 REF		
L2	0.25 BSC		
R	0.07	-	-
R1	0.07	-	-
h	0.30	0.40	0.50
θ	0°	-	8°
θ1	15°	17°	19°
θ2	11°	13°	15°
θ3	15°	17°	19°
θ4	11°	13°	15°

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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