

DIO3581/1A_3582_3584

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

Features

- Rail-to-Rail Input and Output
 - Maxim offset (V_{OS}): $\pm 3\text{mV}$
 - Unity Gain Stable
 - Gain Bandwidth Product: 1.4MHz
 - Very low input bias currents: 5pA
 - Wide supply range: 2V to 5.5V
 - Input Voltage Range:
-0.1V to +5.6V with $V^+ = 5.5\text{V}$
 - Ultra low power: 60μA per channel
 - Compact Package best for portable applications
- DIO3581/1A: SOT23-5 and SC70-5
DIO3582: SOIC-8, MSOP-8 and DFN2*2-8
DIO3584: SOIC-14 and TSSOP-14

Applications

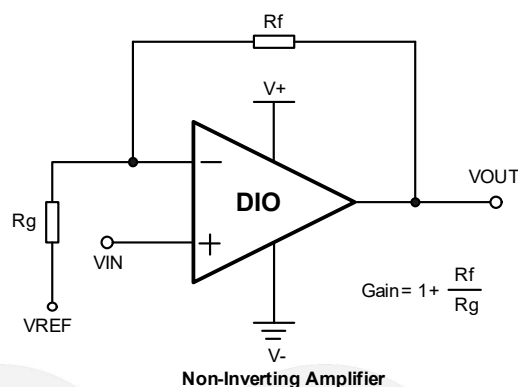
- ASIC Input or Output Amplifier
- Sensor Interface
- Piezo Electric Transducer Amplifier
- Medical Instrumentation
- Audio Output
- Portable Systems
- Smoke Detectors
- Notebook PC
- Battery-Powered equipment

Descriptions

DIO3581/ 1A(single), DIO3582 (dual) and DIO3584 (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 2V to 5.5V. Products are fully specified over the extended -40 to 125°C temperature range.

DIO3581/1A_3582_3584 provide 1.4MHz bandwidth consuming ultra low current of 60μA per channel. Very low input bias currents of 5pA enable them ideal for integrators, photodiode amplifiers, and piezoelectric sensors.

Typical Application



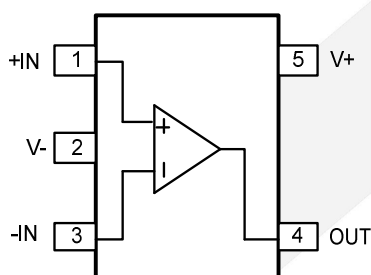
Ordering Information

Order Part Number	Top Marking		T _A	Package	
DIO3581ST5	YWXS	RoHS or Green	-40 to 125°C	SOT23-5	Tape & Reel, 3000
DIO3581SC5	YWXS	RoHS or Green	-40 to 125°C	SC70-5	Tape & Reel, 3000
DIO3581AST5	YW1A	RoHS or Green	-40 to 125°C	SOT23-5 SC70-5	Tape & Reel, 3000
DIO3582MP8	DIO358	RoHS or Green	-40 to 125°C	MSOP-8	Tape & Reel, 3000
DIO3582SO8	DIO358	RoHS or Green	-40 to 125°C	SOIC-8	Tape & Reel, 2500
DIO3582CN8	3582	RoHS or Green	-40 to 125°C	DFN2*2-8	Tape & Reel, 3000
DIO3584TP14	DIO3584	RoHS or Green	-40 to 125°C	TSSOP-14	Tape & Reel, 2500
DIO3584SO14	DIO3584	RoHS or Green	-40 to 125°C	SOIC-14	Tape & Reel, 2500

Pin Assignments

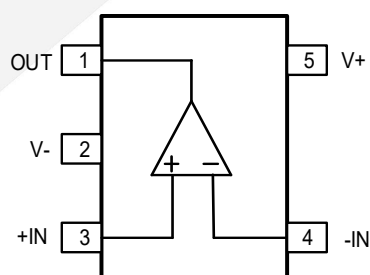
SOT23-5/SC70-5

DIO3581



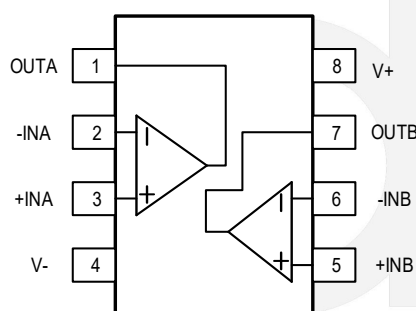
SOT23-5/SC70-5

DIO3581A



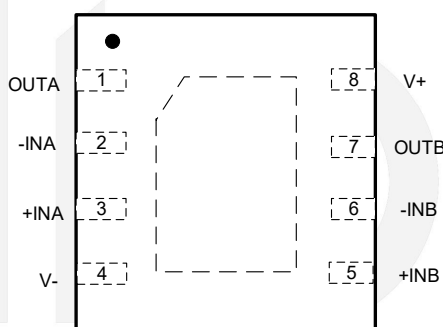
SOIC-8/MSOP-8

DIO3582



DFN2*2-8

DIO3582



TSSOP-14/SOIC-14

DIO3584

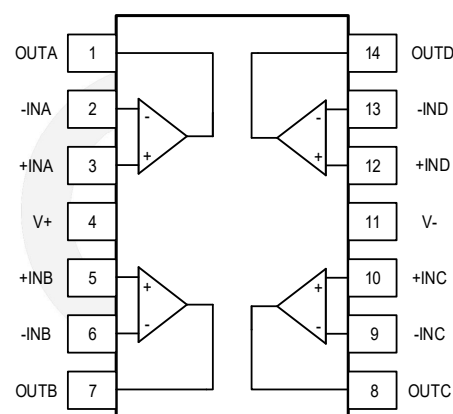


Figure 1 Pin Assignment

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 maxim 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	-0.1 to (V+)+0.1	V
Operating Temperature Range	-40 to 125	°C

Electrical Characteristics

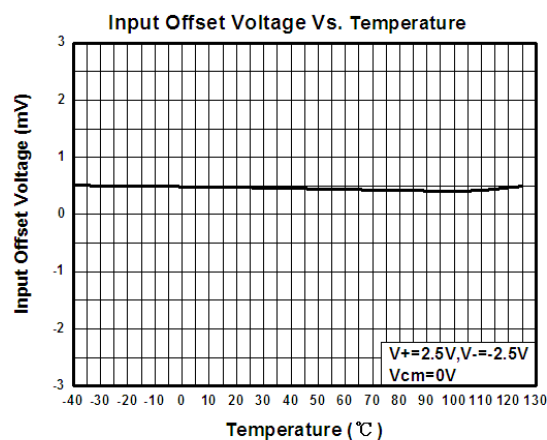
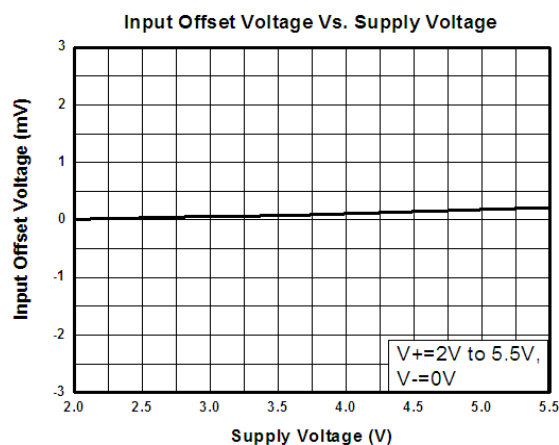
Typical value: $V_+ = 5V$, $R_L = 100k\Omega$ to $V_+/2$, $T_A = 25^\circ C$, unless otherwise specified.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
INPUT CHARACTERISTICS						
V _{OS}	Input Offset Voltage	-40°C≤T _A ≤125°C, V ₊ =2V to 5V	-3	0.5	3	mV
I _B	Input Bias Current	-40°C≤T _A ≤125°C, V ₊ =2V to 5V		5		pA
I _{OS}	Input Offset Current	-40°C≤T _A ≤125°C, V ₊ =2V to 5V		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	65	75		dB
A _{OL}	Open Loop Voltage Gain	R _L =5kΩ, V _O = 0.1 to (V ₊)-0.1	80	100		dB
		R _L =200kΩ, 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	R _L =100kΩ, -40°C≤T _A ≤125°C		4.998		V
V _{OL}	Output Voltage Low	R _L =100kΩ, -40°C≤T _A ≤125°C		2.5		mV
I _{SC}	Output Short Circuit Current	Source I _{SC} , V ₊ =5V		40		mA
		Sink I _{SC} , V ₊ =5V		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 =100K, C _L =100pF		1.4		MHz
SR	Slew Rate	G=1, 2V Output Step		0.6		V/μs
t _s	Setting Time	G=1, 2V Output Step		2.4		μs
NOISE PERFORMANCE						
THD	Total Harmonic Distortion	f=10kHz,2V Output Step, R _L =10kΩ		0.019		%
e _n	Voltage Noise Density	f=1kHz		45		nV/√Hz
		f=10kHz		35		

Specifications subject to change without notice.

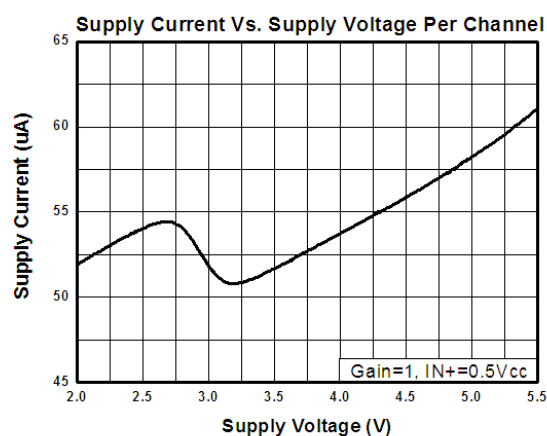
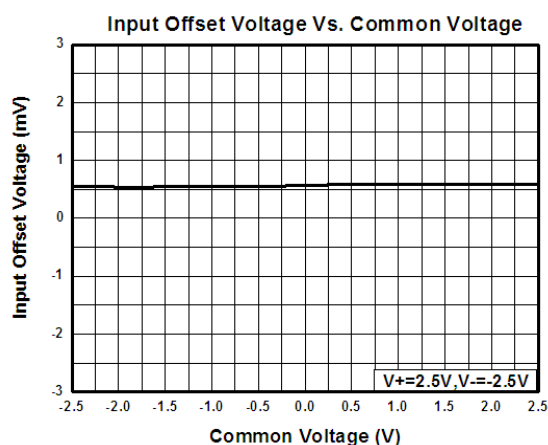
Typical Performance Characteristics

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



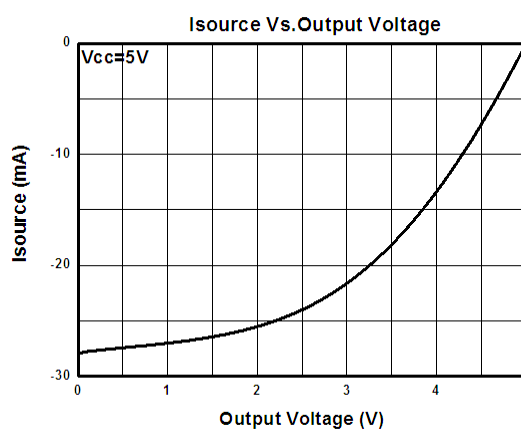
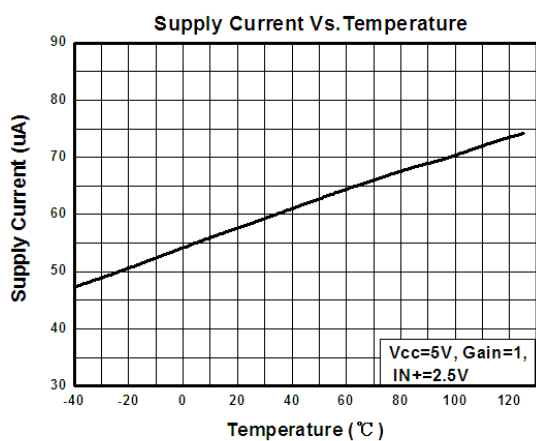
Input Offset Voltage Vs. Supply Voltage

Input Offset Voltage Vs. Temperature



Input Offset Voltage Vs. Common Voltage

Supply Current Vs. Supply Voltage Per Channel

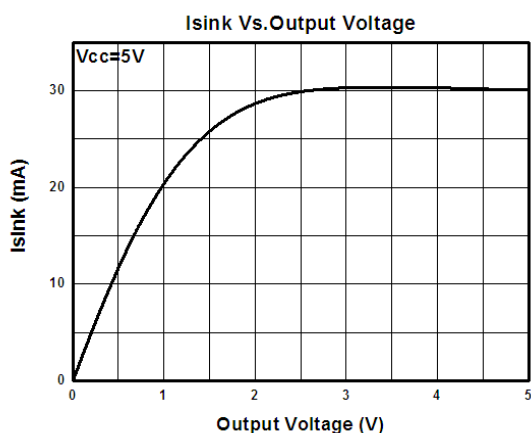


Supply Current Vs. Temperature

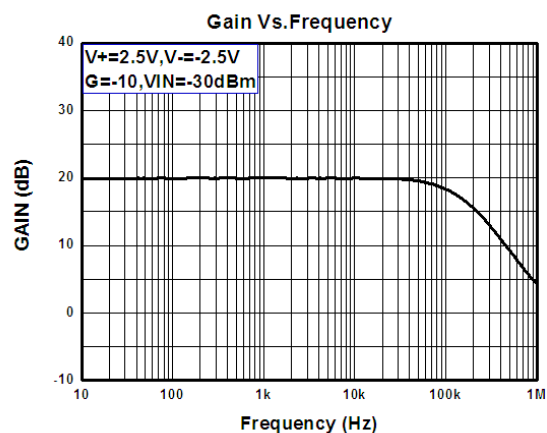
Isource Vs. Output Voltage

Typical Performance Characteristics(continued)

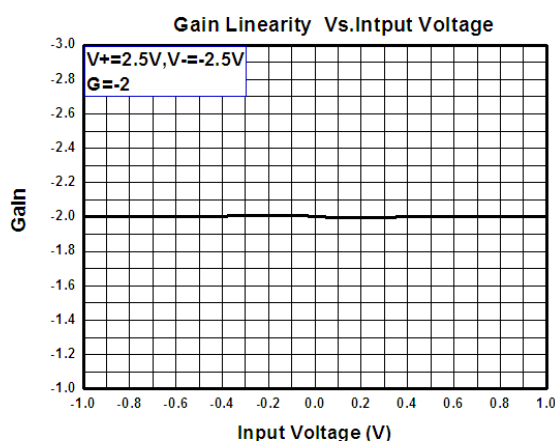
All typical value are at $V_+ = 2.5V$, $V_- = -2.5V$, $T_A = 25^\circ C$, unless otherwise specified.



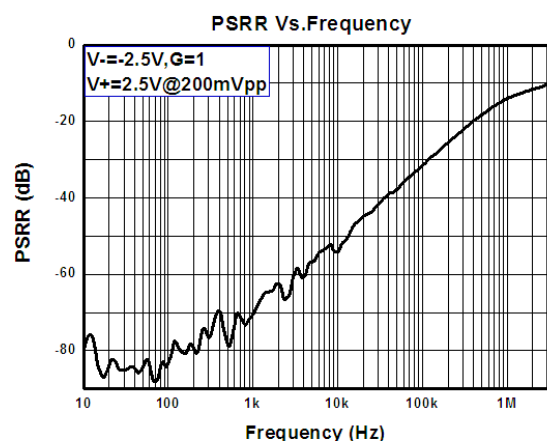
Isink Vs. Output Voltage



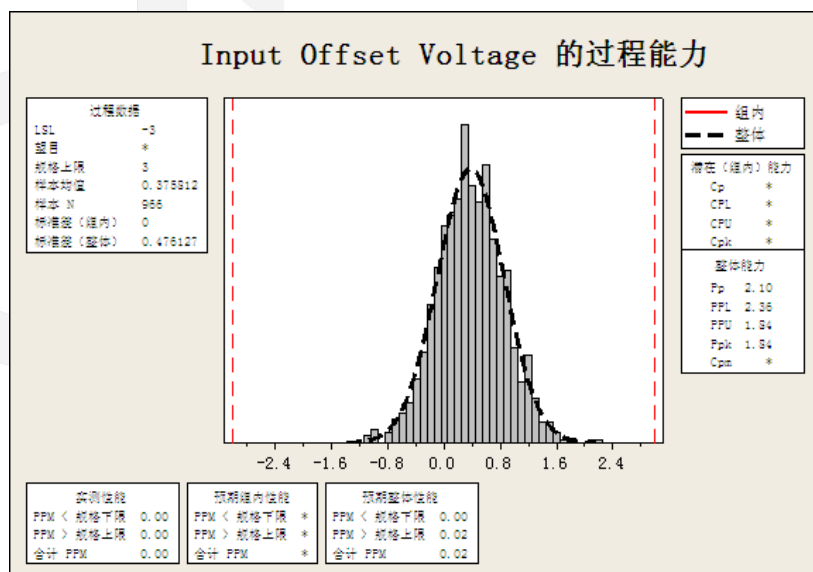
Gain Vs. Frequency



Gain Linearity Vs. Input Voltage



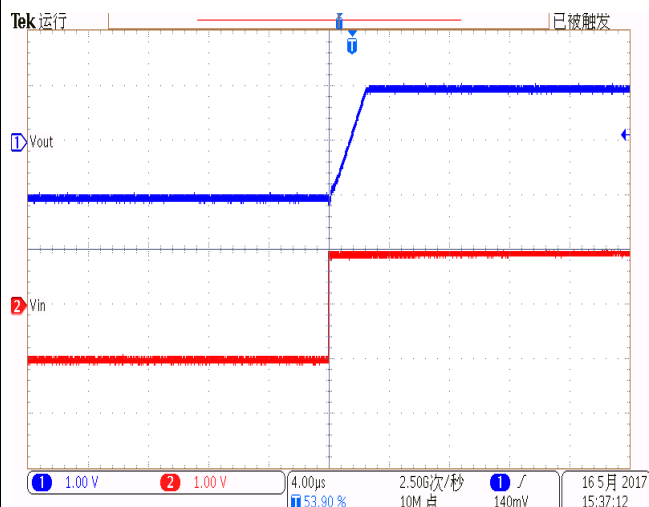
PSRR Vs. Frequency



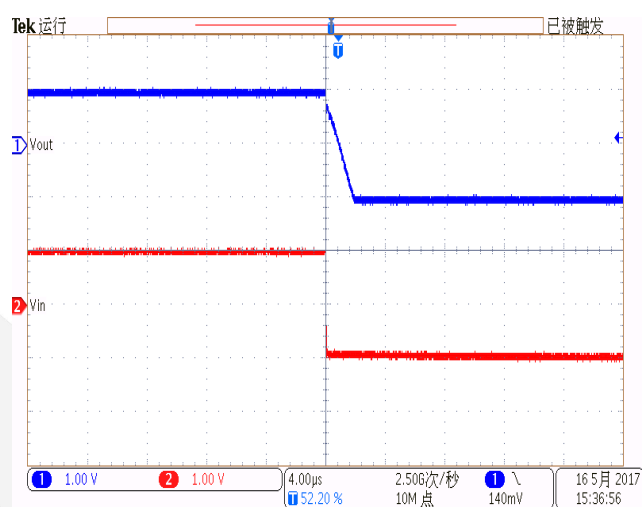
Input Offset Voltage Statistics

Typical Performance Characteristics(continued)

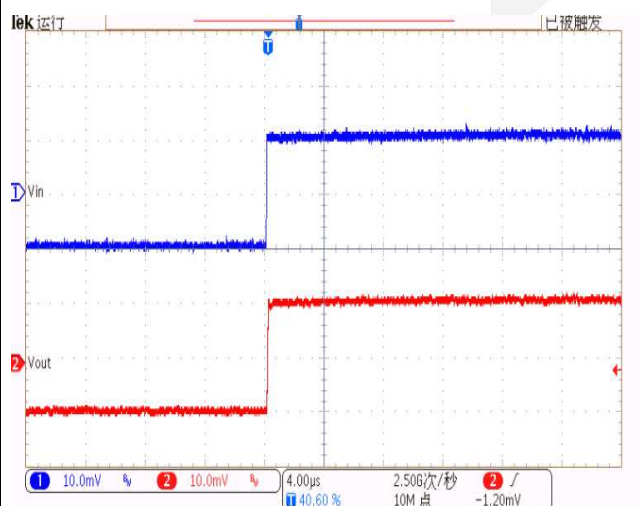
All typical value are at $V_+ = 2.5V$, $V_- = -2.5V$, $G = 1$, $R_L = 1M\Omega$, $T_A = 25^\circ C$, unless otherwise specified.



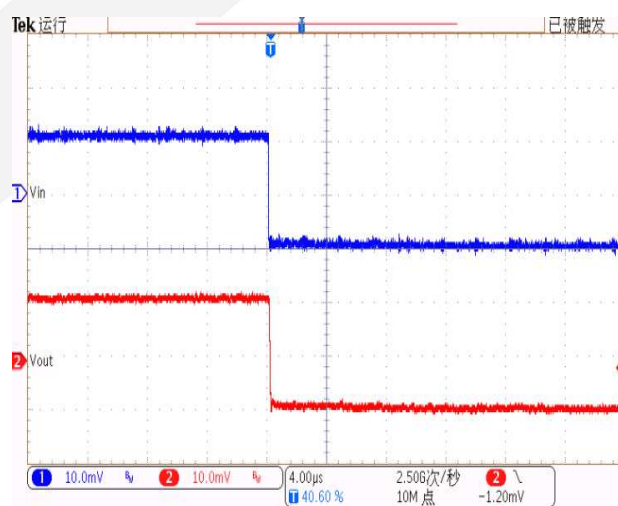
Slew Rate(+)



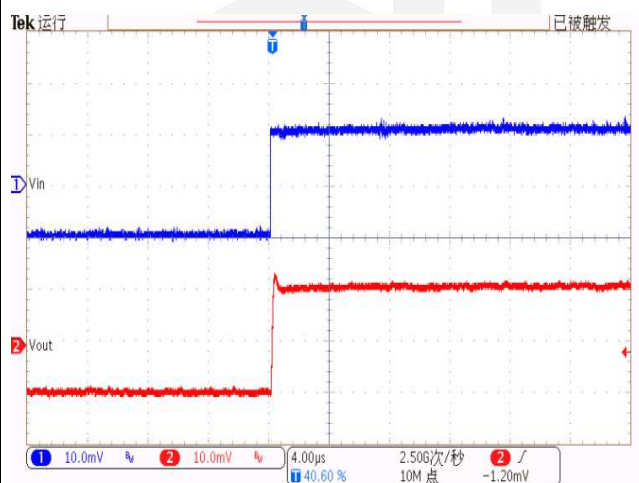
Slew Rate(-)



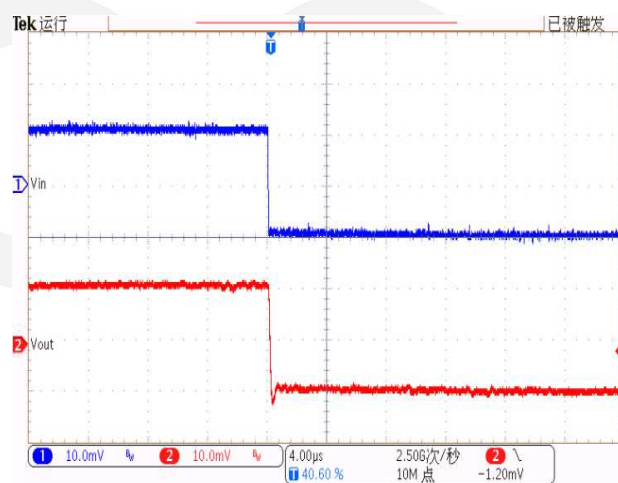
Small-Signal Response Rise ($C_L = \text{No Load}$)



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



Small-Signal Response Rise ($C_L = 200pF$)



Small-Signal Response Fall ($C_L = 200pF$)

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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