APPLICATION MANUAL

Single Supply Dual OP Amp
TK17031M/L

CONTENTS

MEETING YOUR NEEDS
TOKO, INC.

Single Supply Dual OP Amp
TK17031M/L

1. DESCRIPTION

The TK17031M/L is a general purpose dual operational amplifier. The features are low voltage operation and a small package. It is suitable for use with portable equipment.

2. FEATURES

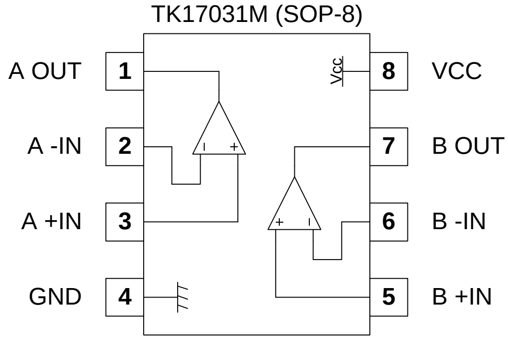
■ Low Voltage Operation	V_{OP}=2V to 10V
■ Slew Rate	SR=0.75V/µsec
■ Unity Gain Bandwidth	GB=2MHz
■ Small Package	SOP-8,SOT23L-8

3. APPLICATIONS

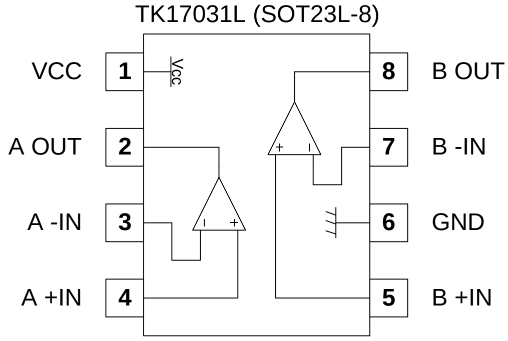
- ■ General Purpose
- ■ Portable Equipment
- ■ Low Operating Voltage Equipment

4. PIN CONFIGURATION

TK17031M (SOP-8)

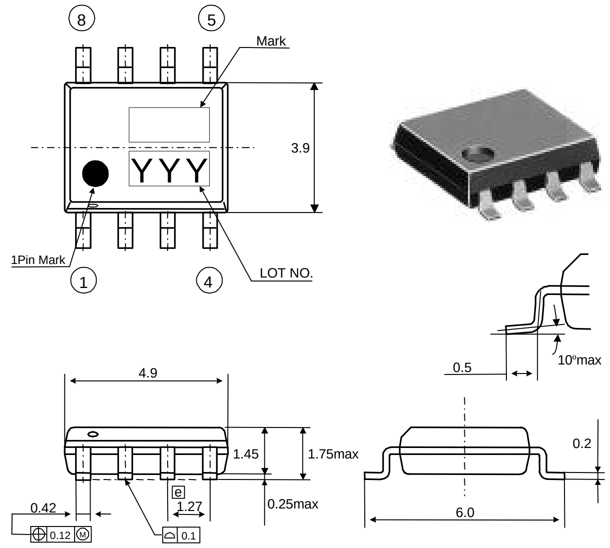


TK17031L (SOT23L-8)



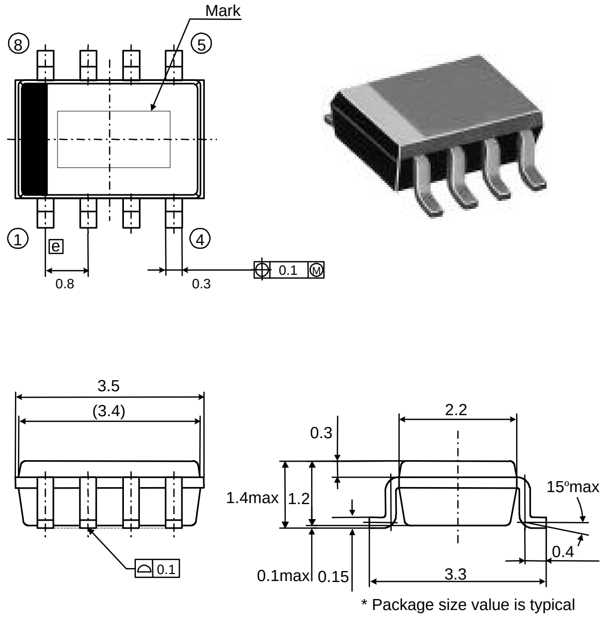
5. PACKAGE OUTLINE

■ SOP-8



* Package size value is typical

■ SOT23L-8



* Package size value is typical

6. ABSOLUTE MAXIMUM RATINGS

T_a=25°C

Parameter	Symbol	Rating	Units	Conditions
Supply Voltage	V_{CC}	12	V	
Power Dissipation	P_D	400	mW	*
Storage Temperature Range	T_{stg}	-55 ~ +150	°C	
Operating Temperature Range	T_{OP}	-40 ~ +85	°C	
Operating Voltage Range	V_{OP}	2 ~ 10	V	

* P_D must be decreased at the rate of 3.2mW/°C for operation above 25°C.

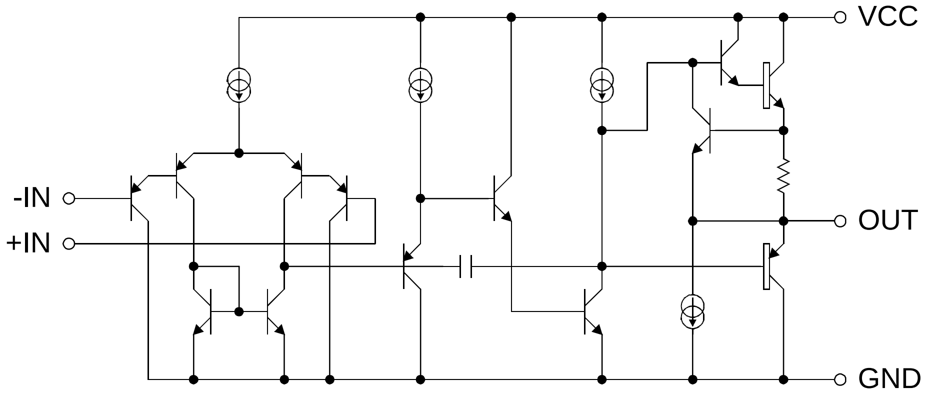
7. ELECTRICAL CHARACTERISTICS

V_{CC}=5V, T_a=25°C

Parameter	Symbol	Value			Units	Conditions
		MIN	TYP	MAX		
Supply Current	I_{CC}	-	0.7	1.2	mA	R_L=∞, Vin=GND
Input Offset Voltage	V_{IO}	-	1	5	mV	
Input Offset Current	I_{IO}	-	5	50	nA	
Input Bias Current	I_{IB}	-	25	250	nA	
Common-Mode Input Voltage Range	V_{ICMR}	0~ Vcc-1.5	-	-	V	
Maximum Output Voltage	V_{OM}	3.5	-	-	V	R_L =2kΩ
Source Current	I_{SO}	20	40	-	mA	V_O=2V, V_{IN}+=1V, V_{IN}-=0V
Sink Current	I_{SI}	8	20	-	mA	V_O=2V, V_{IN}+=0V, V_{IN}-=1V
		30	60		µA	V_O=0.2V, V_{IN}+=0V, V_{IN}-=1V
Common-Mode Rejection Ratio	CMRR	60	85	-	dB	
Supply Voltage Rejection Ratio	SVRR	60	100	-	dB	
Open Circuit Voltage Gain	G_{VO}	60	100	-	dB	R_L ≥2kΩ
Slew Rate	SR	-	0.75	-	V/µs	A_V=1, R_L=∞, V_{IN}=1V_{P-P}
Gain-Bandwidth Product	GB	-	2	-	MHz	f=10kHz
Cross Talk	CT	-	120	-	dB	f=1kHz

8. SIMPLIFIED SCHEMATIC

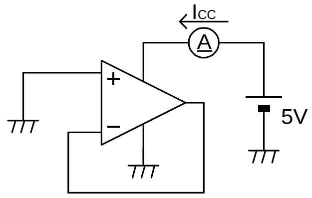
- TK17031M/L



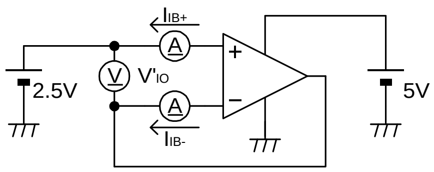
* The circuit in the above figure represents one of the two devices in the package.

9. TEST CIRCUIT

- Supply Current



- Input Offset Voltage, Input Offset Current, Input Bias Current

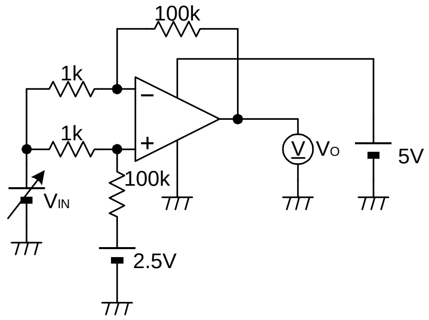


$$V_{IO} = |V'_{IO}|$$

$$I_{IO} = |I_{IB+} - I_{IB-}|$$

$$I_{IB} = \frac{I_{IB+} + I_{IB-}}{2}$$

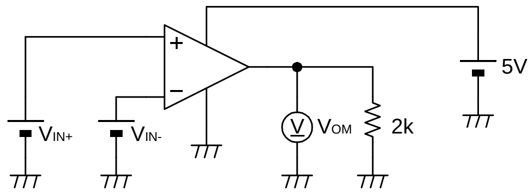
- Common-Mode Rejection Ratio, Common-Mode Input Voltage Range



$$CMRR = 20\log\left(101 \times \left|\frac{\Delta V_{IN}}{\Delta V_O}\right|\right)$$

$$V_{ICMR} : CMRR > 60dB$$

- Maximum Output Voltage

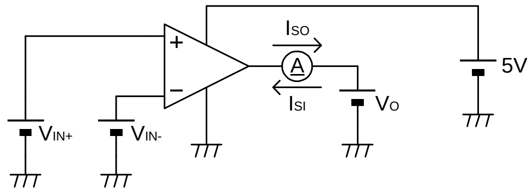


$$V_{OM+} : V_{IN+} = 1V, V_{IN-} = 0V$$

$$V_{OM-} : V_{IN+} = 0V, V_{IN-} = 1V$$

$$V_{OM} = V_{OM+} - V_{OM-}$$

- Source Current, Sink Current

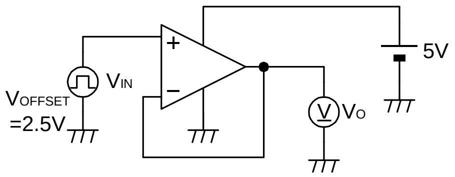


$$I_{SO} : V_{IN+} = 1V, V_{IN-} = 0V, V_O = 2V$$

$$I_{SI1} : V_{IN+} = 0V, V_{IN-} = 1V, V_O = 2V$$

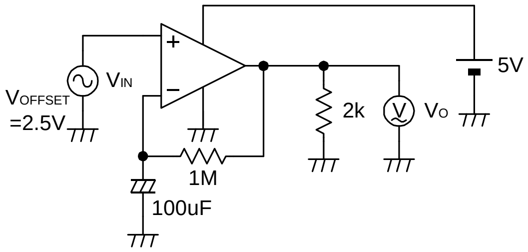
$$I_{SI2} : V_{IN+} = 0V, V_{IN-} = 1V, V_O = 0.2V$$

- Slew Rate



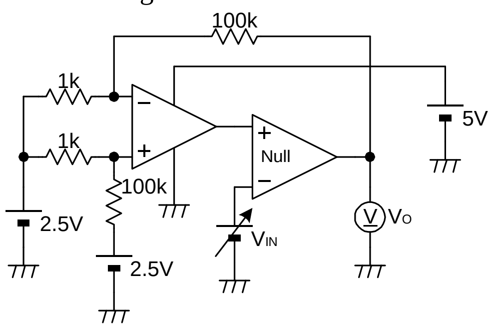
$$SR = \frac{\Delta V_O}{\Delta T_{RISE}}$$

- Gain-Bandwidth Product



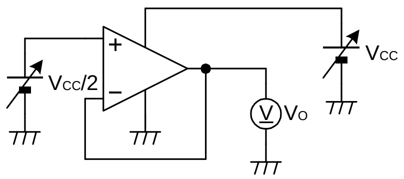
$$GB = \frac{V_O(f_T)}{V_{IN}(f_T)} \times f_T$$

- Open Circuit Voltage Gain



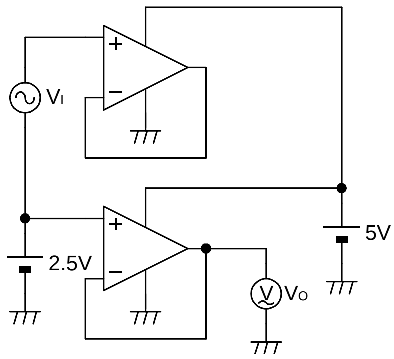
$$G_{VO} = 20\log\left(101 \times \frac{-\Delta V_{IN}}{\Delta V_O}\right)$$

- Supply Voltage Rejection Ratio



$$SVRR = 20\log\frac{\Delta V_{CC}}{\Delta V_O}$$

- Cross Talk

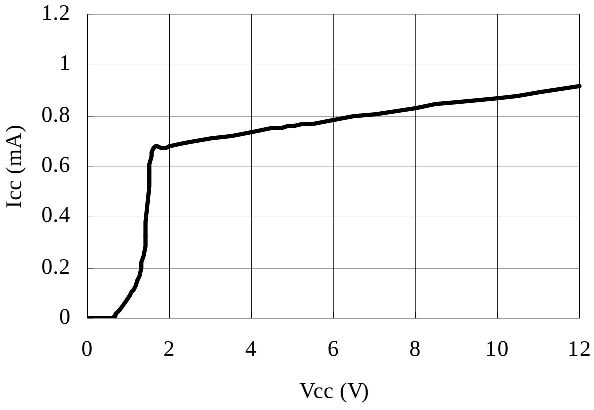


$$CT = 20\log\frac{\Delta V_I}{\Delta V_O}$$

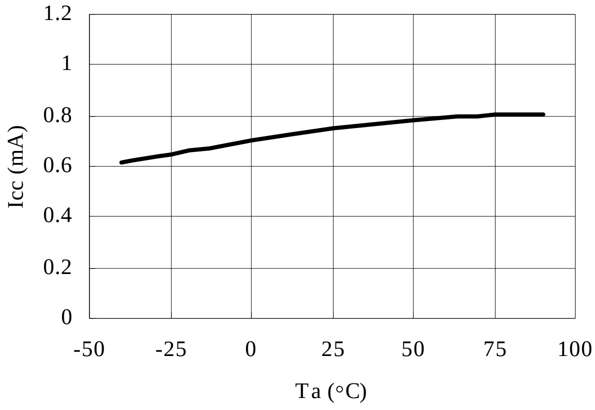
10. TYPICAL CHARACTERISTICS

(Ta=25°C,Vcc=5V)

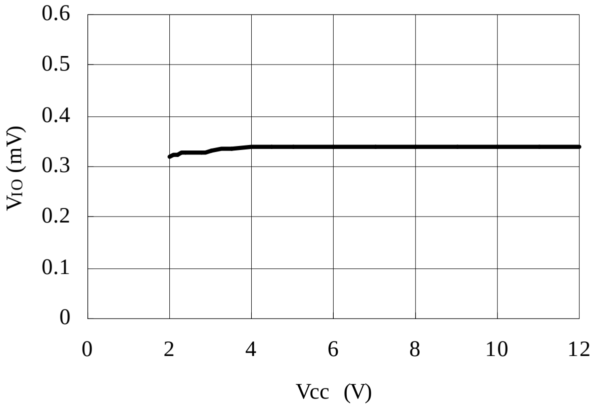
• Supply Current vs. Supply Voltage



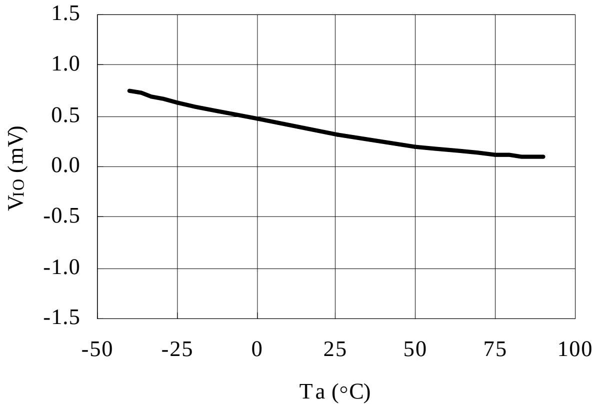
• Supply Current vs. Temperature



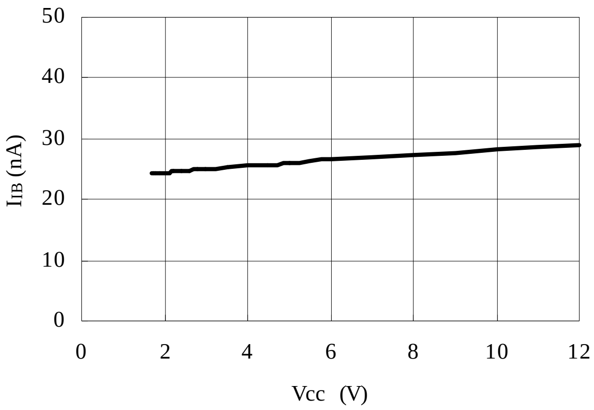
• Input Offset Voltage vs. Supply Voltage



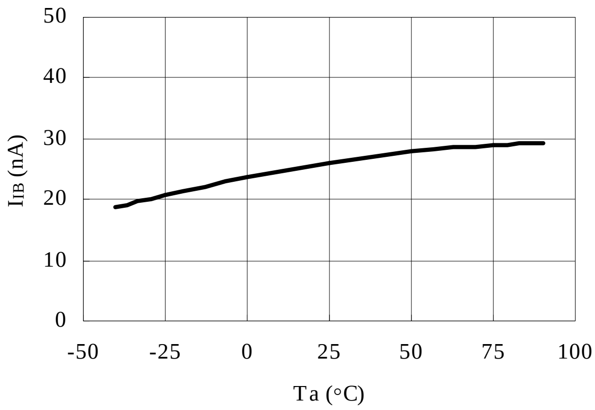
• Input Offset Voltage vs. Temperature



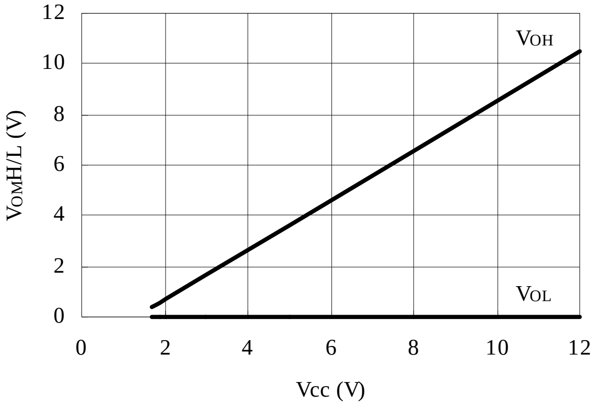
• Input Bias Current vs. Supply Voltage



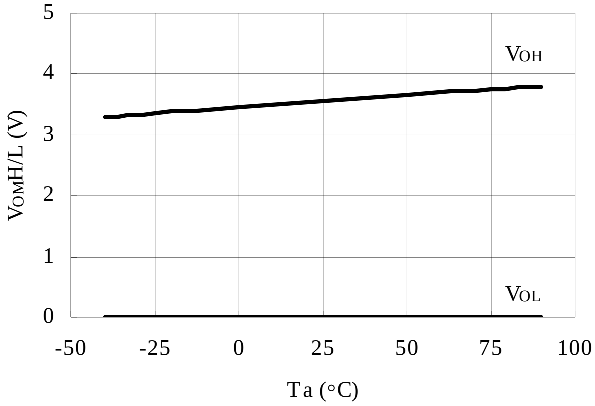
• Input Bias Current vs. Temperature



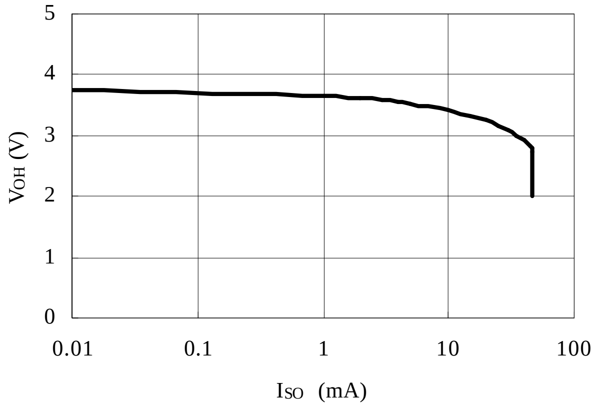
- Maximum Output Voltage vs. Supply Voltage



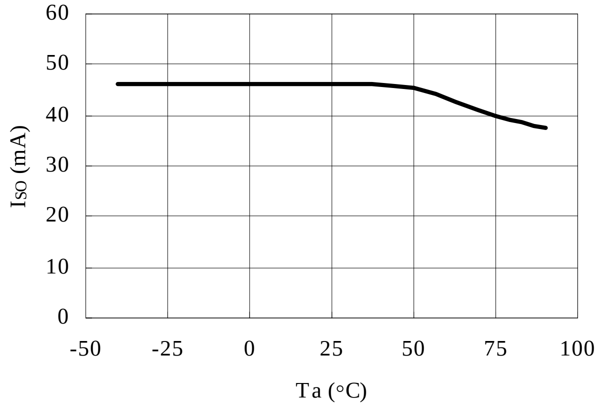
- Maximum Output Voltage vs. Temperature



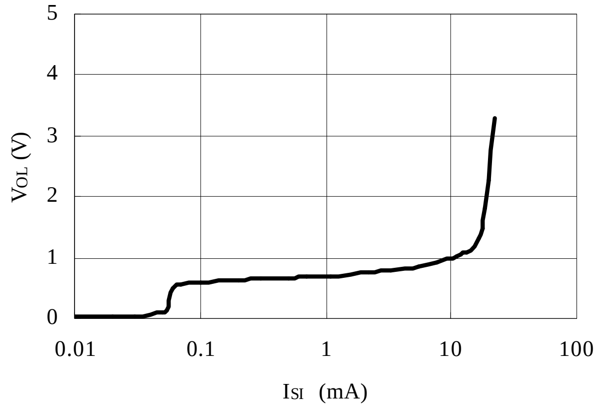
- Maximum High Output Voltage vs. Source Current (V_{IN+}=1V ,V_{IN-}=0V)



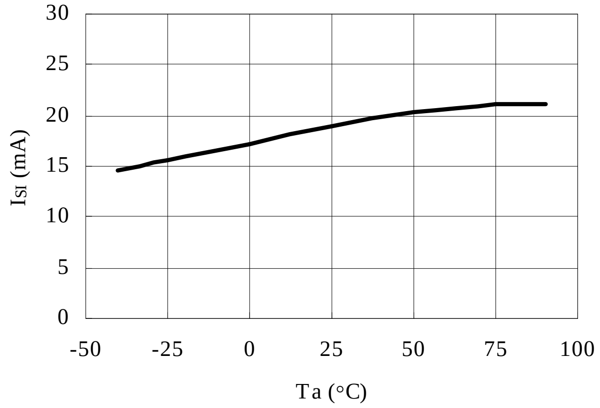
- Source Current vs. Temperature (V_O=2V, V_{IN+}=1V, V_{IN-}=0V)



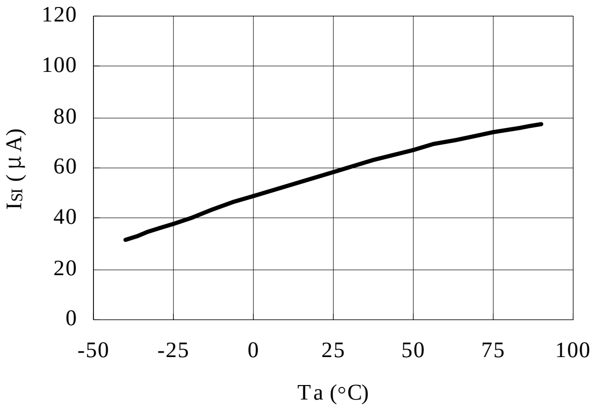
- Maximum Low Output Voltage vs. Sink Current (V_{IN+}=0V ,V_{IN-}=1V)



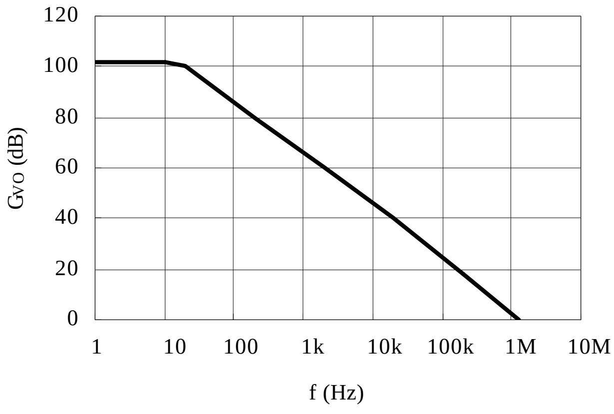
- Sink Current vs. Temperature (V_O=2V, V_{IN+}=0V, V_{IN-}=1V)



• Sink Current vs. Temperature
(V_O=0.2V, V_{IN+}=0V, V_{IN-}=1V)



• Open Circuit Voltage Gain vs. Frequency



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■ None of the ozone depleting substances (ODS) under the Montreal Protocol are used in our manufacturing process.

12. OFFICES

If you need more information on this product and other TOKO products, please contact us.

■ TOKO Inc. Headquarters
1-17, Higashi-yukigaya 2-chome, Ohta-ku, Tokyo, 145-8585, Japan
TEL: +81.3.3727.1161
FAX: +81.3.3727.1176 or +81.3.3727.1169
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