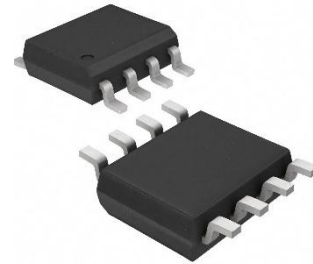


HX07-S General Purpose Amplifier

General Description

The HX07-S is an industry standard for instrumentation applications due to its excellent accuracy and stability. It offers a wide input voltage range of ± 13 V minimum, high CMRR of 106 dB, and high input impedance, ensuring high accuracy in the noninverting circuit configuration. Even at high closed-loop gains, the HX07-S maintains excellent linearity and gain accuracy. It exhibits outstanding stability of offsets and gain over time and variations in temperature. With its accuracy and stability, combined with the freedom from external nulling, the HX07-S has become widely recognized and used in the instrumentation industry.



SOP-8

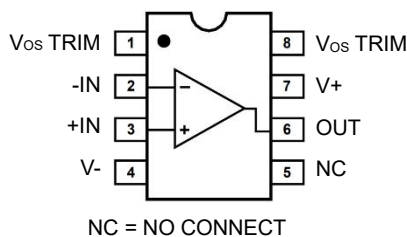
Features

- Low VOS: maximum 75 μ V
- Low VOS drift: maximum 1.3 μ V/ $^{\circ}$ C
- Low noise: maximum 0.6 μ V p-p
- Ultrastable vs. time: maximum 1.5 μ V per month
- Wide supply voltage range: ± 3 V to ± 18 V
- Wide input voltage range: typical ± 14 V
- 125 $^{\circ}$ C temperature-tested dice

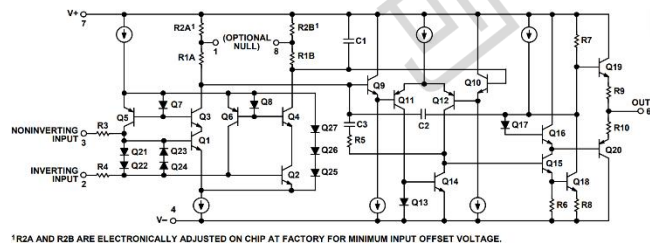
Applications

- Wireless base station control circuits
- Optical network control circuits
- Instrumentation
- Sensors and controls
 - Thermocouples
 - Strain bridges
 - Shunt current measurements
 - Resistor thermal detectors (RTDs)
- Precision filters

PIN CONFIGURATIONS



Simplified Schematic

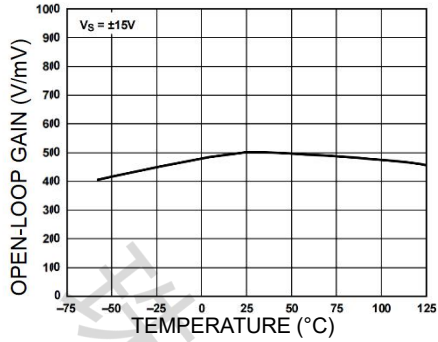


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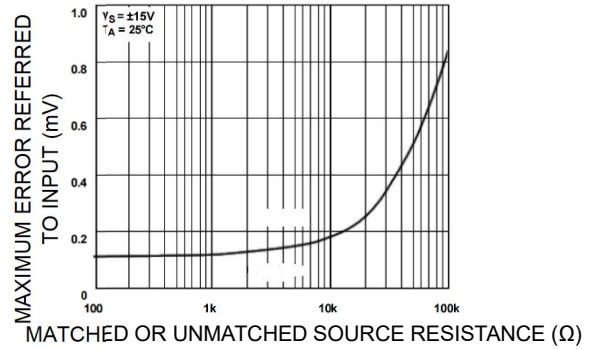
ELECTRICAL CHARACTERISTICS

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
INPUT CHARACTERISTICS						
TA = 25°C						
Input Offset Voltage	V_{OS}			60	150	μV
Long-Term VOS Stability	V_{OS}/Time			0.4	2.0	$\mu\text{V}/\text{Month}$
Input Offset Current	I_{OS}			0.8	6.0	nA
Input Bias Current	I_B			± 1.8	± 7.0	nA
Input Noise Voltage	e_n p-p	0.1 Hz to 10 Hz		0.38	0.65	μV p-p
Input Noise Voltage Density	e_n	$f_o = 10 \text{ Hz}$		10.5	20.0	nV/ $\sqrt{\text{Hz}}$
		$f_o = 100 \text{ Hz}^c$		0.2	13.5	
		$f_o = 1 \text{ kHz}$		9.8	11.5	
Input Noise Current	I_n p-p			15	35	pA p-p
Input Noise Current Density	I_n	$f_o = 10 \text{ Hz}$		0.35	0.90	pA/ $\sqrt{\text{Hz}}$
		$f_o = 100 \text{ Hz}^c$		0.15	0.27	
		$f_o = 1 \text{ kHz}$		0.13	0.18	
Input Resistance, Differential Mode	R_{IN}		8	33		M Ω
Input Resistance, Common Mode	R_{INCM}			120		G Ω
Input Voltage Range	IVR		± 13	± 14		V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = \pm 13 \text{ V}$	100	120		dB
Power Supply Rejection Ratio	PSRR	$V_S = \pm 3 \text{ V to } \pm 18 \text{ V}$		7	32	$\mu\text{V}/\text{V}$
Large Signal Voltage Gain	A_{VO}	$R_L \geq 2 \text{ k}\Omega, V_O = \pm 10 \text{ V}$	120	400		V/mV
		$R_L \geq 500 \Omega, V_O = \pm 0.5 \text{ V}, V_S = \pm 3 \text{ V}$	100	400		
-40°C ≤ TA ≤ +85°C						
Input Offset Voltage	V_{OS}			85	250	μV
Voltage Drift Without External Trim	TCV_{OS}			0.5	1.8	$\mu\text{V}/^\circ\text{C}$
Voltage Drift with External Trim	TCV_{OSN}	$R_P = 20 \text{ k}\Omega$		0.4	1.6	$\mu\text{V}/^\circ\text{C}$
Input Offset Current	I_{OS}			1.6	8.0	nA
Input Offset Current Drift	TCI_{OS}			12	50	pA/ $^\circ\text{C}$
Input Bias Current	I_B			± 2.2	± 9.0	nA
Input Bias Current Drift	TCI_B			18	50	pA/ $^\circ\text{C}$
Input Voltage Range	IVR		± 13	± 13.5		V
Common-Mode Rejection Ratio	CMRR	$V_{CM} = \pm 13 \text{ V}$	97	120		dB
Power Supply Rejection Ratio	PSRR	$V_S = \pm 3 \text{ V to } \pm 18 \text{ V}$		10	51	$\mu\text{V}/\text{V}$
Large Signal Voltage Gain	A_{VO}	$R_L \geq 2 \text{ k}\Omega, V_O = \pm 10 \text{ V}$	100	400		V/mV
OUTPUT CHARACTERISTICS						
TA = 25°C						
Output Voltage Swing	V_O	$R_L \geq 10 \text{ k}\Omega$	± 12.0	± 13.0		V
		$R_L \geq 2 \text{ k}\Omega$	± 11.5	± 12.8		
		$R_L \geq 1 \text{ k}\Omega$		± 12.0		
-40°C ≤ TA ≤ +85°C						
Output Voltage Swing	V_O	$R_L \geq 2 \text{ k}\Omega$	± 12	± 12.6		V
DYNAMIC PERFORMANCE						
TA = 25°C						
Slew Rate	SR	$R_L \geq 2 \text{ k}\Omega$	0.1	0.3		V/ μs
Closed-Loop Bandwidth	BW	$A_{VOL} = 1^E$	0.4	0.6		MHz
Open-Loop Output Resistance	R_O	$V_O = 0, I_O = 0$		60		Ω
Power Consumption	P_d	$V_S = \pm 15 \text{ V}, \text{ No load}$		80	150	mW
		$V_S = \pm 3 \text{ V}, \text{ No load}$		4	8	
Offset Adjustment Range		$R_P = 20 \text{ k}\Omega$		± 4		mV

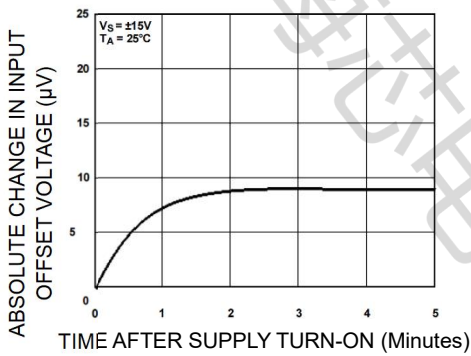
TYPICAL PERFORMANCE CHARACTERISTICS



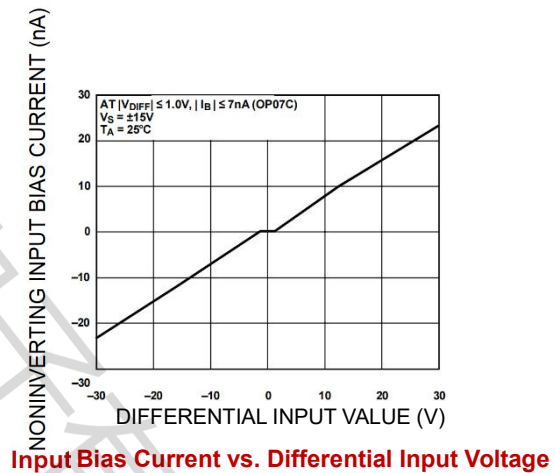
Open-Loop Gain vs. Temperature



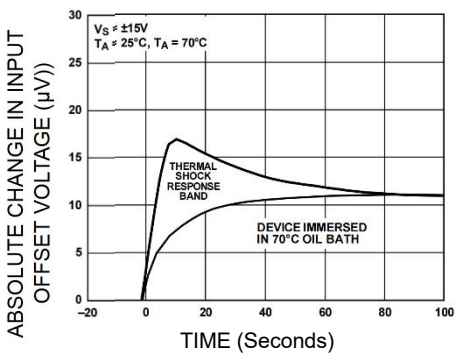
Maximum Error vs. Source Resistance



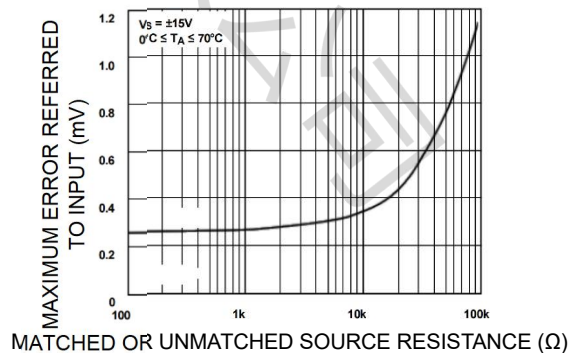
Warm-Up Drift



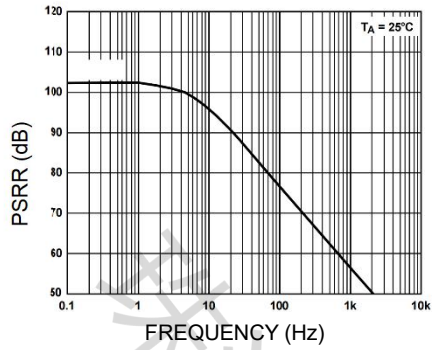
Input Bias Current vs. Differential Input Voltage



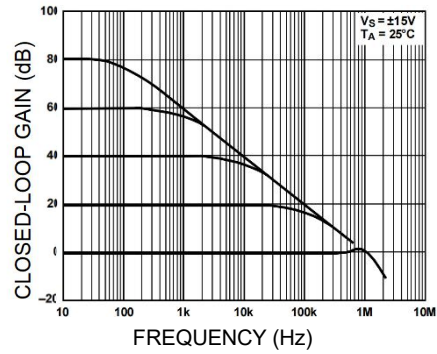
Offset Voltage Change due to Thermal



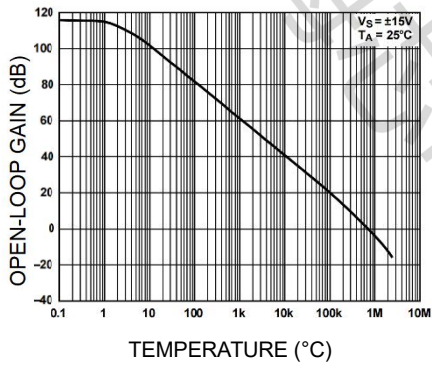
Maximum Error vs. Source Resistance



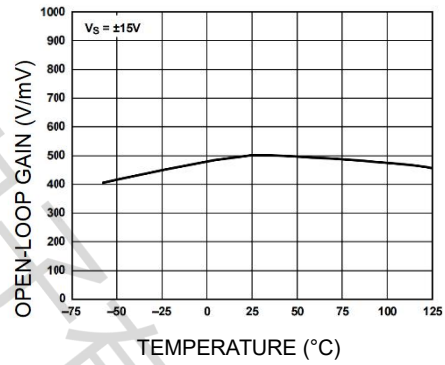
PSRR vs. Frequency



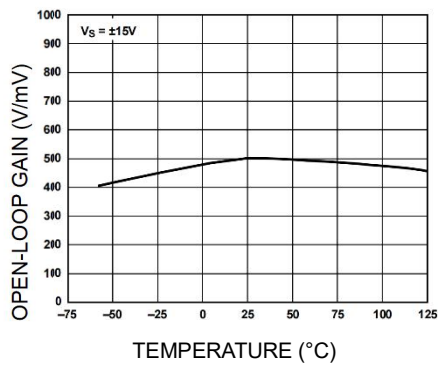
Closed-Loop Frequency Response for Various Gain



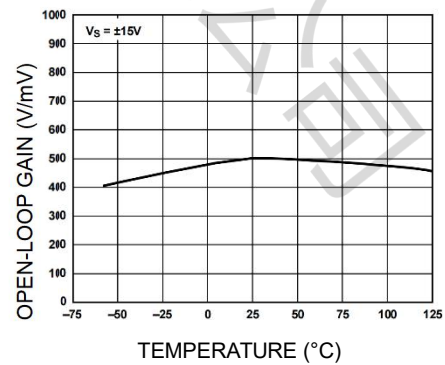
Open-Loop Gain vs. Temperature



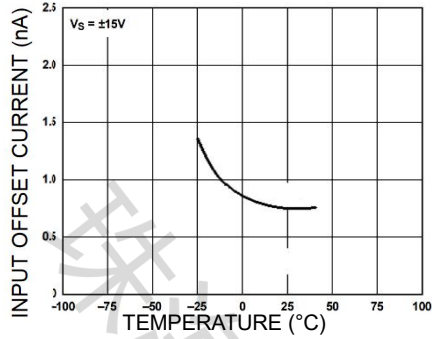
Open-Loop Gain vs. Temperature



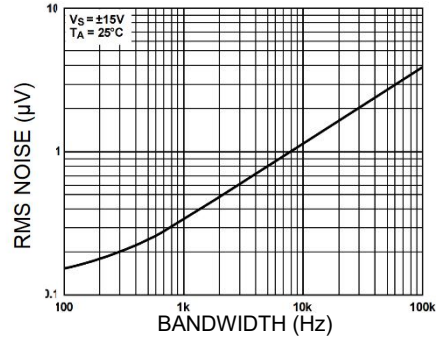
Open-Loop Gain vs. Temperature



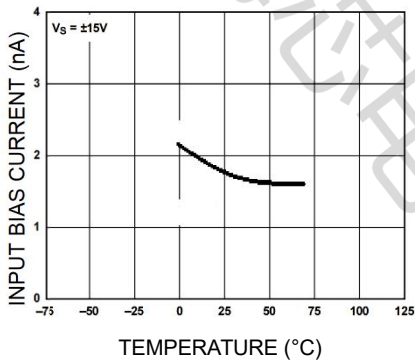
Open-Loop Gain vs. Temperature



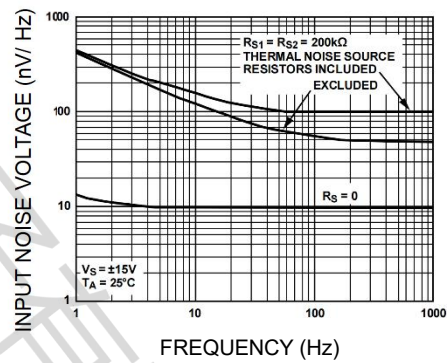
Input Offset Current vs. Temperature



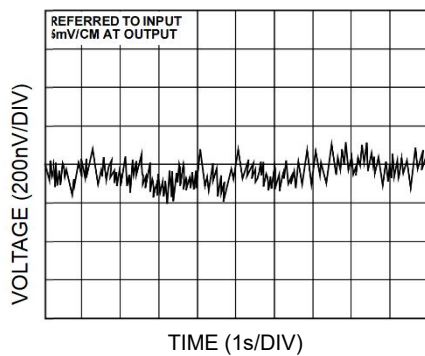
Input Wideband Noise vs. Bandwidth, 0.1 Hz to Frequency Indicated



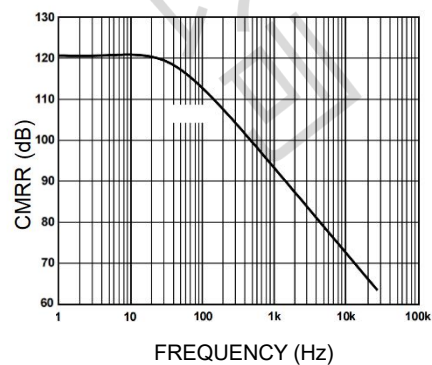
Input Bias Current vs. Temperature



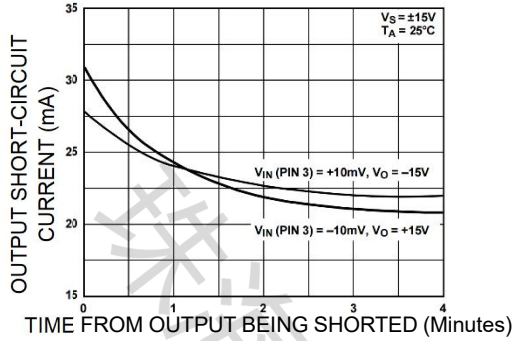
Total Input Noise Voltage vs. Frequency



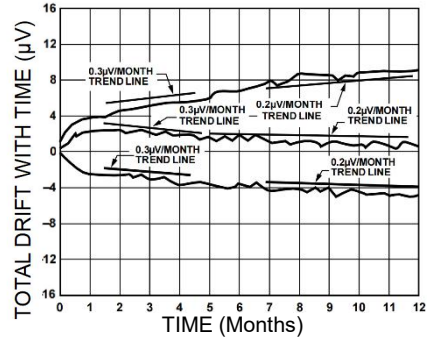
Low Frequency Noise



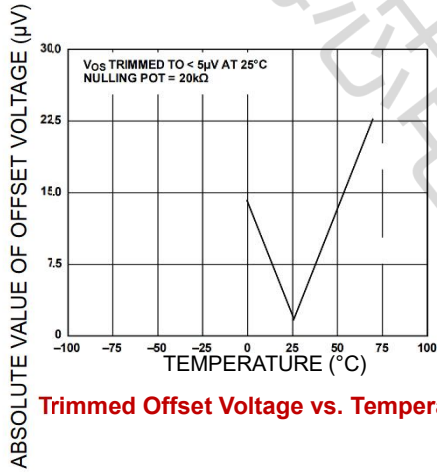
CMRR vs. Frequency



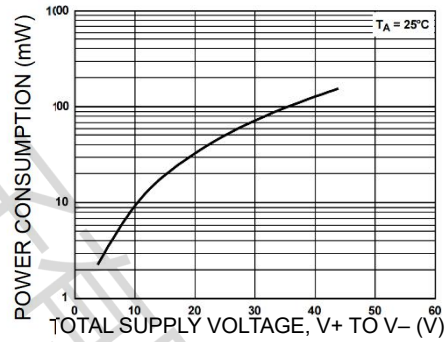
Output Short-Circuit Current vs. Time



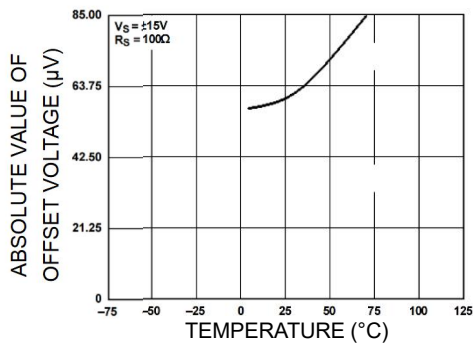
Offset Voltage Drift vs. Time



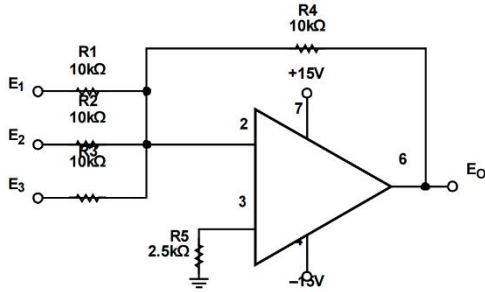
Trimmed Offset Voltage vs. Temperature



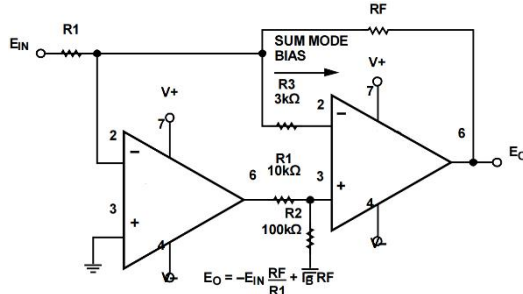
Power Consumption vs. Power Supply



Untrimmed Offset Voltage vs. Temperature

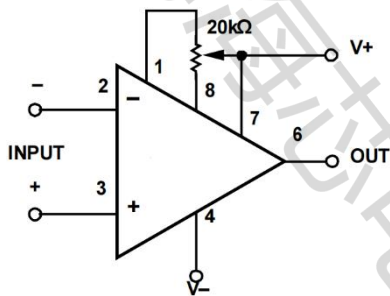


Typical Low Frequency Noise Circuit

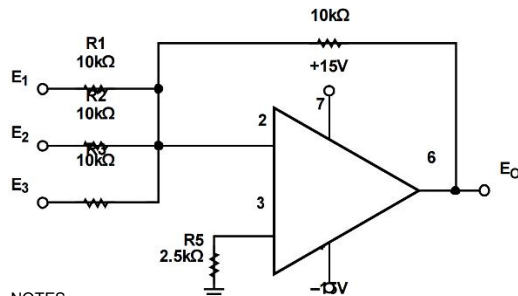


NOTES
1. PINOUT SHOWN FOR P PACKAGE

High Speed, Low VOS Composite Amplifier

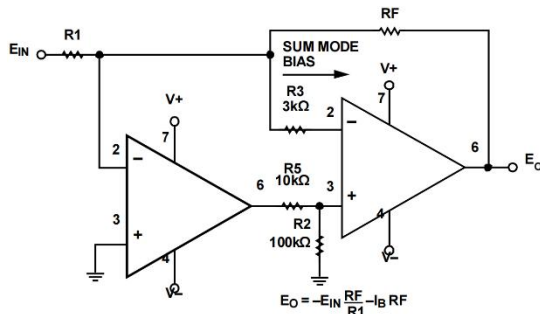


Optional Offset Nulling Circuit

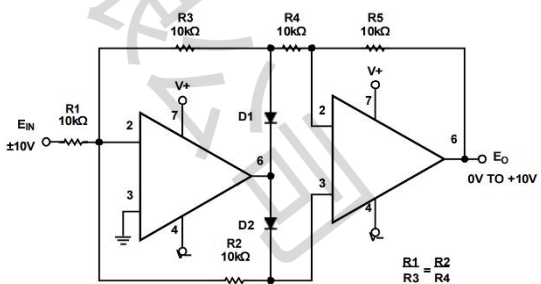


NOTES
1. PINOUT SHOWN FOR P PACKAGE

TEN Test Circuit and Voltage Waveforms



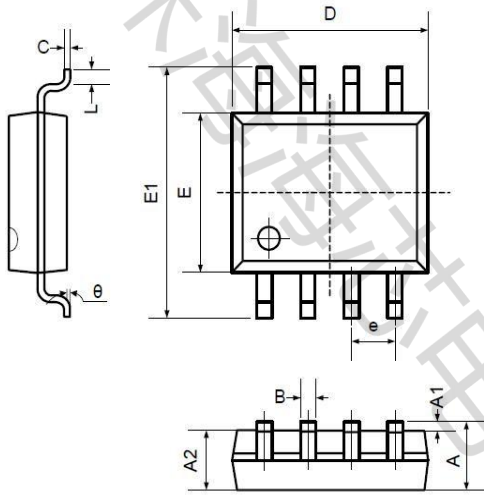
Typical Offset Voltage Test Circuit



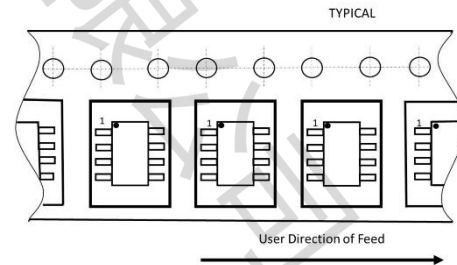
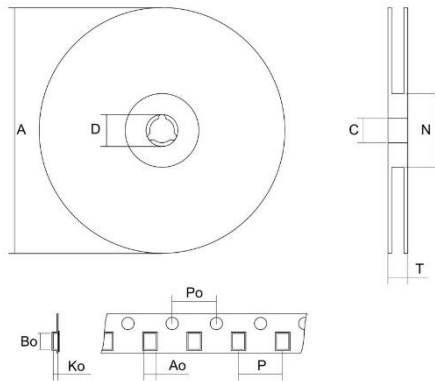
Absolute Value Circuit

DIMENSIONAL DRAWINGS

SOP-8 (Package Outline Dimensions)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
B	0.330	0.510	0.013	0.020
C	0.190	0.250	0.007	0.010
D	4.780	5.000	0.188	0.197
E	3.800	4.000	0.150	0.157
E1	5.800	6.300	0.228	0.248
e	1.270TYP		0.050TYP	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°



Package Type	package	quantity
SOP-8	Taping	2500

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