

HX432-S Dual Op Amp with On-Chip Fixed 2.5V Reference

Description

The HX432-S integrates two operational amplifiers and a 2.5V precision reference voltage source. The reference voltage is provided by the shunt regulator with a fixed output of 2.5V, providing a stable and accurate reference point for the analog circuit.

The op amp in the HX432-S, has a common-mode input range that extends to ground, increasing circuit design flexibility for low-voltage signal processing.

The HX432-S integrates a reference voltage source and operational amplifier into a single package, providing a space-saving and cost-saving solution for low-cost charging applications. The combination of these components enables accurate and reliable charging circuits without the need for additional external components and is ideal for designers of electronics projects on a budget.

Peculiarity

- ★ Reference Circuitry
- ★ (Typical for $V_S = 5V$)
- ★ Input Offset Voltage 0.6mV
- ★ Reference Voltage 2.5V
- ★ Input Bias Current 3nA
- ★ Common-Mode Input Voltage Range 0V to $V_S - 1V$
- ★ Power Supply Current 150 μA
- ★ Reference Voltage Deviation ($-40^{\circ}C$ to $85^{\circ}C$) 4mV
- ★ Input Offset Current 1nA
- ★ (Typical for $V_S = 5V$)
- ★ Sink Current Capability 0.2mA to 10mA

Applications

- ★ Low Cost Charging Circuitry
- ★ Power Supplies and Adapters

Connection Diagram

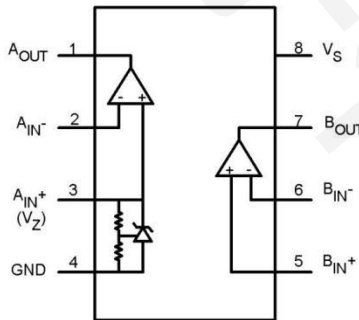


Figure 1. 8-Pin SOP-8 (Top View)
See Package Number D

Application Circuit

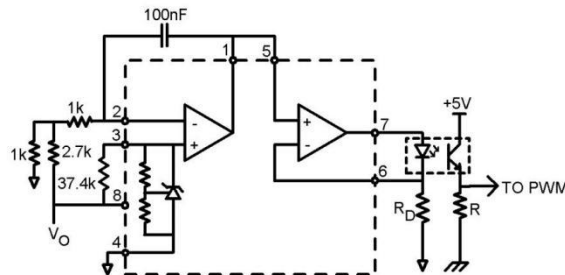


Figure 2. Optocoupler Driver Circuit for Power Supply Isolation

Absolute Maximum Ratings⁽¹⁾⁽²⁾⁽³⁾

Supply Voltage (V_S)	20V
Storage Temperature	-65°C to 150°C
Junction Temperature (T_J)	150°C
ESD Human Body Model	2kV
Input Voltage Range	-0.3V to 20V

(1) Absolute Maximum Ratings indicate limits beyond which damage to the device may occur.

(2) All voltages are measured with respect to GND = 0V_{DC}, unless otherwise specified.

Operating Ratings⁽¹⁾⁽²⁾

Temperature Range	-40°C to 85°C
Supply Voltage ⁽³⁾	2.5V to 16V
Thermal Resistance(θ_{JA})	162°C/W

(1) Operating Rating indicate conditions for which the device is functional. These rating do not ensure specific performance limits. For ensured specifications and test conditions, see the Electrical Characteristics. The ensured specifications apply only for the test conditions listed. Some performance characteristics may degrade when the device is not operated under the listed test conditions.

(2) All voltages are measured with respect to GND = 0V_{DC}, unless otherwise specified.

(3) Minimum value of operating voltage is for Amplifier B only.

Electrical Characteristics

The following specifications apply for both amplifiers at $V_S = 5V$, $V_{CM} = 2.5V$, $V_O = 2.5V$, $R_L = \infty$, and $T_J = 25^\circ C$, unless otherwise noted.

Symbol	Parameter	Conditions	Min ⁽¹⁾	Typ ⁽²⁾	Max ⁽¹⁾	Units
OP Amp Circuitry						
V_{OS}	Input Offset Voltage	Amplifier B only	-4	0.6	4	mV
I_{OS}	Input Offset Current	Amplifier B only		1	50	nA
I_B	Input Bias Current	Amplifier B only		3	150	nA
V_{CM}	Common-Mode Input Voltage Range	Amplifier B only, CMRR > 50dB	0		$V_S - 1$	V
I_S	Power Supply Current	Total for both amplifiers		150	500	μA
A_V	Voltage Gain	$V_S = 16V$, $1V < V_O < 11V$, $R_L = 10k\Omega$ connected to $V_S/2$	65	100		dB
V_{OL}	Output Voltage Low			2	50	mV
V_{OH}	Output Voltage High		$V_S - 1.5$	$V_S - 1.3$		V
I_{SOURCE}	Output Current Source		20	30		mA
I_{SINK}	Output Current Sink		5	11		mA
Reference Circuitry For Op Amp A (The following specifications apply for $I_Z = 200\mu A$ and $T_J = 25^\circ C$, unless otherwise noted.)						
V_Z	Reference Voltage at IN^+ Terminal		2.450	2.5	2.550	V
V_{ZDEV}	Reference Voltage Deviation at IN^+ Terminal Over Temperature ⁽³⁾⁽⁴⁾	$-40^\circ C \leq T_J \leq 85^\circ C$		4	65	mV
$I_Z (MIN)$	Minimum Cathode Current for Regulation at IN^+ (V_Z) Terminal			150	200	μA
r_z	Dynamic Output Impedance ⁽⁵⁾	$200\mu A < I_Z < 1mA$, Freq = 0Hz		0.2		Ω

(1) Ensured to Average Outgoing Quality Level (AOQL).

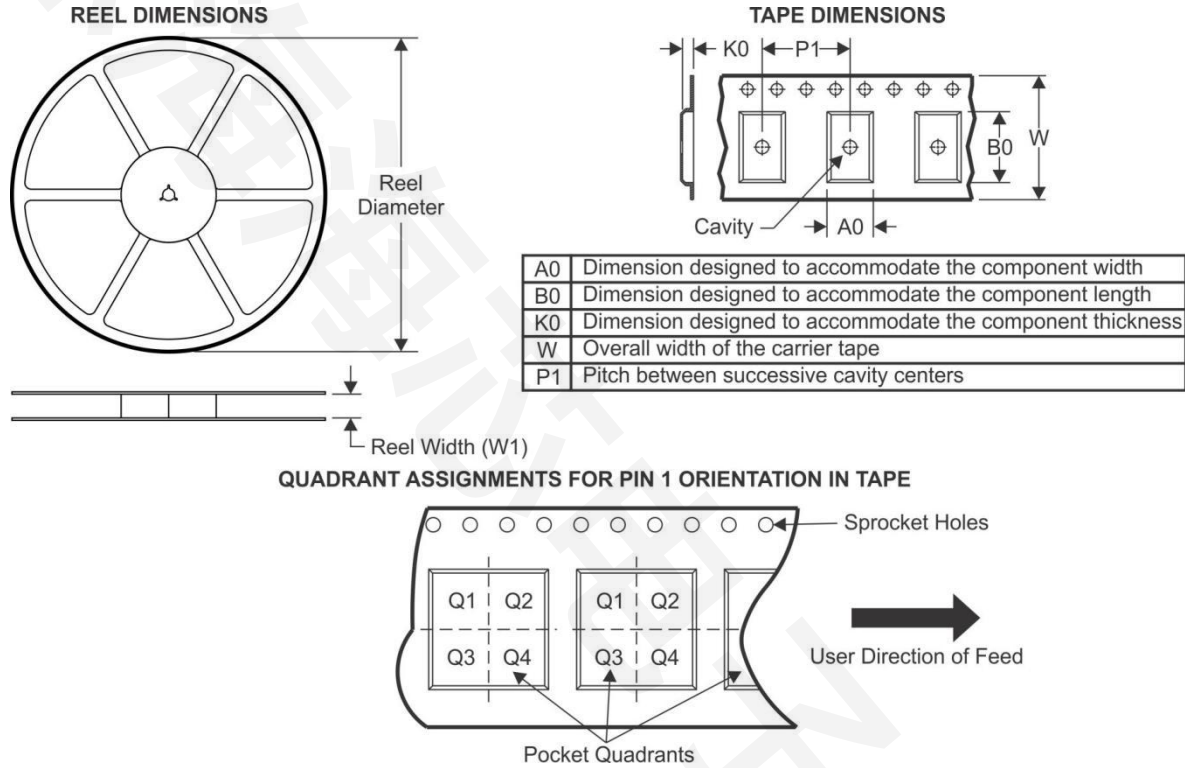
(2) Typicals represent the most likely parametric norm.

(3) Reference voltage deviation, V_{ZDEV} , is defined as the maximum variation of the reference input voltage over the full temperature range.

(4) Typical Temperature drift $\Delta V/\Delta T = 12.8ppm/^\circ C$

(5) The Dynamic Output Impedance, r_z , is defined as $r_z = \Delta V_Z/\Delta I_Z$.

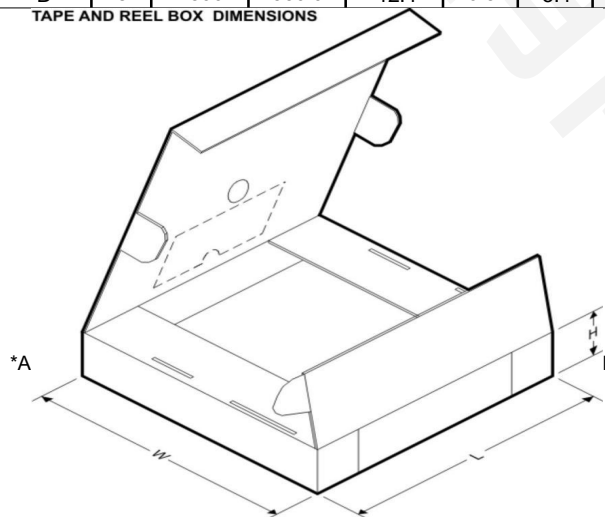
Tape and reel information



*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Reel Diameter (mm)	Reel Width W1 (mm)	A0 (mm)	B0 (mm)	K0 (mm)	P1 (mm)	W (mm)	Pin1 Quadrant
HX432-S	SOP-8	D	8	2500	330.0	12.4	6.5	5.4	2.0	8.0	12.0	Q1

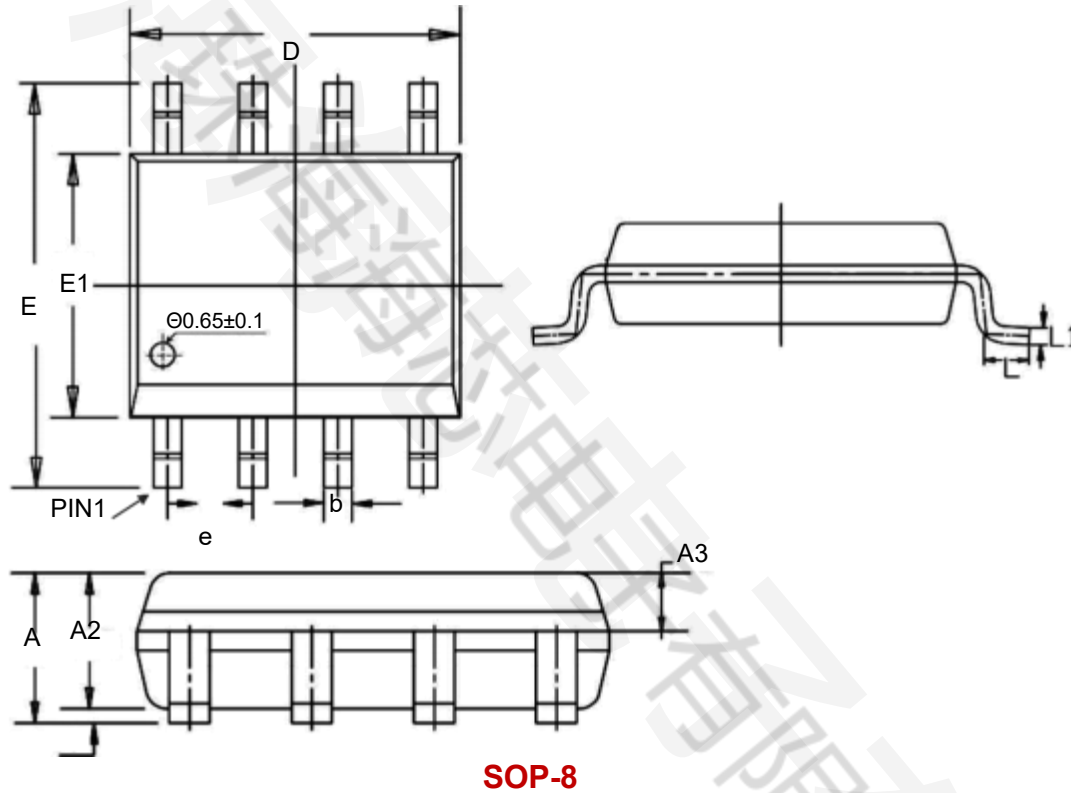
TAPE AND REEL BOX DIMENSIONS



Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
HX432-S	SOP-8	D	8	2500	367.0	367.0	35.0

DIMENSIONAL DRAWINGS

Part Number	Package Type	Package	quantity
HX432-S	SOP-8	Taping	2500



UNIT:mm

	MIN	NOM	MAX
A	1.450	1.550	1.650
A1	0.100	0.150	0.200
A2	1.300	1.400	1.500
A3	0.600	0.650	0.700
b	0.380		0.510
e	1.240	1.270	1.300
D	4.800	4.900	5.000
E	5.800	6.000	6.200
E1	3.800	3.900	4.000
L	0.450	0.600	0.750
L1		0.25BSC	