Features

- Wide Operating Voltage
- Low input offset voltage
- Low Quiescent Current
- Unity Gain Stable
- Rail to Rail input and output operation
- -40˚C to +85˚C Operating Temperature Range
- Dual amplifiers per package
- Package types: 8-pin SOP

Applications

- Portable Test Equipment
- Medical Instrument
- Sensor Applications
- Temperature Measurements
- Battery Powered Systems

General Description

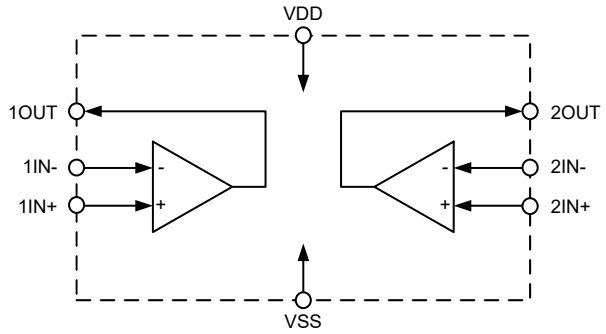
The HT92632/HT92652 family of precision operational amplifiers offers the benefits of low offset voltage and low offset drift. They are unity gain stable, have low 1/f noise as well as good PSRR and CMRR characteristics. The devices also provide full rail-to-rail input and output operation. The HT92632 has a gain bandwidth product of 300kHz while the HT92652 has a gain bandwidth product of 1.5MHz.

These characteristics along with their single supply operation and low power consumption features provide a range of low offset voltage operational amplifiers suitable for use in a wide range of applications, especially for portable devices and battery powered equipment. With regard to packaging, both devices are supplied in 8-pin SOP package formats.

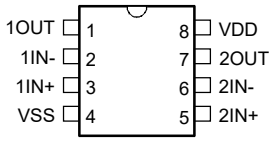
Selection Table

Device Name	Amplifiers	Operating Voltage	Gain Bandwidth (Typ.)	V_{OS} (Typ.)	$\Delta V_{OS}/\Delta T_A$ (Typ.)	Slew Rate (Typ.)	Package Type
HT92632	2	2.0V~5.5V	300kHz	15μV	50nV	0.15V/μs	8SOP
HT92652	2	2.0V~5.5V	1.5MHz	10μV(Max.)	50nV(Max.)	0.5V/μs	8SOP

Block Diagram



Pin Assignment



HT92632/HT92652
8 SOP-A

Pin Description

Pin Number	Pin Name	Description
1	1OUT	Output – OPA1
2	1IN-	Inverting Input – OPA1
3	1IN+	Non-inverting Input – OPA1
4	VSS	Negative Power Supply
5	2IN+	Non-inverting Input – OPA2
6	2IN-	Inverting Input – OPA2
7	2OUT	Output – OPA2
8	VDD	Positive Power Supply

Absolute Maximum Ratings

Supply Voltage ..... V_{SS}-0.3V to 6.0V
Input Voltage ..... V_{SS}-0.3V to V_{DD}+0.3V
Storage Temperature ..... -50°C to 150°C
Operating Temperature ..... -40°C to 85°C
I_{OL} Total 80mA
I_{OH} Total ..... -80mA
Total Power Dissipation 500mW

Note: These are stress ratings only. Stresses exceeding the range specified under "Absolute Maximum Ratings" may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Electrical Characteristics

HT92632

Unless otherwise indicated, Ta=25°C, V_{DD}=2.0V to 5.5V, V_{SS}=GND, V_{CM}=V_{DD}/3, V_{OUT}≈V_{DD}/2, V_L=V_{DD}/2, R_L=100kΩ to V_L and C_L=30pF

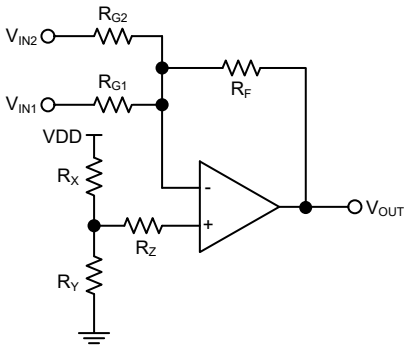
Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
		V_{DD}	Conditions				
V_{DD}	Supply Voltage	—	Ta=25°C	2.0	—	5.5	V
V_{OS}	Input Offset Voltage	—	Ta=25°C	—	15	40	μV
$\Delta V_{OS}/\Delta T_A$	Drift with Temperature	—	Ta=-40°C~125°C	-50	—	+50	nV/°C
I_{OS}	Input Offset Current	—	Ta=25°C	—	100	—	pA
I_B	Input Bias Current	—	Ta=25°C	—	50	—	pA
V_{CML}	Input Common Mode Range Low	—	—	—	—	V_{SS}-0.1	V
V_{CMH}	Input Common Mode Range High	—	—	V_{DD}+0.1	—	—	V
V_{OL}	Minimum Output Voltage Swing	—	R_L=10kΩ to V_L, G=+2, 0.5V input overdrive	V_{SS}	V_{SS}+35	V_{SS}+80	mV
V_{OH}	Maximum Output Voltage Swing	—	R_L=10kΩ to V_L, G=+2, 0.5V input overdrive	V_{DD}-80	V_{DD}-35	V_{DD}	mV
A_{OL}	Large Signal DC Open Loop Gain	—	V_{OUT}=0.3V~V_{DD}-0.3V	100	130	—	dB
GBW	Gain Bandwidth Product	—	—	—	300	—	kHz
PM	Phase Margin	—	—	—	70	—	degree
CMRR	Common Mode Rejection Ratio	—	V_{CM}=-0.1V~V_{DD}+0.1V	100	120	—	dB
PSRR	Power Supply Rejection Ratio	—	—	100	120	—	dB
I_Q	Quiescent Current/Amplifier	—	I_{OUT}=0	10	30	40	μA
SR	Slew Rate	—	—	—	0.15	—	V/μs
I_{SC}	Output Short Circuit Current	3V	—	—	±6	—	mA
		5V	—	—	±21	—	mA
E_{ni}	Input Noise Voltage	—	f=0.1Hz to 10Hz	—	1	—	μV_{P-P}
e_{ni}	Input Noise Voltage Density	—	F<2kHz	—	50	—	nV/$\sqrt{Hz}$
TOOR	Output Overdrive Recovery Time	—	G=-10, ±0.5V input overdrive to V_{DD}/2, V_{IN} 50% point to V_{OUT} 90%	—	120	—	μs
TOCS	Offset Correction Settling Time	—	G=+1, V_{IN} step of 2V, V_{OS} within 100uV of its final value	—	100	—	μs
Tstart	Start Up Time	—	G=+1, 0.1% V_{OUT} settling	—	2	—	ms

HT92652

Unless otherwise indicated, Ta=25°C, V_{DD}=2.0V to 5.5V, V_{SS}=GND, V_{CM}=V_{DD}/3, V_{OUT}≈V_{DD}/2, V_L=V_{DD}/2, R_L=20kΩ to V_L and C_L=60pF

Symbol	Parameter	Test Conditions		Min	Typ	Max	Units
		V_{DD}	Conditions				
V_{DD}	Supply Voltage	—	Ta=25°C	2.0	—	5.5	V
V_{OS}	Input Offset Voltage	—	Ta=25°C	-10	—	+10	μV
$\Delta V_{OS}/\Delta T_A$	Drift with Temperature	—	Ta=-40°C~125°C	-50	—	+50	nV/°C
I_{OS}	Input Offset Current	—	Ta=25°C	—	100	—	pA
I_B	Input Bias Current	—	Ta=25°C	—	50	—	pA
V_{CML}	Input Common Mode Range Low	—	—	—	—	V_{SS}-0.1	V
V_{CMH}	Input Common Mode Range High	—	—	V_{DD}+0.1	—	—	V
V_{OL}	Minimum Output Voltage Swing	—	R_L=10kΩ to V_L, G=+2, 0.5V input overdrive	V_{SS}	V_{SS}+35	V_{SS}+80	mV
V_{OH}	Maximum Output Voltage Swing	—	R_L=10kΩ to V_L, G=+2, 0.5V input overdrive	V_{DD}-80	V_{DD}-35	V_{DD}	mV
A_{OL}	Large Signal DC Open Loop Gain	—	V_{OUT}=0.3V~V_{DD}-0.3V	100	130	—	dB
GBW	Gain Bandwidth Product	—	—	1.3	1.5	—	MHz
PM	Phase Margin	—	—	—	70	—	degree
CMRR	Common Mode Rejection Ratio	—	V_{CM}=-0.1V~V_{DD}+0.1V	100	120	—	dB
PSRR	Power Supply Rejection Ratio	—	—	100	120	—	dB
I_Q	Quiescent Current/Amplifier	—	I_{OUT}=0	—	—	500	μA
SR	Slew Rate	—	—	—	0.5	—	V/μs
I_{SC}	Output Short Circuit Current	3V	—	—	±7	—	mA
		5V	—	—	±22	—	mA
E_{ni}	Input Noise Voltage	—	f=0.1Hz to 10Hz	—	1	—	μV_{P-P}
e_{ni}	Input Noise Voltage Density	—	F<2.5kHz	—	120	—	nV/$\sqrt{Hz}$
TOOR	Output Overdrive Recovery Time	—	G=-100, ±0.5V input overdrive to V_{DD}/2, V_{IN} 50% point to V_{OUT} 90%	—	120	—	μs
TOCS	Offset Correction Settling Time	—	G=+1, V_{IN} step of 2V, V_{OS} within 100uV of its final value	—	300	—	μs
Tstart	Start Up Time	—	G=+1, 0.1% V_{OUT} settling	—	2	—	ms

Application Circuits



$R_{VIN-} = \frac{1}{\frac{1}{R_{G1}}+\frac{1}{R_{G2}}+\frac{1}{R_F}}$, R_{VIN-} = total resistance at the inverting input.

$R_{VIN+} = \frac{1}{\frac{1}{R_X}+\frac{1}{R_Y}} + R_Z$, R_{VIN+} = total resistance at the non-inverting input, $R_{VIN+} = R_{VIN-}$.

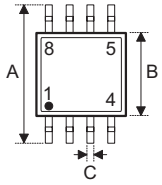
Package Information

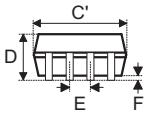
Note that the package information provided here is for consultation purposes only. As this information may be updated at regular intervals users are reminded to consult the Holtek website for the latest version of the Package/Carton Information.

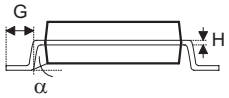
Additional supplementary information with regard to packaging is listed below. Click on the relevant section to be transferred to the relevant website page.

- Package Information (include Outline Dimensions, Product Tape and Reel Specifications)
- The Operation Instruction of Packing Materials
- Carton information

8-pin SOP (150mil) Outline Dimensions







Symbol	Dimensions in inch		
	Min.	Nom.	Max.
A	—	0.236 BSC	—
B	—	0.154 BSC	—
C	0.012	—	0.020
C′	—	0.193 BSC	—
D	—	—	0.069
E	—	0.050 BSC	—
F	0.004	—	0.010
G	0.016	—	0.050
H	0.004	—	0.010
α	0°	—	8°

Symbol	Dimensions in mm		
	Min.	Nom.	Max.
A	—	6.00 BSC	—
B	—	3.90 BSC	—
C	0.31	—	0.51
C′	—	4.90 BSC	—
D	—	—	1.75
E	—	1.27 BSC	—
F	0.10	—	0.25
G	0.40	—	1.27
H	0.10	—	0.25
α	0°	—	8°