

Features

- Low Voltage Operation
- Low Quiescent Current
- Unity Gain Stable
- Rail to Rail input and output operation
- Dual amplifiers per package
- The package types: 8-pin SOP

Applications

- Household Appliances
- Portable Equipment
- Photodiode Amplifiers
- Analog Active Filters
- Battery Powered Systems

General Description

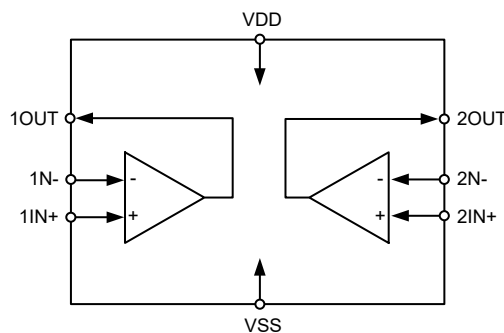
The HT92232/HT92252 family of general purpose operational amplifiers offer the benefits of wide bandwidth along with low quiescent current. Both devices operate with a supply voltage down to 2.1V, and deliver full rail to rail input and output voltage range operation. Both have a -40°C to 85°C operating temperature range but differ in their bandwidth and quiescent current characteristics. The HT92232 device provides a 300kHz bandwidth with a 16μA (typ.) per amplifier quiescent current while the HT92252 provides 1MHz bandwidth with a 40μA (typ.) per amplifier quiescent current.

With their single supply operation and low power consumption features coupled with their low cost these operational amplifiers are suitable for use in a wide range of applications. With regard to packaging, both devices are supplied in 8-pin SOP package formats.

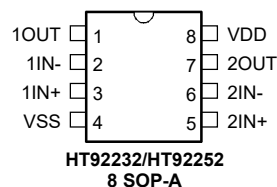
Selection Table

Device	Amplifiers	Operating Voltage	Gain Bandwidth (typ.)	Quiescent Current (typ.)	Slew Rate (typ.)	Packages
HT92232	2	2.1-5.5	300kHz	16μA	0.15 V/μs	8SOP
HT92252	2	2.1-5.5	1MHz	40μA	0.5 V/μs	8SOP

Block Diagram



Pin Assignment



Pin Description

Pin Name	Description
1OUT	Output – OPA1
1IN-	Inverting Input – OPA1
1IN+	Non-inverting Input – OPA1
VSS	Negative Power Supply
2IN+	Non-inverting Input – OPA2
2IN-	Inverting Input – OPA2
2OUT	Output – OPA2
VDD	Positive Power Supply

Absolute Maximum Ratings

Supply Voltage	$V_{SS}-0.3V$ to $6.0V$	Storage Temperature	$-50^{\circ}C$ to $125^{\circ}C$
Input Voltage	$V_{SS}-0.3V$ to $V_{DD}+0.3V$	Operating Temperature	$-40^{\circ}C$ to $85^{\circ}C$
I_{OL} Total	80mA	Total Power Dissipation	500mW
I_{OH} Total	-80mA		

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

Unless otherwise indicated, $V_{CM}=V_{DD}/2$, $V_L=V_{DD}/2$, $R_L=100k\Omega$ to V_L

HT92232

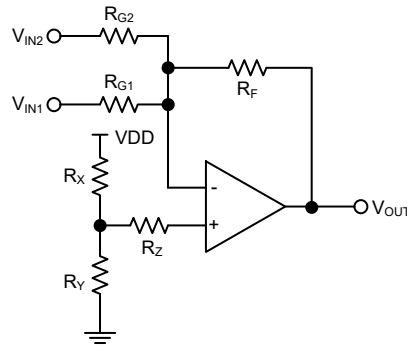
Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
		V_{DD}	Conditions				
V_{DD}	Supply Voltage	—	$T_a=25^{\circ}C$	2.1	—	5.5	V
V_{DD}	Supply Voltage	—	$T_a=-40^{\circ}C\sim 85^{\circ}C$	2.5	—	5.5	V
V_{OS}	Input Offset Voltage	—	$T_a=25^{\circ}C$	—	—	5	mV
$\Delta V_{OS}/\Delta T_a$	Drift with Temperature	—	$T_a=25^{\circ}C$	—	3	6	$\mu V/^{\circ}C$
I_{OS}	Input Offset Current	—	$T_a=25^{\circ}C$	—	20	120	pA
I_B	Input Bias Current	—	$T_a=25^{\circ}C$	—	10	60	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	—	$R_L=10k\Omega$ to V_L , $G=+2$, 0.5V input overdrive	V_{SS}	—	$V_{SS}+50$	mV
V_{OH}	Maximum Output Voltage Swing	—	$R_L=10k\Omega$ to V_L , $G=+2$, 0.5V input overdrive	$V_{DD}-50$	—	V_{DD}	mV
A_{OL}	Large Signal DC Open Loop Gain	2.5~5.5V	$V_{OUT}=0.3V\sim V_{DD}-0.3V$	88	—	—	dB
			$V_{OUT}=35mV\sim V_{DD}-35mV$	70	—	—	
GBW	Gain Bandwidth Product	—	—	220	300	—	kHz
PM	Phase Margin	—	—	46	65	—	degrees
CMRR	Common Mode Rejection Ratio	—	$V_{CM}=-0.1V\sim V_{DD}-1.2V$ $T_a=25^{\circ}C$	70	85	—	dB
			$V_{CM}=-0.1V\sim V_{DD}-1.2V$ $T_a=-40^{\circ}C\sim 85^{\circ}C$	65	80	—	

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
		V _{DD}	Conditions				
PSRR	Power Supply Rejection Ratio	2.5~5.5V	V _{CM} = V _{SS} , Ta=25°C	70	85	—	dB
		2.5~5.5V	V _{CM} =V _{SS} Ta= -40°C~85°C	60	83	—	
I _Q	Quiescent Current/Amplifier	—	I _{OUT} =0, Ta=25°C	—	16	22	μA
			I _{OUT} =0, Ta= -40°C~85°C	—	30	35	
SR	Slew Rate	—	C _L =60pF	0.1	0.15	—	V/μs
I _{SOURCE}	Output Short Circuit Source Current	5V	R _L =10Ω to V _L	15	—	—	mA
I _{SINK}	Output Short Circuit Sink Current	5V	R _L =10Ω to V _L	15	—	—	mA
E _{ni}	Input Noise Voltage	—	Ta=25°C, 0.1Hz to 10Hz	—	6	8	μV _{P-P}
e _{ni}	Input Noise Voltage Density	—	Ta=25°C, 1kHz	—	50	67	nV/√Hz

HT92252

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Units
		V _{DD}	Conditions				
V _{DD}	Supply Voltage	—	Ta=25°C	2.1	—	5.5	V
V _{DD}	Supply Voltage	—	Ta= -40°C~85°C	2.5	—	5.5	V
V _{OS}	Input Offset Voltage	—	Ta=25°C	—	—	5	mV
ΔV _{OS} /ΔTa	Drift with Temperature	—	Ta=25°C	—	3	6	μV/°C
I _{OS}	Input Offset Current	—	Ta=25°C	—	20	120	pA
I _B	Input Bias Current	—	Ta=25°C	—	10	60	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} +40	mV
			R _L =10kΩ to V _L , G=+2, 0.5V input overdrive	V _{DD} -40	—	V _{DD}	
V _{OH}	Maximum Output Voltage Swing	—	R _L =10kΩ to V _L , G=+2, 0.5V input overdrive	V _{DD} -40	—	V _{DD}	mV
			R _L =10kΩ to V _L , G=+2, 0.5V input overdrive	V _{SS}	—	V _{SS} +40	
A _{OL}	Large Signal DC Open Loop Gain	2.5~5.5V	V _{OUT} =0.3V~V _{DD} -0.3V	88	—	—	dB
			V _{OUT} =35mV~V _{DD} -35mV	70	—	—	
GBW	Gain Bandwidth Product	—	—	730	1000	—	kHz
PM	Phase Margin	—	—	46	65	—	degrees
CMRR	Common Mode Rejection Ratio	—	V _{CM} = -0.1V~V _{DD} -1.2V Ta=25°C	65	80	—	dB
			V _{CM} = -0.1V~V _{DD} -1.2V Ta= -40°C~85°C	60	78	—	
PSRR	Power Supply Rejection Ratio	2.5~5.5V	V _{CM} =V _{SS} , Ta=25°C	70	80	—	dB
		2.5~5.5V	V _{CM} =V _{SS} , Ta= -40°C~85°C	60	80	—	
I _Q	Quiescent Current/Amplifier	—	I _{OUT} =0, Ta=25°C	—	40	50	μA
			I _{OUT} =0, Ta= -40°C~85°C	—	40	78	
SR	Slew Rate	—	CL=60pF	0.35	0.5	—	V/μs
I _{SOURCE}	Output Short Circuit Source Current	5V	R _L =10Ω to V _L	15	—	—	mA
I _{SINK}	Output Short Circuit Sink Current	5V	R _L =10Ω to V _L	15	—	—	mA
E _{ni}	Input Noise Voltage	—	Ta=25°C, 0.1Hz to 10Hz	—	6	8	μV _{P-P}
e _{ni}	Input Noise Voltage Density	—	Ta=25°C, 1kHz	—	28	37.3	nV/√Hz

Application Circuits



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

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

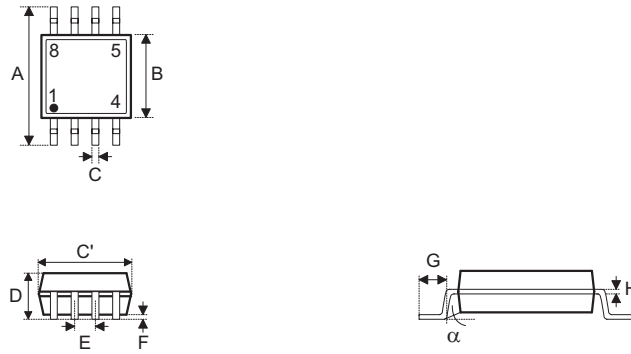
Package Information

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 information](#).

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

- Further Package Information (include Outline Dimensions, Product Tape and Reel Specifications)
- Packing Materials Information
- 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°

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