
1MHz, Rail-to-Rail I/O CMOS Operational Amplifiers

FEATURES

- Low power consumption: 48 μ A per amplifier at 5V
- Channel A offset voltage: 0.5mV typical
Channel B offset voltage: 5mV typical
- Rail-to-rail input/output
- Gain Bandwidth Product: 1MHz
- Extended temperature : -40°C to +125°C
- Low supply voltage: 2.5V to 5.5V (25°C)
- Wide Input Voltage Range:
- 0.2V to +5.7V with $V_S = 5.5V$
- TS2258SA Available in SO-8

GENERAL DESCRIPTION

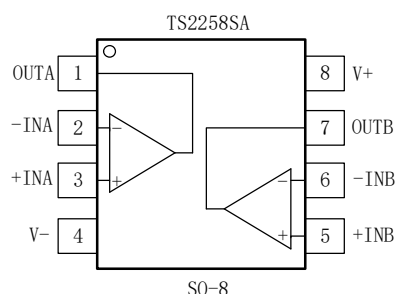
The TS2258SA is the most cost effective amplifiers for low voltage, low power consumption and low cost applications. The rail-to-rail output and rail-to-rail inputs that exceed power supply range makes the TS2258SA extremely easy to use. It is specified for -40°C to +125°C temperature range.

Low IB feature allows the part to be ideal for integrators, photodiode amplifiers and piezo-electric sensors. 1MHz GBW and 0.5V/ μ s slew rate under low power supply voltage can meet almost all sensor requirements.

APPLICATIONS

- Sensor Interface
- Smoke Detectors
- Battery-Powered Applications
- Portable Devices
- Signal Conditioning
- Active Filtering
- Current Sensor Amplifier
- Weight Scale Sensor
- Medical/Industrial Instrumentation

PIN ASSIGNMENTS



ORDERING INFORMATION

Model	Part Number	Eco Plan	Package	AMP	Container, Pack Qty
TS2258SA	TS2258SASO8R	Rohs	SO-8	2	Reel, 2500

ABSOLUTE MAXIMUM RATINGS

Parameter	Min	Max	Unit
Supply Voltage		7.0	V
Signal Input Terminal Voltage	(V-) - 0.5	(V+) + 0.5	V
Operating Temperature	-45	125	°C
Junction Temperature		150	°C
Storage Temperature	-65	150	°C
Lead Temperature (Soldering, 10s)		260	°C
ESD HBM		±4000	V

ESD CAUTION

ESD (Electrostatic Discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjects to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

ELECTRICAL CHARACTERISTICS

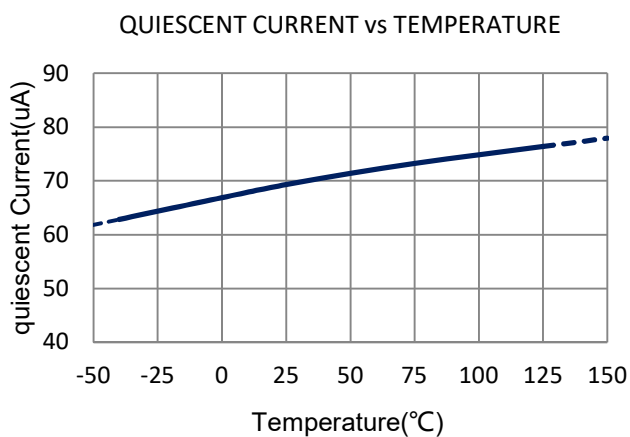
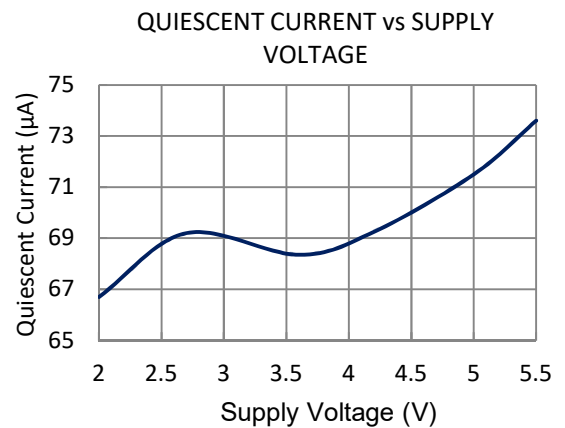
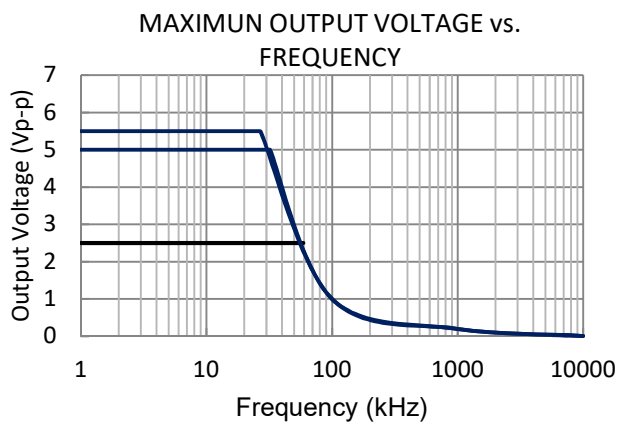
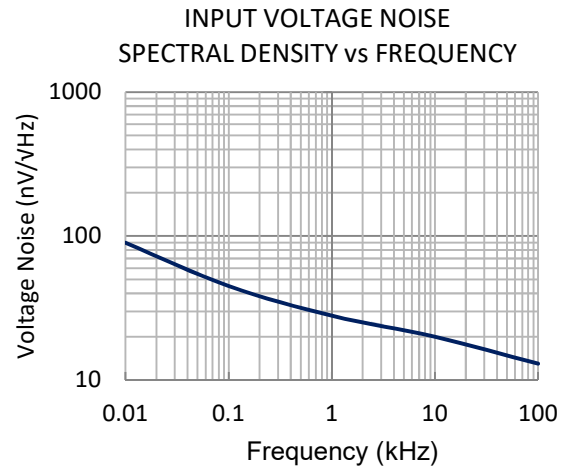
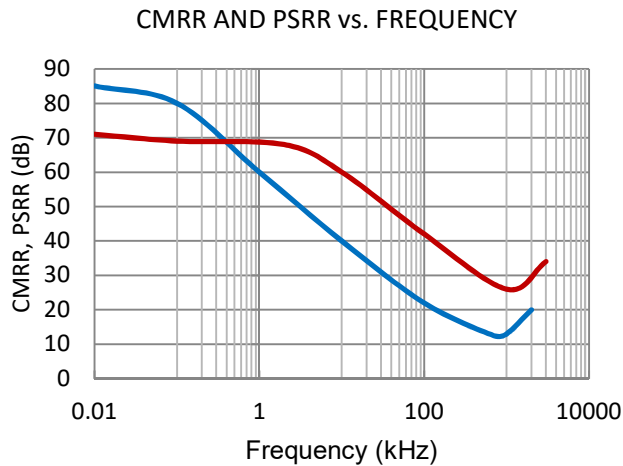
$V_S = +2.5V$ to $+5.5V$, at $T_A = +25^\circ C$, $R_L = 100k\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.

Boldface limits apply over the specified temperature range, $T_A = -40^\circ C$ to $+125^\circ C$.

Symbol	Parameter	Operating Conditions	Min	Typ	Max	Unit
Input Characteristics						
V_{OS}	Input Offset Voltage	$V_S = 5V$		0.8	4	mV
	Channel A			5		$\mu V/^\circ C$
	Channel B			3		
dV_{OS}/dT	Average Drift					
CMRR	Common Mode Rejection Ratio	$(V_-) - 0.2V < V_{CM} < (V_+) - 2V$	72	84		dB
	$T_A = -40^\circ C$ to $+125^\circ C$	$(V_-) - 0.2V < V_{CM} < (V_+) - 2V$	65			dB
		$V_S = 5.5V, (V_-) - 0.2V < V_{CM} < (V_+) + 0.2V$	58	66		dB
	$T_A = -40^\circ C$ to $+125^\circ C$	$V_S = 5.5V, (V_-) - 0.2V < V_{CM} < (V_+) + 0.2V$	55			dB
I_B	Input Bias Current			1		pA
I_{OS}	Input Offset Current			1		pA
PSRR	Power Supply Rejection Ratio	$V_S = 2.5V$ to $V_S = 5.5V, V_{CM} < (V_+) - 2V$	74	84		dB
	$T_A = -40^\circ C$ to $+125^\circ C$		65			dB
A_{OL}	Open-Loop Gain	$V_S = 5V, R_L = 5k\Omega, 0.125V < V_O < 4.875V$	102	106		dB
	$T_A = -40^\circ C$ to $+125^\circ C$	$V_S = 5V, R_L = 5k\Omega, 0.125V < V_O < 4.875V$	70			dB
	Open-Loop Gain	$V_S = 5V, R_L = 100k\Omega, 0.025V < V_O < 4.975V$	104	108		dB
	$T_A = -40^\circ C$ to $+125^\circ C$	$V_S = 5V, R_L = 100k\Omega, 0.025V < V_O < 4.975V$	76			dB
Output Characteristics						
	Output Voltage Swing from Rail	$R_L = 100k\Omega$		10		mV
R_{OUT}	Open-Loop Output Impedance	$f = 1MHz, I_o = 0$		220		Ω
Frequency Domain Response						
GBW	Gain Bandwidth Product	$V_{OUT} = 2V$ step; $G = +1$		1		MHz
t_s	Settling Time to 0.1%	$V_{in} * Gain > V_S$		5		μs
	Overload recovery time	$G = +1$		3		μs
SR	Slew Rate			0.5		V/ μs
Distortion/Noise Response						
THD+N	Total Harmonic Distortion+ Noise	$V_S = 5V, V_O = 3V_{pp}, G = +1, f = 1kHz$		0.004		%
e_n	Input Voltage Noise Density	$f = 10kHz$		20		nV/ $\sqrt{Hz}$
V_{NOISE}	Input Voltage Noise	$f = 0.1Hz$ to $10Hz$		6.5		μV_{pp}
Power Supply						
V_S	Specified Voltage Range		2.5		5.5	V
	Operating Voltage Range		2.2		5.5	V
I_S	Supply Current	$I_O = 0, V_S = 5V$		48	70	μA
Temperature Range						
θ_{JA}	Specified Range Thermal Resistance		-40		125	$^\circ C$
	SO-8			150		$^\circ C/W$

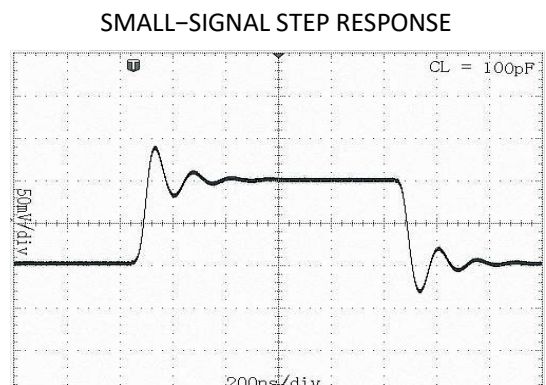
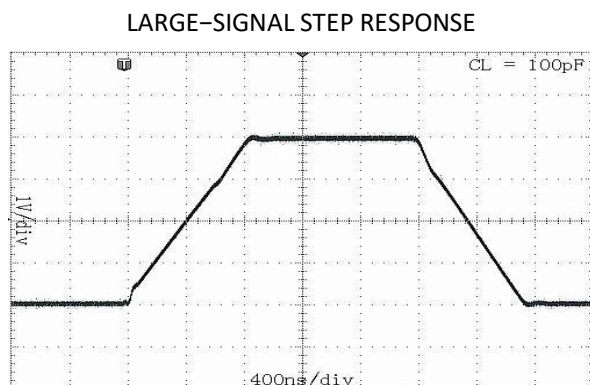
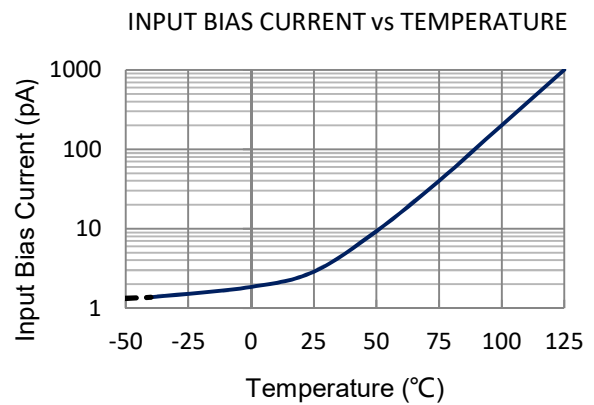
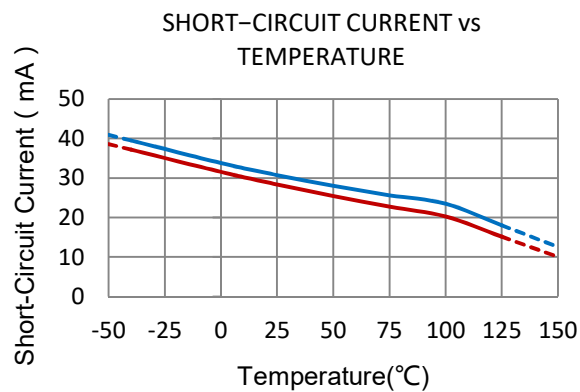
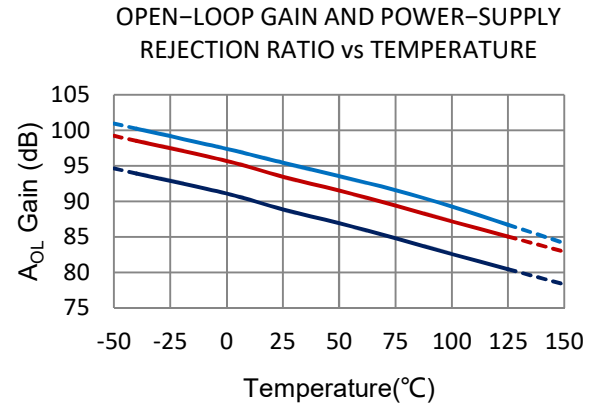
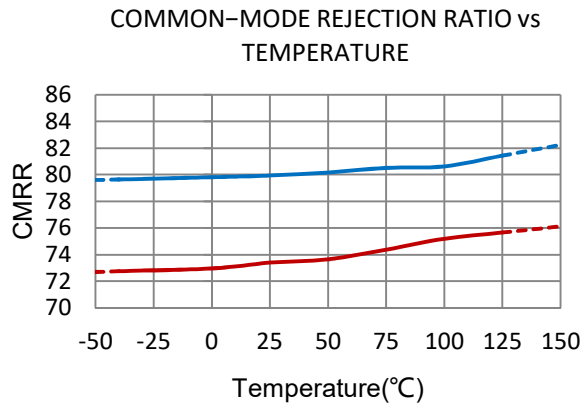
TYPICAL CHARACTERISTICS

At $T_A = +25^\circ\text{C}$, $R_L = 10\text{k}\Omega$ connected to $V_S/2$, and $V_{OUT} = V_S/2$, unless otherwise noted.



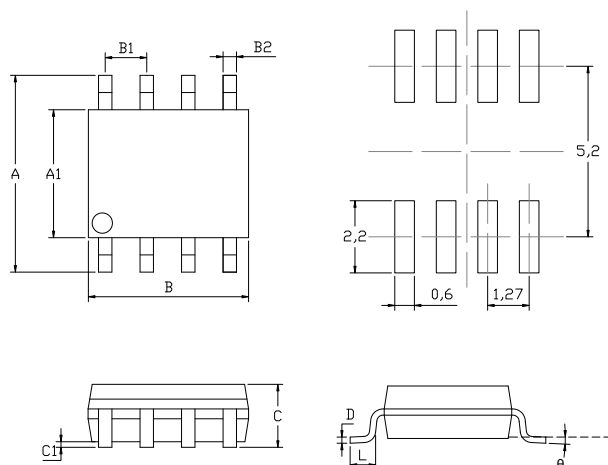
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MECHANICAL DIMENSIONS

SO-8 PACKAGE MECHANICAL DRAWING



SO-8 PACKAGE MECHANICAL SPECIFICATIONS

symbol	dimensions			
	millimeters		inches	
	min	max	min	max
A	5.8	6.2	0.2283	0.2441
A1	3.8	4	0.1496	0.1575
B	4.8	5	0.1890	0.1969
B1	1.27		0.0500	
B2	0.31	0.51	0.0122	0.0201
C		1.75MAX		0.0689MAX
C1	0.1	0.25	0.0039	0.0098
L	0.4	1.27	0.0157	0.0500
D	0.13	0.25	0.0051	0.0098
θ	0°	8°	0°	8°

CONTACT INFORMATION

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