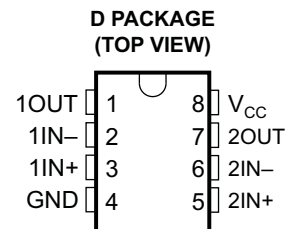


FEATURES

- **Controlled Baseline**
 - One Assembly/One Test Site, One Fabrication Site
- **Extended Temperature Performance of –55°C to 125°C**
- **Enhanced Diminishing Manufacturing Sources (DMS) Support**
- **Enhanced Product-Change Notification**
- **Qualification Pedigree ⁽¹⁾**
- **Wide Supply Range:**
 - Single Supply . . . 3 V to 30 V
 - Dual Supplies . . . ±1.5 V to ±15 V
- **Low Supply-Current Drain, Independent of Supply Voltage . . . 0.7 mA Typ**
- **Common-Mode Input Voltage Range Includes Ground, Allowing Direct Sensing Near Ground**
- **Low Input Bias and Offset Parameters:**
 - Input Offset Voltage . . . 2 mV Typ
 - Input Offset Current . . . 2 nA Typ
 - Input Bias Current . . . 15 nA Typ
- **Differential Input Voltage Range Equal to Maximum-Rated Supply Voltage . . . 32 V**
- **Open-Loop Differential Voltage Amplification . . . 100 V/mV Typ**
- **Internal Frequency Compensation**



- (1) Component qualification in accordance with JEDEC and industry standards to ensure reliable operation over an extended temperature range. This includes, but is not limited to, Highly Accelerated Stress Test (HAST) or biased 85/85, temperature cycle, autoclave or unbiased HAST, electromigration, bond intermetallic life, and mold compound life. Such qualification testing should not be viewed as justifying use of this component beyond specified performance and environmental limits.

DESCRIPTION/ORDERING INFORMATION

The LM258A consists of two independent, high-gain, frequency-compensated operational amplifiers designed to operate from a single supply over a wide range of voltages. Operation from split supplies also is possible if the difference between the two supplies is 3 V to 30 V, and V_{CC} is at least 1.5 V more positive than the input common-mode voltage. The low supply-current drain is independent of the magnitude of the supply voltage.

Applications include transducer amplifiers, dc amplification blocks, and all the conventional operational amplifier circuits that now can be implemented more easily in single-supply-voltage systems. For example, this device can be operated directly from the standard 5-V supply used in digital systems and easily can provide the required interface electronics without additional ±5-V supplies.

ORDERING INFORMATION

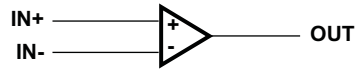
T _A	V _{IO} max AT 25°C	MAX TESTED V _{CC}	PACKAGE ⁽¹⁾		ORDERABLE PART NUMBER	TOP-SIDE MARKING
–55°C to 125°C	3mV	30V	SOIC – D	Reel of 2500	LM258AMDREP	258AM

- (1) Package drawings, standard packing quantities, thermal data, symbolization, and PCB design guidelines are available at www.ti.com/sc/package.

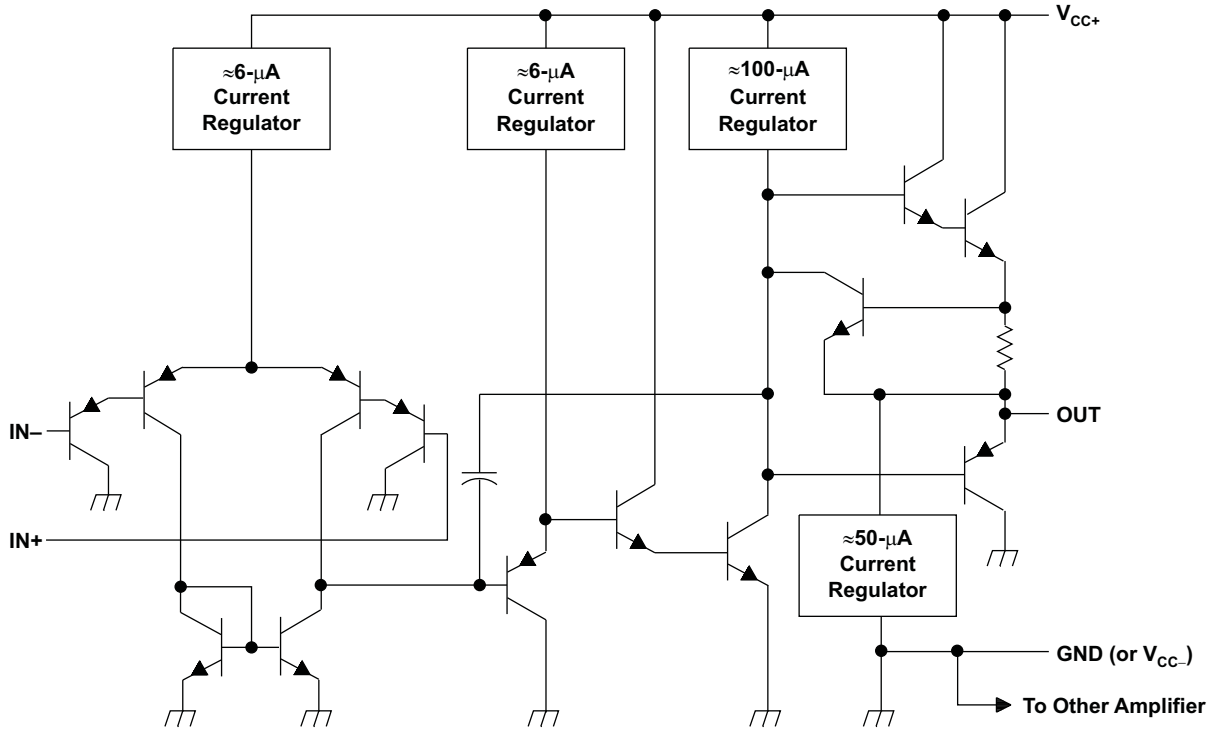


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SYMBOL (EACH AMPLIFIER)



SCHEMATIC (EACH AMPLIFIER)



COMPONENT COUNT	
Epi-FET	1
Diodes	2
Resistors	7
Transistors	51
Capacitors	2

Absolute Maximum Ratings⁽¹⁾

over operating free-air temperature range (unless otherwise noted)

	VALUE	UNIT
V _{CC} Supply voltage ⁽²⁾	±16 or 32	V
V _{ID} Differential input voltage ⁽³⁾	±32	V
V _I Input voltage (either input)	–0.3 to 32	V
Duration of output short circuit (one amplifier) to ground at (or below) 25°C free-air temperature (V _{CC} ≤ 15 V) ⁽⁴⁾	Unlimited	
θ _{JA} Package thermal impedance ⁽⁵⁾⁽⁶⁾	97	°C/W
T _A Operating free-air temperature range	–55 to 125	°C
T _J Operating virtual junction temperature	150	°C
T _{stg} Storage temperature range ⁽⁷⁾	–65 to 150	°C

- (1) Stresses beyond those listed under "absolute maximum ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under "recommended operating conditions" is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.
- (2) All voltage values, except differential voltages and V_{CC} specified for measurement of I_{OS}, are with respect to the network ground terminal.
- (3) Differential voltages are at IN+ with respect to IN–.
- (4) Short circuits from outputs to V_{CC} can cause excessive heating and eventual destruction.
- (5) Maximum power dissipation is a function of T_{J(max)}, θ_{JA}, and T_A. The maximum allowable power dissipation at any allowable ambient temperature is P_D = (T_{J(max)} – T_A)/θ_{JA}. Operating at the absolute maximum T_J of 150°C can affect reliability.
- (6) The package thermal impedance is calculated in accordance with JESD 51-7.
- (7) Long-term high-temperature storage and/or extended use at maximum recommended operating conditions may result in a reduction of overall device life. See http://www.ti.com/ep_quality for additional information on enhanced plastic packaging.

Electrical Characteristics

at specified free-air temperature, $V_{CC} = 5\text{ V}$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS ⁽¹⁾		T_A ⁽²⁾	MIN	TYP ⁽³⁾	MAX	UNIT	
V_{IO}	Input offset voltage	$V_{CC} = 5\text{ V to }30\text{ V},$ $V_{IC} = V_{ICR(min)},$ $V_O = 1.4\text{ V}$		25°C		2	3	mV	
				Full range			4		
α_{IO}	Average temperature coefficient of input offset voltage			Full range		7	15	$\mu\text{V}/^\circ\text{C}$	
I_{IO}	Input offset current	$V_O = 1.4\text{ V}$		25°C		2	15	nA	
				Full range			30		
α_{IIO}	Average temperature coefficient of input offset current			Full range		10	200	$\text{pA}/^\circ\text{C}$	
I_{IB}	Input bias current	$V_O = 1.4\text{ V}$		25°C		-15	-80	nA	
				Full range			-100		
V_{ICR}	Common-mode input voltage range	$V_{CC} = 5\text{ V to Max}$		25°C		0 to $V_{CC} - 1.5$		V	
				Full range		0 to $V_{CC} - 2$			
V_{OH}	High-level output voltage	$R_L \geq 2\text{ k}\Omega$ $V_{CC} = 30\text{ V}$		25°C		$V_{CC} - 1.5$		V	
				Full range		26			
				Full range		27	28		
V_{OL}	Low-level output voltage	$R_L \leq 10\text{ k}\Omega$		Full range		5	20	mV	
A_{VD}	Large-signal differential voltage amplification	$V_{CC} = 15\text{ V},$ $V_O = 1\text{ V to }11\text{ V},$ $R_L \geq 2\text{ k}\Omega$		25°C		50	100	V/mV	
				Full range		25			
CMRR	Common-mode rejection ratio	$V_{CC} = 5\text{ V to Max}$ $V_{IC} = V_{ICR(min)}$		25°C		70	80	dB	
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{DD}/\Delta V_{IO}$)	$V_{CC} = 5\text{ V to Max}$		25°C		65	100	dB	
V_{O1}/V_{O2}	Crosstalk attenuation	$f = 1\text{ kHz to }20\text{ kHz}$		25°C		120		dB	
I_O	Output current	$V_{CC} = 15\text{ V},$ $V_{ID} = 1\text{ V},$ $V_O = 0$		Source	25°C	-20	-30	-60	mA
				Source	Full range		-10		
		$V_{CC} = 15\text{ V},$ $V_{ID} = -1\text{ V},$ $V_O = 15\text{ V}$		Sink	25°C	10	20		
				Sink	Full range		5		
$V_{ID} = -1\text{ V}, V_O = 200\text{ mV}$			25°C	12	30		μA		
I_{OS}	Short-circuit output current	V_{CC} at 5 V, GND at -5 V, $V_O = 0$		25°C		± 40	± 60	mA	
I_{CC}	Supply current (two amplifiers)	$V_O = 2.5\text{ V}, \text{ No load}$		Full range		0.7	1.2	mA	
		$V_{CC} = \text{Max}, V_O = V_{CC}/2, \text{ No load}$		Full range		1	2		

- (1) All characteristics are measured under open-loop conditions with zero common-mode input voltage, unless otherwise specified. MAX V_{CC} for testing purposes is 30 V.
(2) Full range is -55°C to 125°C.
(3) All typical values are at $T_A = 25^\circ\text{C}$.

Operating Characteristics

$V_{CC} = \pm 15\text{ V}$, $T_A = 25^\circ\text{C}$

PARAMETER	TEST CONDITIONS	TYP	UNIT
SR Slew rate at unity gain	$R_L = 1\text{ M}\Omega$, $C_L = 30\text{ pF}$, $V_I = \pm 10\text{ V}$, See Figure 1	0.3	$\text{V}/\mu\text{s}$
B_1 Unity-gain bandwidth	$R_L = 1\text{ M}\Omega$, $C_L = 20\text{ pF}$, See Figure 1	0.7	MHz
V_n Equivalent input noise voltage	$R_S = 100\ \Omega$, $V_I = 0\text{ V}$, $f = 1\text{ kHz}$, See Figure 2	40	$\text{nV}/\sqrt{\text{Hz}}$

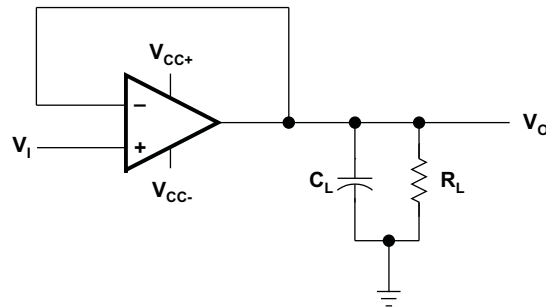


Figure 1. Unity-Gain Amplifier

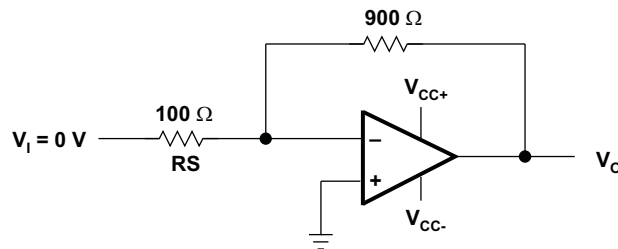


Figure 2. Noise-Test Circuit

PACKAGING INFORMATION

Orderable part number	Status (1)	Material type (2)	Package Pins	Package qty Carrier	RoHS (3)	Lead finish/ Ball material (4)	MSL rating/ Peak reflow (5)	Op temp (°C)	Part marking (6)
LM258AMDREP	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	258AM
LM258AMDREP.A	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	258AM
LM258AMDREPG4	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	258AM
V62/07605-01XE	Active	Production	SOIC (D) 8	2500 LARGE T&R	Yes	NIPDAU	Level-1-260C-UNLIM	-55 to 125	258AM

(1) **Status:** For more details on status, see our [product life cycle](#).

(2) **Material type:** When designated, preproduction parts are prototypes/experimental devices, and are not yet approved or released for full production. Testing and final process, including without limitation quality assurance, reliability performance testing, and/or process qualification, may not yet be complete, and this item is subject to further changes or possible discontinuation. If available for ordering, purchases will be subject to an additional waiver at checkout, and are intended for early internal evaluation purposes only. These items are sold without warranties of any kind.

(3) **RoHS values:** Yes, No, RoHS Exempt. See the [TI RoHS Statement](#) for additional information and value definition.

(4) **Lead finish/Ball material:** Parts may have multiple material finish options. Finish options are separated by a vertical ruled line. Lead finish/Ball material values may wrap to two lines if the finish value exceeds the maximum column width.

(5) **MSL rating/Peak reflow:** The moisture sensitivity level ratings and peak solder (reflow) temperatures. In the event that a part has multiple moisture sensitivity ratings, only the lowest level per JEDEC standards is shown. Refer to the shipping label for the actual reflow temperature that will be used to mount the part to the printed circuit board.

(6) **Part marking:** There may be an additional marking, which relates to the logo, the lot trace code information, or the environmental category of the part.

Multiple part markings will be inside parentheses. Only one part marking contained in parentheses and separated by a "~" will appear on a part. If a line is indented then it is a continuation of the previous line and the two combined represent the entire part marking for that device.

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OTHER QUALIFIED VERSIONS OF LM258A-EP :

- Catalog : [LM258A](#)

NOTE: Qualified Version Definitions:

- Catalog - TI's standard catalog product

TAPE AND REEL INFORMATION

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE


*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
LM258AMDREP	SOIC	D	8	2500	330.0	12.4	6.4	5.2	2.1	8.0	12.0	Q1

TAPE AND REEL BOX DIMENSIONS


*All dimensions are nominal

Device	Package Type	Package Drawing	Pins	SPQ	Length (mm)	Width (mm)	Height (mm)
LM258AMDREP	SOIC	D	8	2500	353.0	353.0	32.0



D0008A

PACKAGE OUTLINE

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



4214825/C 02/2019

NOTES:

- Linear dimensions are in inches [millimeters]. Dimensions in parenthesis are for reference only. Controlling dimensions are in inches. Dimensioning and tolerancing per ASME Y14.5M.
- This drawing is subject to change without notice.
- This dimension does not include mold flash, protrusions, or gate burrs. Mold flash, protrusions, or gate burrs shall not exceed .006 [0.15] per side.
- This dimension does not include interlead flash.
- Reference JEDEC registration MS-012, variation AA.

EXAMPLE BOARD LAYOUT

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



LAND PATTERN EXAMPLE
 EXPOSED METAL SHOWN
 SCALE:8X



SOLDER MASK DETAILS

4214825/C 02/2019

NOTES: (continued)

- 6. Publication IPC-7351 may have alternate designs.
- 7. Solder mask tolerances between and around signal pads can vary based on board fabrication site.

EXAMPLE STENCIL DESIGN

D0008A

SOIC - 1.75 mm max height

SMALL OUTLINE INTEGRATED CIRCUIT



SOLDER PASTE EXAMPLE
BASED ON .005 INCH [0.125 MM] THICK STENCIL
SCALE:8X

4214825/C 02/2019

NOTES: (continued)

8. Laser cutting apertures with trapezoidal walls and rounded corners may offer better paste release. IPC-7525 may have alternate design recommendations.
9. Board assembly site may have different recommendations for stencil design.

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