

Industry-Standard Dual Operational Amplifiers

1 Features

- Wide supply range of 3V to 36V (B, BA versions)
- Quiescent current: 300µA/ch (B, BA versions)
- Unity-gain bandwidth of 1.2MHz (B, BA versions)
- Common-mode input voltage range includes ground, enabling direct sensing near ground
- 2mV input offset voltage maximum at 25°C (BA version)
- 3mV input offset voltage maximum at 25°C (A, B versions)
- Internal RF and EMI filter (B, BA versions)
- On products compliant to MIL-PRF-38535, all parameters are tested unless otherwise noted. On all other products, production processing does not necessarily include testing of all parameters.

2 Applications

- Merchant network and server power supply units
- Multi-function printers
- Power supplies and mobile chargers
- Motor control: AC induction, brushed DC, brushless DC, high-voltage, low-voltage, permanent magnet, and stepper motor
- Desktop PC and motherboard
- Indoor and outdoor air conditioners
- Washers, dryers, and refrigerators
- AC inverters, string inverters, central inverters, and voltage frequency drives
- Uninterruptible power supplies
- Electronic point-of-sale systems

3 Description

The LM358B and LM2904B devices are the next-generation versions of the industry-standard operational amplifiers (op amps) LM358 and LM2904, which include two high-voltage (36V) op amps. These

devices provide outstanding value for cost-sensitive applications, with features including low offset (300µV, typical), common-mode input range to ground, and high differential input voltage capability.

The LM358B and LM2904B op amps simplify circuit design with enhanced features such as unity-gain stability, lower offset voltage maximum of 3mV (2mV maximum for LM358BA and LM2904BA), and lower quiescent current of 300µA per amplifier (typical). High ESD (2kV, HBM) and integrated EMI and RF filters enable the LM358B and LM2904B devices to be used in the most rugged, environmentally challenging applications.

The LM358B and LM2904B amplifiers are available in micro-sized packaging, such as the SOT23-8, as well as industry standard packages including SOIC, TSSOP, and VSSOP.

Package Information

PART NUMBER ⁽¹⁾	PACKAGE	PACKAGE SIZE ⁽²⁾
LM358B, LM358BA, LM2904B, LM2904BA, LM358, LM358A, LM2904, LM2904V, LM258, LM258A	D (SOIC, 8)	4.9mm × 6mm
LM358B, LM358BA, LM2904B, LM2904BA, LM358, LM358A, LM2904, LM2490V	PW (TSSOP, 8)	3mm × 6.4mm
LM358B, LM358BA, LM2904B, LM2904BA, LM358, LM358A, LM2904, LM2904V, LM258, LM258A	DGK (VSSOP, 8)	3mm × 4.9mm
LM358B, LM358BA, LM2904B, LM2904BA	DDF (SOT-23, 8)	2.9mm × 2.8mm
LM358, LM2904	PS (SO, 8)	6.2mm × 7.8mm
LM358, LM2904, LM358A, LM258, LM258A	P (PDIP, 8)	9.81mm × 9.43mm
LM158, LM158A	JG (CDIP, 8)	9.6mm × 6.67mm
LM158, LM158A	FK (LCCC, 20)	8.89mm × 8.89mm

Family Comparison

Specification	LM358B LM358BA	LM2904B LM2904BA	LM358 LM358A	LM2904	LM2904V LM2904AV	LM258 LM258A	LM158 LM158A	Units
Supply voltage	3 to 36	3 to 36	3 to 30	3 to 26	3 to 30	3 to 30	3 to 30	V
Offset voltage (max, 25°C)	± 3 ± 2	± 3 ± 2	± 7 ± 3	± 7	± 7 ± 2	± 5 ± 3	± 5 ± 2	mV
Input bias current (typ / max)	10 / 35	10 / 35	20 / 250 15 / 100	20 / 250	20 / 250	20 / 150 15 / 80	20 / 150 15 / 50	nA
Gain bandwidth product	1.2	1.2	0.7	0.7	0.7	0.7	0.7	MHz
Supply current (typ, per channel)	0.3	0.3	0.35	0.35	0.35	0.35	0.35	mA
ESD (HBM)	2000	2000	500	500	500	500	500	V
Operating ambient temperature	-40 to 85	-40 to 125	0 to 70	-40 to 125	-40 to 125	-25 to 85	-55 to 125	°C

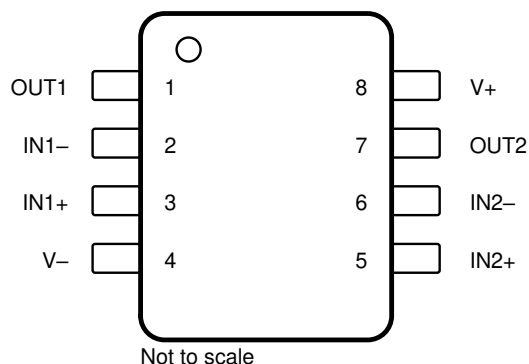
- (1) For all available packages, see the orderable addendum at the end of the data sheet.
- (2) The package size (length × width) is a nominal value and includes pins, where applicable.



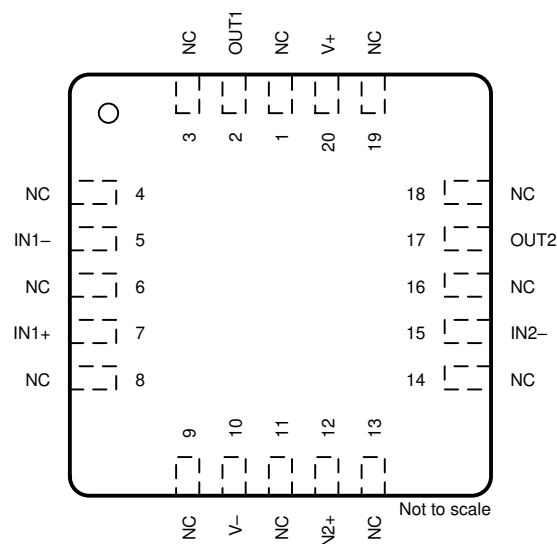
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4 Pin Configuration and Functions



**Figure 4-1. D, DDF, DGK, P, PS, PW, and JG
Package
8-Pin SOIC, SOT23-8, VSSOP, PDIP, SO, TSSOP,
and CDIP
Top View**



NC - No internal connection

**Figure 4-2. FK Package
20-Pin LCCC
Top View**

Table 4-1. Pin Functions

NAME	PIN		I/O	DESCRIPTION
	LCCC ⁽¹⁾	SOIC, SOT23-8, VSSOP, CDIP, PDIP, SO, TSSOP, CFP ⁽¹⁾		
IN1–	5	2	I	Negative input
IN1+	7	3	I	Positive input
IN2–	15	6	I	Negative input
IN2+	12	5	I	Positive input
OUT1	2	1	O	Output
OUT2	17	7	O	Output
V–	10	4	—	Negative (lowest) supply or ground (for single-supply operation)
NC	1, 3, 4, 6, 8, 9, 11, 13, 14, 16, 18, 19	—	—	No internal connection
V+	20	8	—	Positive (highest) supply

(1) For a listing of which devices are available in what packages, see [Section 3](#).