Precision Low-Voltage Micropower Dual Operational Amplifier

OP-290

1.0 SCOPE

1.1 Scope. This specification covers the detail requirements for a low voltage, micropower dual operational amplifier.

It is highly recommended that this datasheet be used as a baseline for new military or aerospace specification control drawings.

1.2 Part Number. The complete part numbers per Table 1 of this specification follow:

Device	Part Number	Package
A	OP-290AZ/883	Z
A	OP-290ARC/883	RC

1.2.3 Case Outline. The case outline is designated as follows:

Letter	Case Outline (Lead Finish per MIL-M-38510)
Z	8-lead ceramic dual-in-line package (CERDIP)
RC	20-contact hermetic leadless chip carrier (LCC)

1.3 Absolute Maximum Ratings. (T_A = +25°C, unless otherwise noted)

Supply Voltage ..... ±18V
Input Voltage ..... [(V-)-20V] to [(V+)+20V]
Differential Input Voltage ..... [(V-)-20V] to [(V+)+20V]
Output Short-Circuit Duration ..... Continuous
Storage Temperature Range ..... -65°C to +150°C
Lead Temperature Range (Soldering, 60 sec) ..... 300°C
Maximum Junction Temperature (T_J) ..... -65°C to 150°C
Operating Temperature Range ..... -55°C to +125°C

1.5 Thermal Characteristics:

Thermal Resistance, CERDIP (Z) package:

Junction-to-Case (Θ_{JC}) = 26°C/W MAX
Junction-to-Ambient (Θ_{JA}) = 119°C/W MAX

Thermal Resistance, leadless chip carrier (RC) package:

Junction-to-Case (Θ_{JC}) = 30°C/W MAX
Junction-to-Ambient (Θ_{JA}) = 120°C/W MAX

TABLE 1

V_S = ±1.5V and ±15V; R_S = 50Ω; T_A = +25°C; unless otherwise specified.

Characteristics	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Input Offset Voltage	V_{OS}		--	200	μV
		-55°C ≤ T_A ≤ +125°C	--	500	μV
Input Offset Current	I_{OS}	V_{CM} = 0V	--	3	nA
		V_{CM} = 0V, -55°C ≤ T_A ≤ +125°C	--	5	
Input Bias Current	I_B	V_{CM} = 0V	--	±15	nA
		V_{CM} = 0V, -55°C ≤ T_A ≤ +125°C	--	±20	
Large-Signal Voltage Gain	A_{VO}	V_S = ±15V, V_O = ±10V, R_L = 100kΩ	700	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 100kΩ, -55°C ≤ T_A ≤ +125°C	225	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 10kΩ	350	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 10kΩ, -55°C ≤ T_A ≤ +125°C	125	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 2kΩ	125	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 2kΩ, -55°C ≤ T_A ≤ +125°C	50	--	V/mV

TABLE 1 (Continued)

V_S = ±1.5V and ±15V; R_S = 50Ω ; T_A = +25°C; unless otherwise specified.

Characteristics	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
		V+ = +5V, V- = 0V, 1V ≤ V_O ≤ 4V; R_L = 100kΩ	200	--	V/mV
Large-Signal Voltage Gain (Cont'd)	A_{VO}	V+ = +5V, V- = 0V, 1V ≤ V_O ≤ 4V; R_L = 100kΩ -55°C ≤ T_A ≤ +125°C	100	--	V/mV
		V+ = +5V, V- = 0V, 1V ≤ V_O ≤ 4V; R_L = 10kΩ	100	--	V/mV
		V+ = +5V, V- = 0V, 1V ≤ V_O ≤ 4V; R_L = 10kΩ -55°C ≤ T_A ≤ +125°C	50	--	V/mV
Output Voltage Swing	V_O	V_S = ±15V, R_L = 10kΩ	±13.5	--	V
		V_S = ±15V, R_L = 10kΩ, -55°C ≤ T_A ≤ +125°C	±13	--	V
		V_S = ±15V, R_L = 2kΩ	±10.5	--	V
		V_S = ±15V, R_L = 2kΩ, -55°C ≤ T_A ≤ +125°C	±10	--	V
Output Voltage Swing	V_{OH}	V+ = +5V, V- = 0V, R_L = 2kΩ	4.0	--	V
		V+ = +5V, V- = 0V, R_L = 2kΩ, -55°C ≤ T_A ≤ +125°C	3.9	--	V

TABLE 1 (Continued)

V_S = ±1.5V and ±15V; R_S = 50Ω; T_A = +25°C; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Output Voltage Swing	V_{OL}	V+ = +5V, V- = 0V, R_L = 10kΩ	--	50	µV
		V+ = +5V, V- = 0V, R_L = 10kΩ, -55°C ≤ T_A ≤ +125°C	--	100	µV
Common-Mode Rejection	CMR	V+ = +5V, V- = 0V, 0V ≤ V_{CM} ≤ 4V	90	--	dB
		V+ = +5V, V- = 0V, 0V ≤ V_{CM} ≤ 3.5V, -55°C ≤ T_A ≤ +125°C	80	--	dB
		V_S = ±15V, -15V ≤ V_{CM} ≤ 13.5V	100	--	dB
		V_S = ±15V, -15V ≤ V_{CM} ≤ 13.5V, -55°C ≤ T_A ≤ +125°C	90	--	dB
Power-Supply Rejection Ratio	PSRR	V_S = ±1.5V, ±15V	--	5.6	µV/V
		V_S = ±1.5V, ±15V, -55°C ≤ T_A ≤ +125°C	--	10	µV/V
Supply Current (Note 2)	I_{SY}	No Load, V_S = ±1.5V	--	30	µA
		No Load, V_S = ±1.5V, -55°C ≤ T_A ≤ +125°C	--	50	µA
		No Load, V_S = ±15V	--	40	µA
		No Load, V_S = ±15V, -55°C ≤ T_A ≤ +125°C	--	60	µA

TABLE 1 (Continued)

V_S = ±1.5V and ±15V; R_S = 50Ω ; T_A = +25°C; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Slew Rate	SR	V_S = ±15V	5	--	V/ms
Input Offset Voltage Temperature Coefficient	TCV_{OS}	V_S = ±15V	--	3	µV/°C

Note 1. IVR guaranteed by CMR test.

Note 2. I_{SY} limit = total of both amplifiers.

TABLE 2

OP-290/883

Electrical Test Requirements For Class B Devices

MIL-STD-883 Test Requirement	Subgroups (see Table 3)
Interim Electrical Parameters (pre Burn-In)	1
Final Electrical Test Parameters	1*, 2, 3,4,5,6
Group A Test Requirements	1,2,3,4,5,6,7,8

* PDA applies to Subgroup 1 only.
No other Subgroups are included in PDA.

TABLE 3
Group A Inspection

V_S = ±1.5V and ±15V; R_S = 50Ω; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Subgroup 1. T_A = +25°C	V_{OS}		--	200	μV
	I_{OS}	V_{CM} = 0V	--	3	nA
	I_B	V_{CM}= 0V	--	±15	nA
	CMR	V+ = +5V, V- = 0V, V_{CM} = 0V,4V	90	--	dB
	(Note 1)	V_S = ±15V, V_{CM} = -15V, 13.5V	100	--	dB
	PSRR	V_S = ±1.5V, ±15V	--	5.6	μV/V
	I_{SY}	V_S = ±1.5V, No Load	--	30	μA
	(Note 2)	V_S = ±15V, No Load	--	40	μA
Subgroup 2. T_A = +125°C	V_{OS}		--	500	μV
	I_{OS}	V_{CM} = 0V	--	5	nA
	I_B	V_{CM}= 0V	--	±20	nA
	CMR	V+ = +5V, V- = 0V, V_{CM} = 0V, 3.5V	80	--	dB
	(Note 1)	V_S = ±15V, V_{CM} = -15V, 13.5V	90	--	dB

TABLE 3

Group A Inspection

V_S = ±1.5V and ±15V; R_S = 50Ω; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Subgroup 2. T_A = +125°C	PSRR	V_S = ±1.5V, ±15V	--	10	µV/V
(Cont'd)	I_{SY} (Note 2)	V_S = ±1.5V, No Load	--	50	µA
		V_S = ±15V, No Load	--	60	µA
Subgroup 3. T_A = -55°C		All Tests, Limits, and Conditions are the same as for Subgroup 2.			
Subgroup 4. T_A = +25°C	A_{VO}	V_S = ±15V, V_O = ±10V, R_L = 100kΩ	700	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 10kΩ	350	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 2kΩ	125	--	V/mV
		V+ = +5V, V- = 0V, V_O = 1V, 4V; R_L = 100kΩ	200	--	V/mV
		V+ = +5V, V- = 0V, V_O = 1V, 4V; R_L = 10kΩ	100	--	V/mV
	V_O	V_S = ±15V, R_L = 10kΩ	±13.5	--	V
		V_S = ±15V, R_L = 2kΩ	±10.5	--	V
	V_{OH}	V+ = +5V, V- = 0V, R_L = 2kΩ	4.0	--	V
	V_{OL}	V+ = +5V, V- = 0V, R_L = 10kΩ	--	50	µV

TABLE 3
Group A Inspection

V_S = ±1.5V and ±15V; R_S = 50Ω; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Subgroup 5. T_A = +125°C		V_S = ±15V, V_O = ±10V, R_L = 100kΩ	225	--	V/mV
		V_S = ±15V, V_O = ±10V, R_L = 10kΩ	125	--	V/mV
	A_{VO}	V_S = ±15V, V_O = ±10V, R_L = 2kΩ	50	--	V/mV
		V+ = +5V, V- = 0V, V_O = 1V, 4V; R_L = 100kΩ	100	--	V/mV
		V+ = +5V, V- = 0V, V_O = 1V, 4V; R_L = 10kΩ	50	--	V/mV
	V_O	V_S = ±15V, R_L = 10kΩ V_S = ±15V, R_L = 2kΩ	±13 ±10	-- --	V V
	V_{OH}	V+ = +5V, V- = 0V, R_L = 2kΩ	3.9	--	V
	V_{OL}	V+ = +5V, V- = 0V, R_L = 10kΩ	--	100	μV
Subgroup 6. T_A = -55°C		All Tests, Limits, and Conditions are the same as for Subgroup 5.			

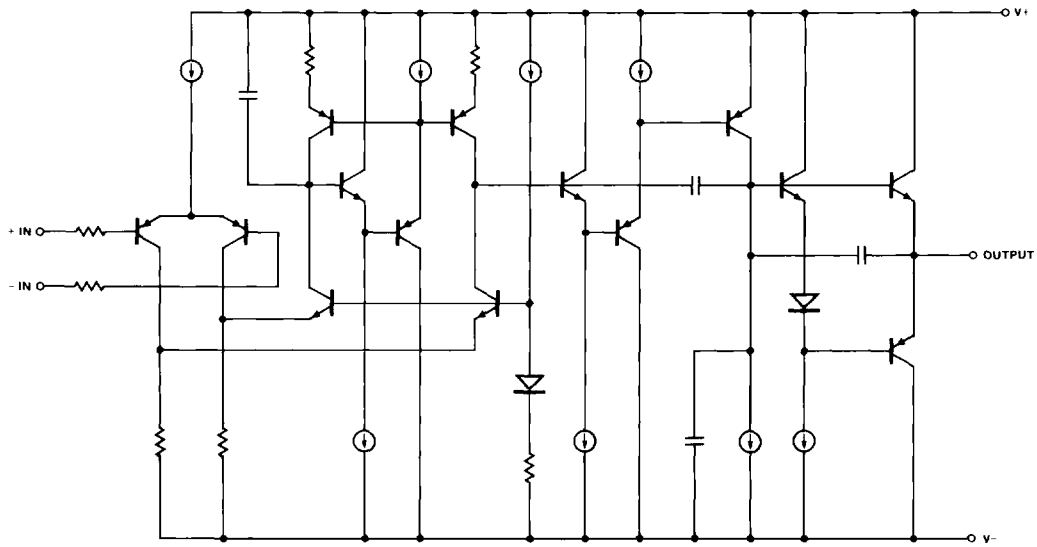
TABLE 3
Group A Inspection

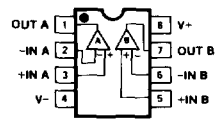
V_S = ±1.5V and ±15V; R_S = 50Ω; unless otherwise specified.

Characteristic	Symbol	Special Conditions	OP-290/883 LIMITS A MIN	MAX	Units
Subgroup 7. T_A = +25°C	SR	V_S = ±15V	5	--	V/ms
Subgroup 8. T_A = -55°C, +125°C	TCV_{OS}	V_S = ±15V	--	3	µV/°C

Note 1. IVR guaranteed by CMR test.
Note 2. I_{SY} limit = total of both amplifiers.

3.2.1 Simplified Schematic and Pin Connections





8-PIN HERMETIC DIP
(Z-Suffix)