ANALOG DEVICES

Dual Matched High Performance Operational Amplifier

OP-14

1.0 SCOPE

This specification covers the detail requirements for a dual general-purpose operational amplifier.

It is highly recommended that this data sheet be used as a baseline for new military or aerospace spec control drawings.

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

Device	Part Number	Package
A	OP-14AJ/883	J
X	OP-14J/883	J
A	OP-14AZ/883	Z
X	OP-14Z/883	Z

1.2.3 Case Outline.

Letter	Case Outline (Lead finish per MIL-M-38510)
J	8-lead metal can (TO-99)
Z	8-lead hermetic dual-in-line package (CERDIP)

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

Supply Voltage ..... ±22V
Power Dissipation 500mW
Differential Input Voltage ..... ±30V
Input Voltage ..... Supply Voltage
Output Short-Circuit Duration ..... Indefinite
Operating Temperature Range ..... -55°C to +125°C
Storage Temperature Range ..... -65°C to +150°C
Lead Temperature (Soldering, 60 sec) ..... +300°C

1.5 Thermal Characteristics:

Thermal Resistance, TO-99 (J) package:
Junction-to-Case (Θ_{JC}) = 45°C/W MAX
Junction-to-Ambient (Θ_{JA}) = 150°C/W MAX

Thermal Resistance, CERDIP (Z) package:
Junction-to-Case (Θ_{JC}) = 26°C/W MAX
Junction-to Ambient (Θ_{JA}) = 119°C/W MAX

TABLE 1

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

Characteristics	Symbol	Special Conditions	OP-14/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Input Offset Voltage	V_{OS}	$R_S \leq 20k\Omega$	–	0.75	–	2.0	mV
		$-55°C \leq T_A \leq +125°C$	–	1.5	–	3.0	mV
Input Offset Current	I_{OS}		–	5	–	5	nA
		$-55°C \leq T_A \leq +125°C$	–	10	–	10	nA
Input Bias Current	I_B		–	±50	–	±75	nA
		$-55°C \leq T_A \leq +125°C$	–	±60	–	±100	nA
Input Voltage Range (Note 1)	IVR	$-55°C \leq T_A \leq +125°C$	±10	–	±10	–	V
Common-Mode Rejection	CMR	V_{CM} = IVR = ±10V, $R_S \leq 20k\Omega$	85	–	80	–	dB
		V_{CM} = IVR = ±10V, $R_S \leq 20k\Omega$, $-55°C \leq T_A$ +125°C	80	–	80	–	dB
Power Supply Rejection Ratio	PSRR	V_S = ±5V to ±20V, $R_S \leq 20k\Omega$, $-55°C \leq T_A \leq +125°C$	–	60	–	100	μV/V
Output Voltage Swing	V_O	$R_L \geq 2k\Omega$	±12	–	±12	–	V
		$R_L \geq 2k\Omega$, $-55°C \leq T_A \leq +125°C$	±12	–	±12	–	V
Large-Signal Voltage Gain	A_{VO}	V_O = ±10V, $R_L \geq 2k\Omega$	100	–	50	–	V/mV
		V_O = ±10V, $R_L \geq 2k\Omega$, $-55°C \leq T_A \leq +125°C$	50	–	25	–	V/mV
Supply Current (Each Amplifier)	I_{SY}	V_O = 0V	–	3	–	3	mA

TABLE 1 (Continued)

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

Characteristics	Symbol	Special Conditions	OP-14/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Power Dissipation (Each Amplifier)	P_d	V_O = 0V	–	90	–	90	mW
Channel Separation	CS		100	–	100	–	dB
Output Short-Circuit Current	I_{SC}^+		–	60	–	60	mA
	I_{SC}^-		-60	–	-60	–	mA
Input Resistance Differential Mode (Note 2)	R_{IN}		2.0	–	1.35	–	MΩ
Rise time	t_r	A_{VCL} = +1, V_{IN} = 50mV $R_L \geq 2k\Omega$, C_L = 50pF	–	350	–	350	ns
Overshoot	OS	A_{VCL} = +1, V_{IN} = 50mV $R_L \geq 2k\Omega$, C_L = 50pF	–	10	–	10	%
Slew Rate	SR	R_L = 2kΩ, C_L = 100pF	0.25	–	0.25	–	V/μs
Bandwidth (Note 3)	BW	A_{VCL} = +1	1	–	1	–	MHz
Large Signal Bandwidth (Note 4)	LSBW	V_O = 20Vp-p	4	–	4	–	kHz
Input Offset Voltage Match	ΔV_{OS}		–	1.0	–	2.0	mV
		-55°C ≤ T_A ≤ +125°C	–	1.5	–	3.0	mV
Common-Mode Rejection Match	ΔCMR	V_{CM} = ±10V, $R_S \leq 100\Omega$	94	–	94	–	dB
		V_{CM} = ±10V, $R_S \leq 100\Omega$ -55°C ≤ T_A ≤ +125°C	90	–	90	–	dB

TABLE 1 (Continued)

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

Characteristics	Symbol	Special Conditions	OP-14/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Average Input Offset Voltage Drift	TCV_{OS}	T_A = -55°C, +125°C	–	8.0	–	10.0	µV/°C
Average Input Offset Current Drift	TCI_{OS}	T_A = -55°C, +125°C	–	120	–	250	pA/°C

NOTES:
1. IVR is defined as the V_{CM} range used for the CMR test.
2. R_{IN} is derived from I_B by the relationship $R_{IN} = \frac{4kT}{qI_B}$, where $\frac{kT}{q} = 0.026V$ @ +25°C
3. Bandwidth (BW) is derived from t_r by the relationship $BW = \frac{0.35}{t_r}$
4. LSBW is derived from SR by the relationship $LSBW = \frac{SR}{2\Pi V_{peak}}$

TABLE 2

OP-14/883

Electrical Test Requirements

For Class B Devices

MIL-STD-883 Test Requirements	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

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

TABLE 3

Group A Inspection

V_S = ±15V; R_S = 50Ω; T_A = T_J unless otherwise specified.

			OP-14/883				
			LIMITS A		LIMITS X		
Subgroup	Symbol	Special Conditions	Min	Max	Min	Max	Units
Subgroup 1	V_{OS}	R_S = 50Ω, 20kΩ	–	0.75	–	2.0	mV
T_A = +25°C	I_{OS}		–	5	–	5	nA
	I_B		–	±50	–	±75	nA
	CMR	V_{CM} = ±10V; R_S = 50Ω, 20kΩ	85	–	80	–	dB
	PSRR	V_S = ±5V, ±20V R_S = 50Ω, 20kΩ	–	60	–	100	µV/V
	P_d	V_O = 0V (Each Amplifier)	–	90	–	90	mW
	ΔV_{OS}		-1	1	-2	2	mV
	ΔCMR	V_{CM} = ±10V	94	–	94	–	dB
Subgroup 2	V_{OS}	R_S = 50Ω, 20kΩ	–	1.5	–	3.0	mV
T_A = +125°C	I_{OS}		–	10	–	10	nA
	I_B		–	±60	–	±100	nA
	CMR	V_{CM} = ±10V; R_S = 50Ω, 20kΩ	80	–	80	–	dB
	PSRR	V_S = ±5V, ±20V R_S = 50Ω, 20kΩ	–	60	–	100	µV/V
	ΔV_{OS}		–	1.5	–	3.0	mV
	ΔCMR	V_{CM} = ±10V	90	–	90	–	dB
Subgroup 3 T_A = -55°C		All Tests, Limits and Conditions are the same as for Subgroup 2.					

TABLE 3

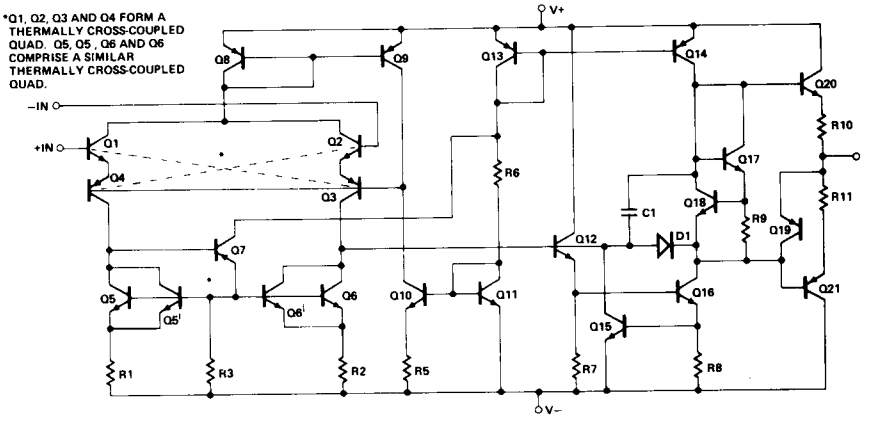
Group A Inspection (Continued)

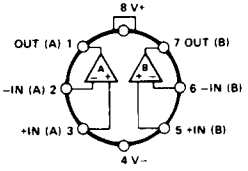
V_S = ±15V; R_S = 50Ω; T_A = T_J unless otherwise specified.

Subgroup	Symbol	Special Conditions	OP-14/883 LIMITS A Min	LIMITS A Max	LIMITS X Min	LIMITS X Max	Units
Subgroup 4	V_O	R_L = 2kΩ	±12	–	±12	–	V
T_A = +25°C	A_{VO}	V_O = ±10V, R_L = 2kΩ	100	–	50	–	V/mV
	CS		100	–	100	–	dB
Subgroup 5	V_O	R_L = 2kΩ	±12	–	±12	–	V
T_A = +125°C	A_{VO}	V_O = ±10V, R_L = 2kΩ	50	–	25	–	V/mV
Subgroup 6 T_A = -55°C		All Tests, Limits and Conditions are the same as for Subgroup 5.					
Subgroup 7	SR	C_L = 100pF, R_L = 2kΩ	0.25	–	0.25	-	V/μs
T_A = +25°C	t_r	A_{VCL} = +1, V_{IN} = 50mV C_L = 50pF, R_L = 2kΩ	–	350	–	350	ns
	OS	A_{VCL} = +1, V_{IN} = 50mV C_L = 50pF, R_L = 2kΩ	–	10	–	10	%

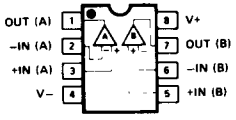
3.2.1 Simplified Schematic and Pin Connections.

(Each Amplifier)





TO-99
(J-Suffix)



8-PIN HERMETIC DIP
(Z-Suffix)

3.2.4 Microcircuit Group Assignment.

This microcircuit is covered by microcircuit group 49.

4.2 Life Test/Burn-In Circuit.