ANALOG DEVICES

High-Speed Voltage Follower/Buffer

BUF-03

1.0 **SCOPE**

This specification covers the detail requirements for a high-speed voltage follower/buffer.

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	BUF-03AJ/883	J
B	BUF-03BJ/883	J

1.2.3 **Case Outline.**

Letter	Case Outline (Lead finish per MIL-M-38510)
J	8-lead metal can (TO-99)

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

Supply Voltage .... ±18V
Internal Power Dissipation
In Still Air Without Heat Sink (Note 1) 1.00W
Input Voltage (Note 2) .... ±18V
Continuous Output Current (Note 3) 70mA
Peak Output Current (Note 3) 100mA
Short-Circuit Protection (Note 3) .... Indefinite (Note 4)
Maximum Junction Temperature (T_J) .... +175°C
Operating Temperature Range (Note 5) .... -55°C to +125°C
Storage Temperature Range .... -65°C to +175°C
Lead Temperature (Soldering, 60 sec) .... +300°C
DICE Junction Temperature Range (T_J) .... -65°C to +175°C

NOTES:

1. Based on MIL-STD-38510 published thermal resistance specification for 8 lead can-case outline C.
2. When V_{CC} < ±18V, the maximum input voltage is equal to the supply voltages.
3. The maximum P_d or T_J are not to be exceeded.
4. At 80mA.
5. When operating at T_A > +25°C, heat sinking is required to insure $T_J max$ = 175°C specification is not exceeded using the equation $T_J max = T_A + (P_d \cdot \Theta_{JC} max = \Theta_{SA})$ where Θ_{SA} = sink to ambient thermal resistance. PMI recommends using either the Thermalloy 2227 or 1101 or equivalent when operating up to T_A = +125°C.

1.5 **Thermal Characteristics:**

Thermal Resistance, TO-99 (J) package:

Junction-to-Case (Θ_{JC}) = 40°C/W MAX

Junction-to-Ambient (Θ_{JA}) = 150°C/W MAX

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OPERATIONAL AMPLIFIERS

REV. B

TABLE 1

$V_S = \pm15V$; $R_S = 0\Omega$; $T_A = T_J = 25°C$ unless otherwise specified. (Note 1)

Characteristics	Symbol	Special Conditions	BUF-03/883 LIMITS A Min	LIMITS A Max	LIMITS B Min	LIMITS B Max	Units
Input Offset Voltage (Note 2)	V_{OS}	$R_S \leq 20k\Omega$	–	6	–	15	mV
		$R_S \leq 20k\Omega$ $-55°C \leq T_A \leq +125°C$	–	20	–	35	mV
Input Bias Current	I_B		–	±400	–	±700	pA
		$T_A = +125°C$	–	±75	–	±90	nA
Nonlinearity (Note 3)	NL	$V_{IN} = \pm10V$, $R_L \geq 2k\Omega$	–	0.023	–	0.030	%F.S.
		$V_{IN} = \pm7V$, $R_L \geq 1k\Omega$	–	0.023	–	0.030	%F.S.
Maximum Output Error (Note 2)	OUT error	$V_{IN} = +10V, 0V, -10V$ $R_L \geq 2k\Omega$, $R_S \leq 20k\Omega$	–	60	–	85	mV
Voltage Gain	A_{VO}	$V_{IN} = \pm10V$, No Load	0.9960	–	0.9940	–	V/V
		$V_O = \pm10V$, $R_L \geq 2k\Omega$	0.9945	–	0.9930	–	V/V
		$V_O = \pm10V$, $R_L \geq 1k\Omega$	0.9925	–	0.9905	–	V/V
		$V_O = \pm10V$, $R_L \geq 2k\Omega$ $-55°C \leq T_A \leq +125°C$	0.9920	–	0.9902	–	V/V
Power Supply Rejection Ratio	PSRR	$V_S = \pm6V$ to $\pm18V$	–	0.71	–	1.42	mV/V
		$V_S = \pm6V$ to $\pm18V$ $-55°C \leq T_A \leq +125°C$	–	1.26	–	2.24	mV/V
Supply Current	I_{SY}	No Load	–	25	–	25	mA
		No Load, $T_A = \pm125°C$	–	24	–	24	mA
Slew Rate (Note 4)	SR	$C_L = 50pF$, $R_L \geq 2k\Omega$ $T_J = T_A = +75°C$	220	–	180	–	V/µs

NOTES:

1. Electrical parameters are pulse tested on automated test equipment. Total test time at each temperature is limited to less than one second maximum to keep T_J approximately equal to T_A.
2. Parameters specified with $R_S \leq 20k\Omega$ are tested at $R_S = 0\Omega$. Limits in test program are adjusted to take into account worst case voltage offet induced by $R_S = 20k\Omega$, i.e., I_B max * $20k\Omega$.
3. Nonlinearity is computed using linear regression techniques with data from five points (e.g., -10V, -5V, 0V, +5V, +10V for ±10V full-scale linearity; -7V, -3.5V, 0V, +3.5V, and +7V for ±7V full-scale linearity).
4. Slew Rate is specified at a Subgroup 8 nonstandard temperature, requiring a separate pass pulse test on automated test equipment. 100% Group A test is required.

TABLE 2

BUF-03/883

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, 8

* PDA applies to Subgroup 1 only. V_{OS} is excluded from PDA. No other Subgroups are included in PDA.

TABLE 3

Group A Inspection

V_S = ±15V; R_S = 0Ω; T_A = T_J unless otherwise specified. (Note 1)

Subgroup	Symbol	Special Conditions	BUF-03/883 LIMITS A Min	LIMITS A Max	LIMITS B Min	LIMITS B Max	Units
Subgroup 1 T_A = +25°C	V_{OS}	R_S ≤ 20kΩ (Note 2)	–	6	–	15	mV
	I_B		–	400	–	700	pA
	NL	V_{IN} = ±10V, R_L = 2kΩ (Note 3) V_{IN} = ±7V, R_L = 1kΩ (Note 3)	– –	0.023 0.023	– –	0.030 0.030	%F.S. %F.S.
	OUT error	V_{IN} = +10V, 0V, -10V R_L = 2kΩ, R_S ≤ 20kΩ (Note 2)	–	60	–	85	mV
	PSRR	V_S = ±6V, ±18V	–	0.71	–	1.42	mV/V
	I_{SY}	No Load	–	25	–	25	mA
Subgroup 2 T_A = +125°C	V_{OS}	R_S ≤ 20kΩ (Note 2)	–	20	–	35	mV
	I_B		–	75	–	90	nA
	PSRR	V_S = ±7V, ±15V	–	1.26	–	2.24	mV/V
	I_{SY}	No Load	–	24	–	24	mA
Subgroup 3 T_A = -55°C	V_{OS}	R_S ≤ 20kΩ (Note 2)	–	20	–	35	mV
	PSRR	V_S = ±7V, ±15V	–	1.26	–	2.24	V/mV
Subgroup 4 T_A = +25°C	A_{VO}	V_{IN} = ±10V, No Load V_{IN} = ±10V, R_L = 2kΩ V_{IN} = ±10V, R_L = 1kΩ	0.9960 0.9945 0.9925	– – –	0.9940 0.9930 0.9905	– – –	V/V V/V V/V
Subgroup 5 T_A = +125°C	A_{VO}	V_{IN} = ±10V, R_L = 2kΩ	0.9920	–	0.9902	–	V/V
Subgroup 6 T_A = -55°C		All Tests, Limits and Conditions are the same as for Subgroup 5.					

TABLE 3

Group A Inspection

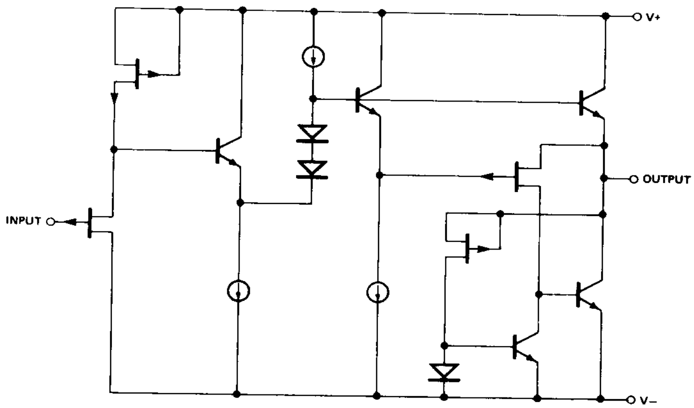
V_S = ±15V; R_S = 0Ω; T_A = T_J unless otherwise specified. (Note 1)

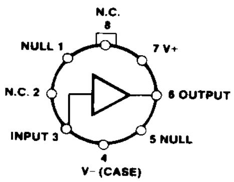
			BUF-03/883				
			LIMITS A		LIMITS B		
Subgroup	Symbol	Special Conditions	Min	Max	Min	Max	Units
Subgroup 8 T_A = +75°C	SR	R_L = 2kΩ, C_L = 50pF (Note 4)	220	–	180	–	V/μs

NOTES:

1. Electrical parameters are pulse tested on automated test equipment. Total test time at each temperature is limited to less than one second maximum to keep T_J approximately equal to T_A.
2. Parameters specified with $R_S \leq 20k\Omega$ are tested at $R_S = 0\Omega$. Limits in test program are adjusted to take into account worst case voltage offet induced by $R_S = 20k\Omega$, i.e., I_B max * 20kΩ.
3. Nonlinearity is computed using linear regression techniques with data from five points (e.g., -10V, -5V, 0V, +5V, +10V for ±10V full-scale linearity; -7V, -3.5V, 0V, +3.5V, and +7V for ±7V full-scale linearity).
4. Slew Rate is specified at a Subgroup 8 nonstandard temperature, requiring a separate pass pulse test on automated test equipment. 100% Group A test is required.

3.2.1 Simplified Schematic and Pin Connections.



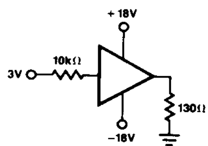


TO-99 (J-Suffix)

3.2.4 Microcircuit Group Assignment.

Microcircuit Group Assignment. This microcircuit is covered by microcircuit group 49.

4.2 Life Test/Burn-In Circuit.



* **Oil Bath Burn-In:** Use the oil bath heated to +125°C to provide the heat sink necessary to maintain the junction temperature at < +175°C.

T_{OIL} = +125°C
T_A = +125°C
T_J < +175°C based on
T_A = +125°C and Θ_{JA} = 58°C/W (worst case)