

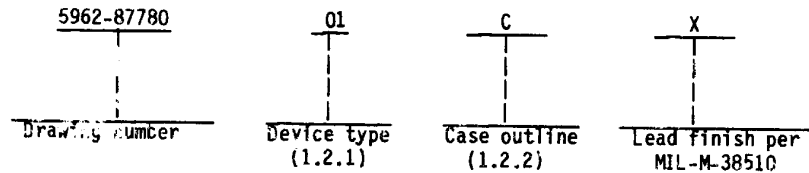
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DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits in accordance with 2.1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant JAN devices".

1.2 Part number. The complete part number shall be as shown in the following example:



1.2.1 Device type. The device type shall identify the circuit function as follows:

Device type	Generic number	Circuit function
01	INA101	Instrumentation amplifier with gain sense
02	INA101	Instrumentation amplifier

1.2.2 Case outline. The case outlines shall be as designated in appendix C of MIL-M-38510, and as follows:

Outline letter	Case outline
C	D-1, (14-lead, .785" x .310" x .200"), dual-in-line package
I	A-2, (10-lead, .370" x .185") can package

1.3 Absolute maximum ratings.

Positive supply voltage (V ⁺)	- - - - -	+20 V dc
Negative supply voltage (V ⁻)	- - - - -	-20 V dc
Internal power dissipation (P _D)	- - - - -	600 mW
Input voltage range	- - - - -	V ₊
Output short circuit duration	- - - - -	continuous to ground
Storage temperature range	- - - - -	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	- - - - -	+300°C
Thermal resistance, junction-to-case (θ _{JC})	- - - - -	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ _{JA}):		
Case C	- - - - -	+125°C/W
Case I	- - - - -	+220°C/W

1.4 Recommended operating conditions.

Positive supply voltage range (V ⁺)	- - - - -	+11 V dc to +20 V dc
Negative supply voltage range (V ⁻)	- - - - -	-11 V dc to -20 V dc
Ambient operating temperature range (T _A)	- - - - -	-55°C to +125°C

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2. APPLICABLE DOCUMENTS

2.1 Government specification and standard. Unless otherwise specified, the following specification and standard, of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-M-38510 - Microcircuits, General Specification for.

STANDARD

MILITARY

MIL-STD-883 - Test Methods and Procedures for Microelectronics.

(Copies of the specification and standard required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Order of precedence. In the event of a conflict between the text of this drawing and the references cited herein, the text of this drawing shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with 1.2.1 of MIL-STD-883, "Provisions for the use of MIL-STD-883 in conjunction with compliant non-JAN devices" and as specified herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-M-38510 and herein.

3.2.1 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.2 Block diagrams. The block diagrams shall be as specified on figure 2.

3.2.3 Case outlines. The case outlines shall be in accordance with 1.2.2 herein.

3.3 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table 1 and apply over the full ambient operating temperature range.

3.4 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the part number listed in 1.2 herein. In addition, the manufacturer's part number may also be marked as listed in 6.4 herein.

3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55^{\circ}\text{C} < T_A < +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Range of gain	A_V	$A_V = 1 + (40k/R_G)$ <u>2/</u>	1, 2, 3	1	1000	V/V
Gain equation error	E_{AV}	$T_A = +25^{\circ}\text{C}$	4		0.05	% FS
					0.10	
					0.10	
					0.40	
DC nonlinearity <u>3/</u>	NL	$T_A = +25^{\circ}\text{C}$	4		.005	%
					.005	
					.007	
					.025	
Gain temperature coefficient	TC_{AV}		5, 6		2	ppm/ $^{\circ}\text{C}$
					25	
					30	
					50	
Output voltage	V_{OP}	$R_L = 2\text{ k}\Omega$	4, 5, 6	± 10		V
Output current	I_O	$R_L = 2\text{ k}\Omega$	4, 5, 6	± 5		mA

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55^{\circ}\text{C} < T_A < +125^{\circ}\text{C}$ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Input offset voltage <u>4/</u>	V_{IO}	$T_A = +25^{\circ}\text{C}$	1		± 75	μV
					± 50	
Input offset voltage temperature coefficient	$\Delta V_{IO}/\Delta T$	$T_A = +125^{\circ}\text{C}$	2		± 2.5	$\mu\text{V}/^{\circ}\text{C}$
					± 1.75	
		$T_A = -55^{\circ}\text{C}$	3		± 2.5	
					± 1.75	
Input offset voltage supply coefficient	PSRR	$V^+ = +5\text{ V}$ $V^- = -5\text{ V}$	1		± 35	$\mu\text{V}/\text{V}$
					± 2	
			2, 3		± 40	
					± 5	
Initial input bias current	I_{IB}		1, 2, 3		± 30	nA
Initial input offset current	I_{IO}		1, 2, 3		± 30	nA
Input voltage linear response range	V_{IN}		1, 2, 3	± 10		V
Input voltage common mode rejection	CMRR	DC to 60 Hz <u>5/</u>	1, 2, 3	80		dB
				96		
				106		
Power supply rated voltage	V_{\pm}		1, 2, 3	± 5	± 20	V

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55°C < T _A < +125°C unless otherwise specified		Group A subgroups	Limits		Unit
					Min	Max	
Power supply quiescent current	I _Q			1, 2, 3		±8.5	mA
Dynamic response slew rate	SR	R ₁ = 2 kΩ	A _v = 1 to 100	4	0.2		V/μs
				5, 6	0.1		
Dynamic response settling settling time	t _S	±10 V to 0.01% of final value.	A _v = 1	9, 10, 11	30		μs
			A _v = 100		50		
			A _v = 1000		500		

1/ V⁺ = +15 V, V⁻ = -15V, R_L = 2 kΩ, unless otherwise specified.

2/ Typically, the tolerance of R_G will be the major source of gain error.

3/ -Input = 0 V, +input is varied to enable nonlinearity error to be measured between -10 V < output < +10 V and determining worst case deviation from straight line connecting these end points at each gain setting.

4/ Adjustable to zero at any one gain.

5/ 1 kΩ source imbalance applies only to T_A = +25°C.

3.6 Certificate of conformance. A certificate of conformance as required in MIL-STD-883 (see 3.1 herein) shall be provided with each lot of microcircuits delivered to this drawing.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

3.8 Verification and review. DESC, DESC's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

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Device types	01	02
Case outlines	C	I
Terminal number	Terminal symbols	
1	OUTPUT	GAIN SET 1
2	V+	OFFSET ADJ
3	-INPUT	OFFSET ADJ
4	GAIN SENSE 1	GAIN SET 2
5	GAIN SET 1	+INPUT
6	OFFSET ADJ	V-
7	OFFSET ADJ	COMMON
8	A1 OUTPUT	OUTPUT
9	A2 OUTPUT	V+
10	GAIN SET 2	-INPUT
11	GAIN SENSE 2	---
12	+INPUT	---
13	V-	---
14	COMMON	---

FIGURE 1. Terminal connections.

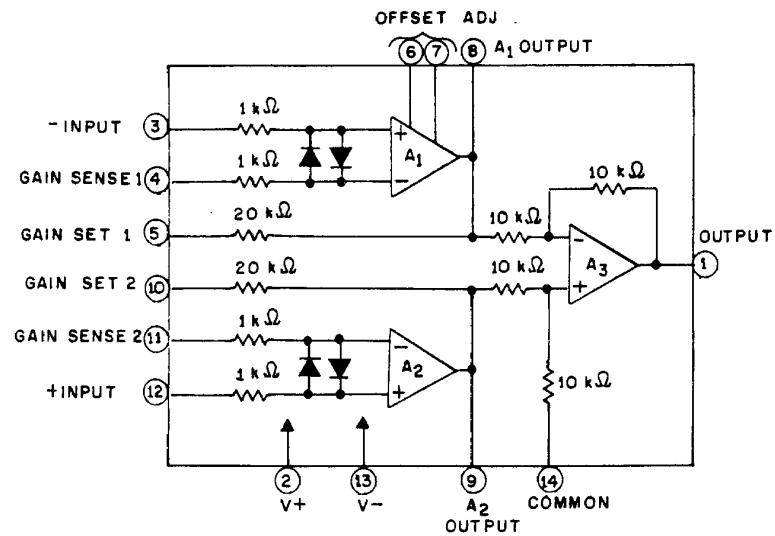
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Case C

Device type 01



Case I

Device type 02

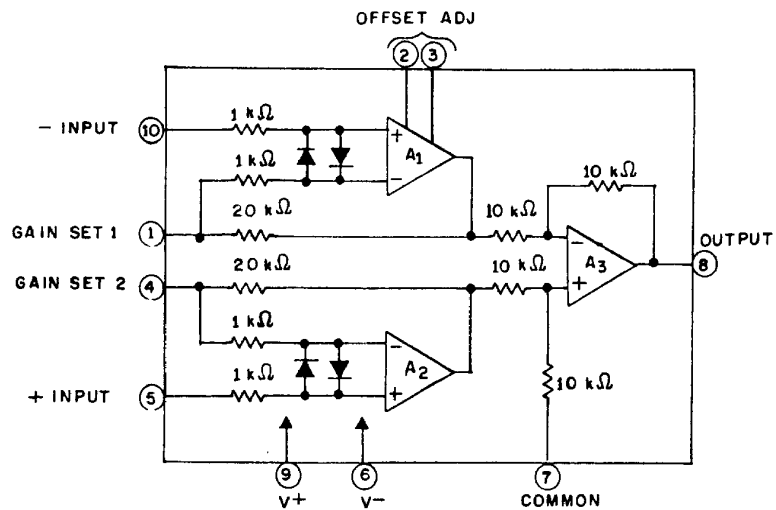


FIGURE 2. Block diagrams.

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4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with section 4 of MIL-M-38510 to the extent specified in MIL-STD-883 (see 3.1 herein).

4.2 Screening. Screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection. The following additional criteria shall apply:

a. Burn-in test, method 1015 of MIL-STD-883.

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

b. Interim and final electrical test parameters shall be as specified in table II herein, except interim electrical parameter tests prior to burn-in are optional at the discretion of the manufacturer.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with method 5005 of MIL-STD-883 including groups A, B, C, and D inspections. The following additional criteria shall apply.

4.3.1 Group A inspection.

a. Tests shall be as specified in table II herein.

b. Subgroups 7 and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

4.3.2 Groups C and D inspections.

a. End-point electrical parameters shall be as specified in table II herein.

b. Steady-state life test conditions; method 1005 of MIL-STD-883:

(1) Test condition A, B, C, or D using the circuit submitted with the certificate of compliance (see 3.5 herein).

(2) $T_A = +125^{\circ}\text{C}$, minimum.

(3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table 1)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*, 2, 3, 4
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

** Subgroups 10 and 11 shall be guaranteed if not tested.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-M-38510.

6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use when military specifications do not exist and qualified military devices that will perform the required function are not available for OEM application. When a military specification exists and the product covered by this drawing has been qualified for listing on QPL-38510, the device specified herein will be inactivated and will not be used for new design. The QPL-38510 product shall be the preferred item for all applications.

6.2 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor-prepared specification or drawing.

6.3 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone 513-296-5375.

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6.4 Approved source of supply. An approved source of supply is listed herein. Additional sources will be added as they become available. The vendor listed herein has agreed to this drawing and a certificate of compliance (see 3.5 herein) has been submitted to DESC-ECS.

Military drawing part number	Vendor CAGE number	Vendor similar part number <u>1/</u>	Replacement military specification part number
5962-8778001CX	13919	INA101VG/883B	
5962-8778002IX	13919	INA101VM/883B	

1/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.

Vendor CAGE
number

13919

Vendor name
and address

Burr-Brown Corporation
P.O. Box 11400
Tucson, AZ 85734

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