REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add case outline 2. Add input voltage test. Add footnote 3/. Editorial changes throughout.	1990 MAR 30	

REV																								
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REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A												
	SHEET	1	2	3	4	5	6	7	8	9	10	11												

PMIC N/A

STANDARDIZED MILITARY DRAWING

THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE

AMSC N/A

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DRAWING APPROVAL DATE: 10 February 1988

REVISION LEVEL: A

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, LINEAR, PRECISION INSTRUMENTATION AMPLIFIER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-88539

SHEET 1

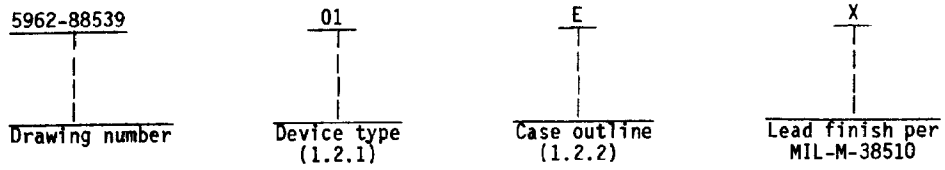
DESC FORM 193
SEP 87

* U.S. GOVERNMENT PRINTING OFFICE: 1987 — 748-129/60911

1. SCOPE

1.1 Scope. This drawing describes device requirements for class B microcircuits 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".

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	AD524	Precision instrumentation amplifier

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

Outline letter	Case outline
E	D-2 (16-lead, .840" x .310" x .200"), dual-in-line package
2	C-2 (20-terminal, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage	±18 V dc
Internal power dissipation	280 mW
Input voltage	±V_S maximum
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
Junction-to-ambient (θ_{JA}):	
Case outline E	95°C/W
Case outline 2	150°C/W

1.4 Recommended operating conditions.

Supply voltage range (V_S)	±6 V dc to ±18 V dc
Ambient operating temperature range (T_A)	-55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standard, and bulletin. Unless otherwise specified, the following specification, standard, and bulletin 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.

BULLETIN

MILITARY

MIL-BUL-103 - List of Standardized Military Drawing (SMD's).

(Copies of the specification, standard, and bulletin 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 diagram. The block diagram shall be as specified on figure 2.

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

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

3.4 Electrical test requirements. The electrical test requirements shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table I.

3.5 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 MIL-BUL-103 (see 6.6 herein).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ 1/ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Gain error 1	GE_1	G = 1, V_O = ±10 V	1		±.05	%
Gain error 10	GE_{10}	G = 10, V_O = ±10 V	1		±.25	%
Gain error 100	GE_{100}	G = 100, V_O = ±10 V	1		±.5	%
Gain error 1000	GE_{1000}	G = 1000, V_O = ±10 V	1		±2.0	%
Gain error drift 1	$TCGE_1$	G = 1, V_O = ±10 V	2, 3		±5	ppm/°C
Gain error drift 10	$TCGE_{10}$	G = 10, V_O = ±10 V	2, 3		±10	ppm/°C
Gain error drift 100	$TCGE_{100}$	G = 100, V_O = ±10 V	2, 3		±25	ppm/°C
Gain error drift 1000	$TCGE_{1000}$	G = 1000, V_O = ±10 V	2, 3		±50	ppm/°C
Input offset voltage	V_{OSI}	V_{IN} = 0 V	1		±100	µV
Input offset voltage drift	TCV_{OSI}	V_{IN} = 0 V, G = 1000	2, 3		±2	µV/°C
Output offset voltage	V_{OSO}	V_{IN} = 0 V	1		±3	mV
Output offset voltage drift	TCV_{OSO}	V_{IN} = 0 V, G = 1	2, 3		±50	µV/°C
Input bias current	I_B	G = 1	1	-50	50	nA
			2, 3	-70	70	
Input offset current	I_{IO}	$I_{IO} = (I_{B^+})-(I_{B^-})$ G = 1	1	-35	35	nA
			2, 3	-50	50	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ 1/ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Common mode rejection	CMRR1	G = 1 V_{IN} = 0 V to +10 V	1, 2, 3	70		dB
Common mode rejection	-CMRR1	G = 1 V_{IN} = 0 V to -10 V	1, 2, 3	70		dB
Common mode rejection	CMRR10	G = 10 V_{IN} = 0 V to +10 V	1, 2, 3	90		dB
Common mode rejection	-CMRR10	G = 10 V_{IN} = 0 V to -10 V	1, 2, 3	90		dB
Common mode rejection	CMRR100	G = 100 V_{IN} = 0 V to +10 V	1, 2, 3	100		dB
Common mode rejection	-CMRR100	G = 100 V_{IN} = 0 V to -10 V	1, 2, 3	100		dB
Common mode rejection	CMRR1000	G = 1000 V_{IN} = 0 V to +10 V	1, 2, 3	110		dB
Common mode rejection	-CMRR1000	G = 1000 V_{IN} = 0 V to -10 V	1, 2, 3	110		dB
Power supply current	I_{CC}	G = 1	1, 2, 3		5	mA
Power supply rejection	PSRR1	G = 1 2/	1, 2, 3	75		dB
Power supply rejection	PSRR10	G = 10 2/	1, 2, 3	95		dB
Power supply rejection	PSRR100	G = 100 2/	1, 2, 3	105		dB
Power supply rejection	PSRR1000	G = 1000 2/	1, 2, 3	115		dB

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \leq T_A \leq +125°C$ 1/ unless otherwise specified	Group A subgroups	Limits		Unit
				Min	Max	
Input voltage	V_{IN}	Differential, linear, G = 1	1	±10		V
		Common mode, linear, G = 1		±7		
		Differential, safe 3/ 4/			±36	
		Common, safe 3/ 4/			±36	

1/ V_S = ±15 V, R_L = 2 K, unless otherwise specified.

2/ Power supply voltage tested at ±15 V with a swing to ±12 V.

3/ Input voltage (differential, safe) is the maximum voltage difference that can exist between the two input pins without damage to the device. Input voltage (common mode, safe) is the maximum voltage that can be applied to both input pins at the same time without damage to the device. The addition of the differential and common mode voltages shall not exceed ±36 volts and can be applied when the device power is on or off without damage to the device.

4/ Guaranteed if not tested to the limits specified.

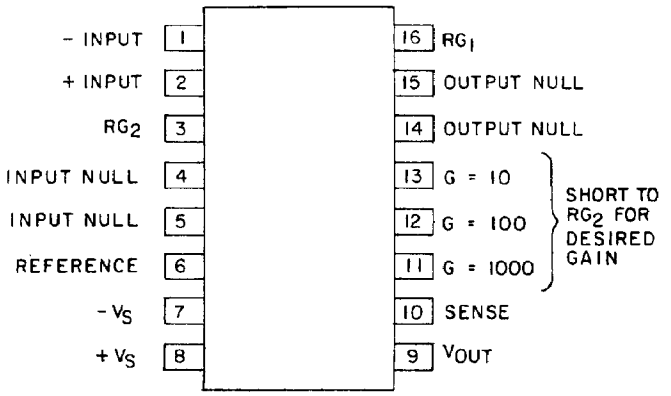
3.6 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-BUL-103 (see 6.6 herein). The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-STD-883 (see 3.1 herein) and the requirements herein.

3.7 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.

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

3.9 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.

Case outline E



Case outline 2

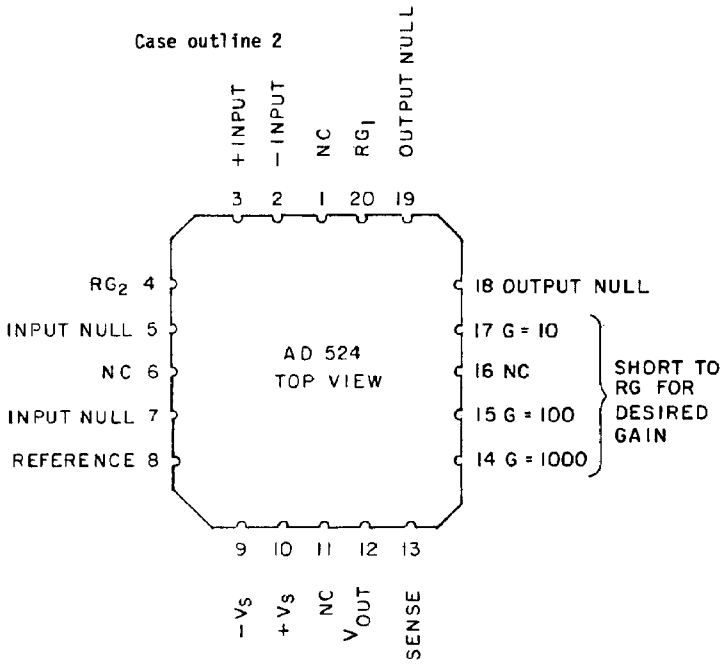


FIGURE 1. Terminal connections.

STANDARDIZED MILITARY DRAWING DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	SIZE A		5962-88539
		REVISION LEVEL A	SHEET 7

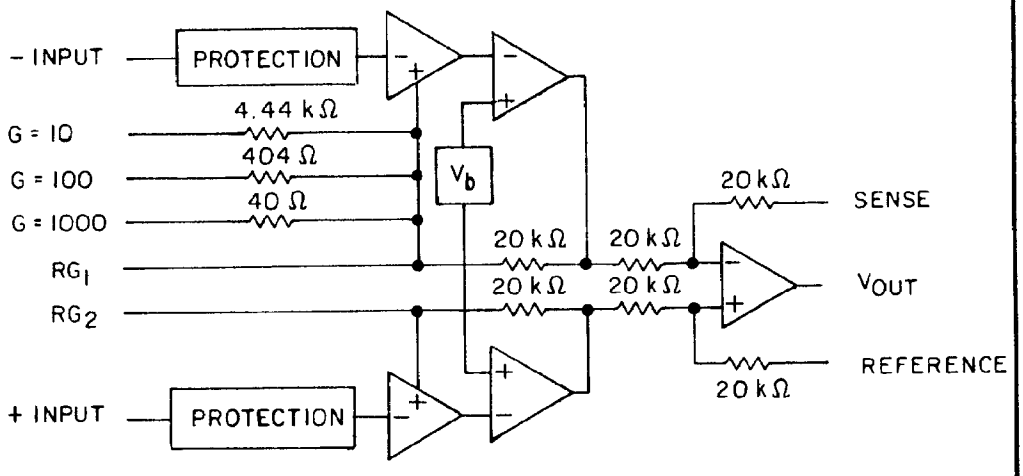


FIGURE 2. Block diagram.

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 3.6 herein).

(2) T_A = +125°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 4, 5, 6, 7, 8, 9, 10, and 11 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 3.6 herein).

(2) T_A = +125°C, minimum.

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

TABLE II. Electrical test requirements.

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

* PDA applies to subgroup 1.

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. Replaceability is determined as follows:

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

b. When a QPL source is established, the part numbered device specified in this drawing will be replaced by the microcircuit identified as part number M38510/14301BEX.

6.3 Configuration control of SMD's. All proposed changes to existing SMD's will be coordinated with the users of record for the individual documents. This coordination will be accomplished in accordance with MIL-STD-481 using DD Form 1693, Engineering Change Proposal (Short Form).

6.4 Record of users. Military and industrial users shall inform Defense Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC will maintain a record of users and this list will be used for coordination and distribution of changes to the drawings. Users of drawings covering microelectronics devices (FSC 5962) should contact DESC-ECS, telephone (513) 296-6022.

6.5 Comments. Comments on this drawing should be directed to DESC-ECS, Dayton, Ohio 45444, or telephone (513) 296-8525.

6.6 Approved source of supply. An approved source of supply is listed in MIL-BUL-103. Additional sources will be added to MIL-BUL-103 as they become available. The vendor listed in MIL-BUL-103 has agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS. The approved source listed below is for information purposes only and is current only to the date of the last action of this document.

Military drawing part number	Vendor CAGE number	Vendor 1/ similar part number	Replacement military specification part number
5962-8853901EX	24355	AD524SD/883B	M38510/14301BEX
5962-88539012X	24355	AD524SE/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	Vendor name and address
24355	Analog Devices Rt. 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: 804 Woburn Street Wilmington, MA 01887