REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

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

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
29 SEPTEMBER 1988

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUITS, LINEAR, DUAL LOW OFFSET, MATCHED OPERATIONAL AMPLIFIER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-87715

SHEET 1 OF 9

DESC FORM 193
SEP 87

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

5962-E571

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:

5962-87715	01	C	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	OP-207A LT1002A	Dual, ultra-low offset, matched operational amplifier

1.2.2 Case outline. The case outline 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

1.3 Absolute maximum ratings.

Supply voltage (V_S)	±22 V
Internal power dissipation (P_D) 1/	500 mW
Differential input voltage	±30 V
Input voltage (V_I) 2/	±22 V
Output short circuit duration	Indefinite
Storage temperature range	-65°C to +150°C
Operating temperature range	-55°C to +125°C
Lead temperature (Soldering, 60 seconds)	300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C

1.4 Recommended operating conditions.

Supply voltage (V_S)	±15 V
Ambient operating temperature range (T_A)	-55°C to +125°C

1/ Maximum ambient temperature for rating is 106°C, derate above maximum ambient temperature 11.3 mW/°C

2/ For supply voltages less than ±22 V, the absolute maximum input voltage is equal to the supply voltage.

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 Case outline. The case outline 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 I 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ $V_S = \pm 15$ V; $R_S = 50\Omega$, $V_{CM} = 0$ V unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Input offset voltage	V_{IO}		1		100	µV
			2,3		230	
Average input offset voltage drift	TCV_{IO}	T_A = -55°C, +125°C	8		1.3	µV/°C
Input offset current	I_{IO}		1		2.8	nA
			2,3		5.6	
Input bias current	I_{IB}		1		±3.0	nA
			2,3		±5.6	
Output voltage swing	V_O	$R_L \ge 10$ kΩ	4	±12.5		V
		$R_L \ge 2$ kΩ		±12.0		
		$R_L \ge 1$ kΩ		±10.0		
		$R_L \ge 2$ kΩ	5,6	±12.0		
Power consumption	P_D	No Load, Both Amplifiers T_A = +25°C	1		240	mW
Input voltage range 1/	IVR		1,2,3	±13		V
Common-mode rejection ratio	CMMR	V_{CM} = IVR = ±13 V	1	106		dB
			2,3	103		
Power supply rejection ratio	PSRR	V_S = ±3 V to ±18 V	1		20	µV/V
			2,3		32	
Input noise voltage	e_n	f_O = 1000 Hz T_A = +25°C	7		12	$nV/\sqrt{Hz}$

See footnote at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$, $V_S = \pm 15$ V; $R_S = 50\Omega$, $V_{CM} = 0$ V unless otherwise specified	Group A subgroups	Limits Min	Limits Max	Unit
Large signal voltage gain	A_{VO}	$R_L \ge 2$ kΩ, $V_O = \pm 10$ V	4	200		V/mV
			5,6	150		
Offset adjustment voltage range	V adj+	$R_p = 20$ kΩ, $T_A = +25°C$	1	0.5		mV
	V adj-				-0.5	
Output short circuit current	I_{OS}^+	$T_A = +25°C$	1	5	58	mA
	I_{OS}^-			-55	-5	
Input offset voltage match	ΔV_{IO}		1		90	µV
			2,3		180	
Average non-inverting bias current	ΔI_B^+		1		±3.5	nA
			2,3		±6.0	
Non-inverting offset current	ΔI_O^+		1		±3.5	nA
			2,3		±6.5	
Inverting offset current	ΔI_O^-		1		±3.5	nA
			2,3		±6.5	
Common mode rejection ratio match	ΔCMRR	V_{CM} = IVR = ±13 V	1	103		dB
			2,3	100		
Power supply rejection ratio match	ΔPSRR	$V_S = \pm 3$ V to ±18 V	1		32	µV/V
			2,3		51	
Channel separation	CS	$T_A = +25°C$	4	126		dB

1/ IVR is defined as the V_{CM} range used for the CMR test.

Device type	01
Case	C
Terminal number	Terminal symbol
1	NULL (A)
2	NULL (A)
3	-IN (A)
4	+IN (A)
5	V- (B)
6	OUT (B)
7	V+ (B)
8	NULL (B)
9	NULL (B)
10	-IN (B)
11	+IN (B)
12	V- (A)
13	OUT (A)
14	V+ (A)

FIGURE 1. Terminal connections

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.

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.

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°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 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 3.5 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*,2,3,4,5,6
Group A test requirements (method 5005)	1,2,3,4,5,6,7,8
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. 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.

6.4 Approved sources of supply. Approved sources of supply are listed herein. Additional sources will be added as they become available. The vendors listed herein have 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 1/
5962-8771501CX	06665	OP-207AY
	64155	LT1002AMJ/883

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
06665	Precision Monolithics, Incorporated 1500 Space Park Drive P.O. Box 58020 Santa Clara, CA 95050
64155	Linear Technology Corporation 1630 McCarthy Boulevard Milpitas, CA 95035-7487