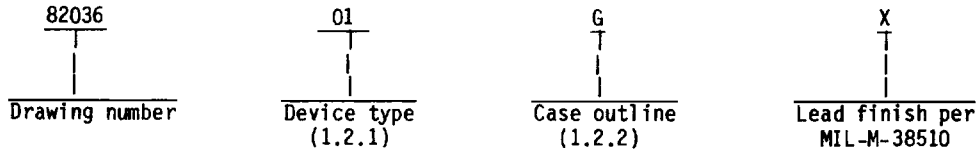


1. SCOPE

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 types. The device types shall identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	OP-07A	Operational amplifier, ultra low offset
02	OP-07	Operational amplifier, low offset

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

<u>Outline letter</u>	<u>Case outline</u>
G	A-1 (8-lead, .370" x .185"), can
P	D-4 (8-lead, .405" 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 (V_{CC}) - - - - -	±22 V dc
Input voltage range (V_{IN}) - - - - -	± V_{CC}
Differential input voltage range - - - - -	±30 V dc
Output short circuit duration - - - - -	1/
Lead temperature (soldering, 60 seconds) - - - - -	±300°C
Storage temperature - - - - -	-65°C to +150°C
Thermal resistance, junction-to-case (θ_{JC}) - - - - -	MIL-M-38510, appendix C
Maximum power dissipation (P_D): 2/	
Case G - - - - -	330 mW at $T_A = +125^\circ\text{C}$
Cases P and 2 - - - - -	400 mW at $T_A = +125^\circ\text{C}$
Thermal resistance, junction-to-ambient (θ_{JA}):	
Cases P and 2 - - - - -	120°C/W
Case G - - - - -	150°C/W

1.4 Recommended operating conditions.

Supply voltage range (V_{CC}) - - - - -	±5.0 V dc to ±20.0 V dc
Ambient operating temperature range (T_A) - - - - -	-55°C to +125°C

1/ Output may be shorted to ground indefinitely at $V_S = \pm 15$ V, $T_A = +25^\circ\text{C}$. Temperature and supply voltages must be limited to ensure dissipation rating is not exceeded.

2/ Must withstand the added P_D due to short circuit test, e.g., I_{OS} .

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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 and logic diagrams. The terminal connections and logic diagrams shall be as specified on figure 1.

3.2.2 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 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55°C < T _A < +125°C V _{CC} = ±15 V, unnull'd, V _{CM} = 0 (unless otherwise specified)	Group A subgroups	Limits				Unit	
				01		02			
				Min	Max	Min	Max		
Input offset voltage	V _{I0}	1/ 2/	1	-25	25	-75	75	μV	
			2, 3	-60	60	-200	200	μV	
Input offset voltage temperature sensitivity	$\frac{dV_{I0}}{dT}$	3/	2, 3	-0.6	0.6	-1.3	1.3	μV/°C	
Input bias current	+I _{IB}		1	-2	2	-3	3	nA	
			2, 3	-3	3	-6	6	nA	
	-I _{IB}		1	-2	2	-3	3	nA	
			2, 3	-4	4	-6	6	nA	
Input offset current	+I _{I0}		1	-2	2	-2.8	2.8	nA	
			2, 3	-4	4	-5.6	5.6	nA	
Power supply rejection ratio	+PSRR		V _{CC} ⁺ = 20 V to 5 V, V _{CC} ⁻ = -15 V	1		10		10	μV/V
	-PSRR		V _{CC} ⁺ = 15 V, V _{CC} ⁻ = -20 V to -5 V	1		10		10	μV/V
	+PSRR	V _{CC} ⁺ = 20 V to 5 V, V _{CC} ⁻ = -15 V	2, 3		20		20	μV/V	
	-PSRR	V _{CC} ⁺ = 15 V, V _{CC} ⁻ = -20 V to -5 V	2, 3		20		20	μV/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 V _{CC} = ±15 V, unnullled, V _{CM} = 0 (unless otherwise specified)	Group A subgroups	Limits				Unit
				01		02		
				Min	Max	Min	Max	
Common mode rejection ratio	CMRR	V _{CM} = ±10 V	1	110		110		dB
		V _{CM} = ±13 V	2, 3	106		106		dB
Output short circuit current	I _{OS(+)}	t < 25 ms 4/	1, 2, 3	-60		-60		mA
	I _{OS(-)}		1, 2, 3		50		50	mA
Supply current	I _{CC}		1		4		4	mA
			2, 3		5		5	mA
Output voltage swing (minimum)	V _{OP}	R _L = 1 kΩ	4, 5, 6	-10	10	-10	10	V
		R _L = 2000Ω	4, 5, 6	-12	12	-12	12	V
Open loop voltage gain (single ended)	A _{VS}	T _A = +25°C 5/	4	300		200		V/mV
			5, 6	200		150		V/mV

- 1/ Users are cautioned to use the group C end-point limits for design purposes due to drift experienced with this parameter during steady-life test (see table III).
- 2/ Testing will occur at least 250 ms after application of power.
- 3/ Shall be guaranteed if not tested, to the specified parameters.
- 4/ Continuous short circuit limits are considerably less than the indicated test limits since maximum power dissipation cannot be exceeded.
- 5/ V_{OUT} = 0 V to +10 V for A_{VS}(+) and V_{OUT} = 0 to -10 for A_{VS}(-). R_L = 2000Ω.

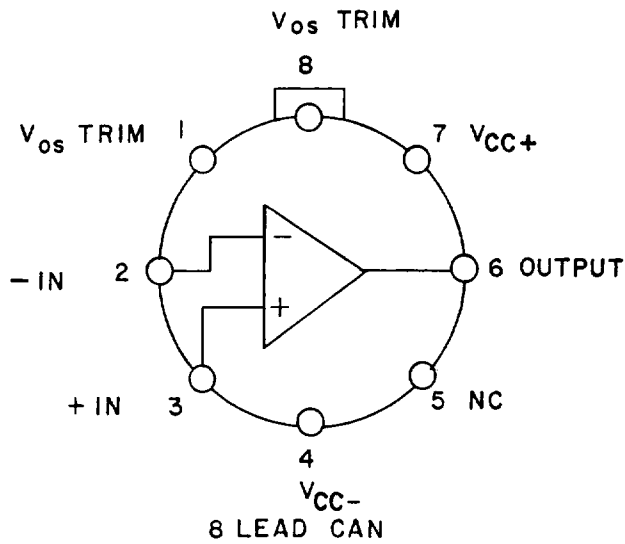
3.5 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in 6.4. The certificate of compliance submitted to DESC-ECS prior to listing as an approved source of supply shall state that the manufacturer's product 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.

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Device types 01 and 02

Case G



Device types 01 and 02

Case P

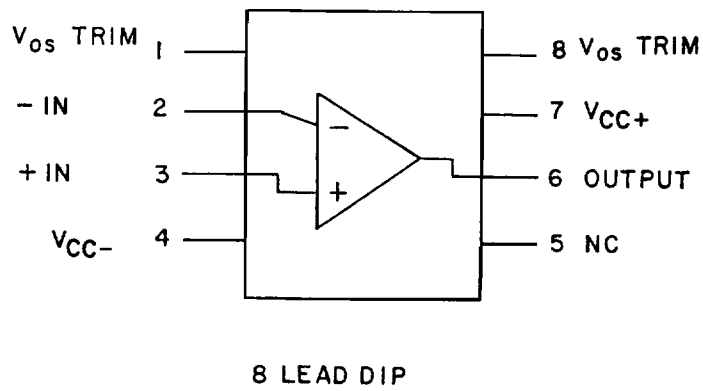


FIGURE 1. Terminal connections and logic diagrams.

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Device types 01 and 02

Case 2

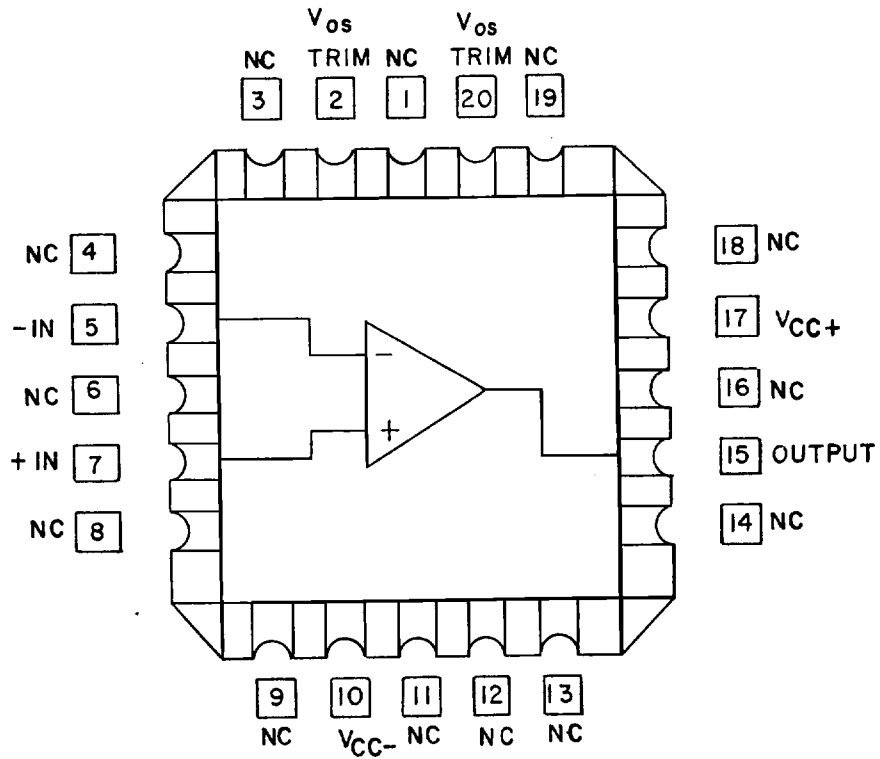


FIGURE 1. Terminal connections and logic diagrams - Continued.

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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) $T_A = +125^\circ\text{C}$, 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, 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 3.5 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 I)
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
Groups C and D end-point electrical parameters (method 5005)	1** and table III

* PDA applies to subgroup 1 excluding V_{IO} .

** Table III limits used for V_{IO} and $\pm I_{IB}$ in place of table I limits.

TABLE III. Group C end-point electrical parameters.

$T_A = +25^\circ\text{C}, \pm V_{CC} = \pm 15 \text{ V}, V_{CM} = 0 \text{ V}$									
Test	Device 01				Device 02				Unit
	End-point limit		Delta		End point limit		Delta		
	Min	Max	Min	Max	Min	Max	Min	Max	
V_{IO}	-100	+100	-75	75	-175	+175	-100	100	μV
$\pm I_{IB}$	-3	+3	-1	1	-4.5	+4.5	1.5	1.5	nA

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.

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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 M38510/13501BXX and M38510/13502BXX.

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

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) 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
8203601GX <u>2/</u>	06665 07933 64155 54186	OP07AJ OP-07AT/883B OP-07AH/883 MPOPO7AJ/883	M38510/13501BGX
8203601PX <u>2/</u>	06665 07933 64155 54186	OP07AZ OP-07ADE/883B OP-07AJ8/883 MPOPO7AZ/883	M38510/13501BPX
82036012X	06665 54186	OP07ARC MPOPO7AL/883	M38510/13501B2X
8203602GX <u>2/</u>	06665 07933 64155 54186	OP07J OP-07T/883B OP-07H/883 MPOPO7J/883	M38510/13502BGX
8203602PX <u>2/</u>	06665 07933 64155 54186	OP07Z OP-07DE/883B OP-07J8/883 MPOPO7Z/883	M38510/13502BPX
82036022X	06665 54186	OP07RC MPOPO7L/883	M38510/13502B2X

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

2/ Inactive for new design, use QPL-M38510 product.

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Vendor CAGE
number

Vendor name
and address

06665

Precision Monolithic Incorporated
1500 Space Park Drive
Santa Clara, CA 95050

07933

Raytheon Company
Semiconductor Division
350 Ellis Street
P.O. Box 7016
Mountain View, CA 94036-7016

64155

Linear Technology Corporation
1630 McCarthy Boulevard
Milptas, CA 95035-7487

54186

Micro Power Systems
3100 Alfred Street
Santa Clara, CA 95054

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