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Defense Electronics Supply Center
Dayton, Ohio

Original date of drawing: 15 September 1987

AMSC N/A

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SIZE: A

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REV

MILITARY DRAWING

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TITLE: MICROCIRCUIT, LINEAR, DUAL MATCHED HI-PERFORMANCE OP AMPS, MONOLITHIC SILICON

DWG NO. 5962-87714

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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:

5962-87714	01	G	X
Drawing number	Device type (1.2.1)	Case outline (1.2.2)	Lead finish per MIL-M-38510

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

Device type	Generic number	Circuit function
01	OP14A	Dual matched high performance operational amplifiers
02	OP14B	Dual matched high performance operational amplifiers

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
G	A-1 (8-lead can) TO-5/TO-99, B
P	D-4 (8-lead 1/4" x 3/8"), dual-in-line package DIP B

1.3 Absolute maximum ratings.

Supply voltage	±22 V
Power dissipation (P_D)	500 mW
Differential input voltage	±30 V
Input voltage	Supply voltage
Output short-circuit duration	Indefinite
Storage temperature range	-65°C to +150°C
Lead temperature range (soldering, 60 seconds)	+300°C
Junction temperature (T_J)	-65°C to +150°C

1.4 Recommended operating conditions.

Supply voltage (V_{CC})	±15 V
Ambient operating temperature range	-55°C to +125°C

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 recommended 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.

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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified $V_S = \pm 15$ V	Device type	Group A subgroups	Limits Min	Limits Max	Unit
Input offset voltage	V_{OS}	$R_S \le 20$ kΩ	01	1	-0.75	0.75	mV
				2,3	-1.5	1.5	
Input offset current	I_{OS}			1	-5	5	nA
				2,3	-10	10	
Input bias current	I_B			1	-50	50	nA
				2,3	-60	60	
Input voltage range	IVR	1/		1	±10		V
				2,3	±10		
Common mode rejection ratio	CMRR	V_{CM} = IVR = ±10 V, $R_S \le 20$ kΩ		1	85		dB
				2,3	80		
Power supply rejection ratio	PSRR	$R_S \le 20$ kΩ, V_S = 15 V to ±20 V		1		60	uV/V
				2,3		60	
Output voltage swing	V_O	$R_L \ge 2$ kΩ		4	±12		V
				5,6	±12		
Large signal voltage gain	A_{VO}	$R_L \ge 2$ kΩ V_O = ±10 V		4	100		V/mV
				5,6	50		
Power supply current	I_{SY}	No load each amplifier, T_A = +25°C		1		3	mA
Power dissipation	P_D	No load each amplifier, T_A = +25°C		1		90	mW
Channel separation	CS			7	100		dB
Output short circuit current	I_{SC^-}			1	-60		mA
	I_{SC^+}			2,3		60	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified $V_S = \pm 15$ V	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Input resistance differential mode	R_{IN}	2/	01	1	2.0		MΩ
Rise time	t_r	$A_{VCL} = +1$, $V_{IN} = 50$ mV $R_L \ge 2$ kΩ, $R_S = 50Ω$, $C_L = 50$ pF		9		350	ns
Overshoot	OS	$A_{VCL} = +1$, $V_{IN} = 50$ mV $R_L \ge 2$ kΩ, $R_S = 50Ω$, $C_L = 50$ pF		9		10	%
Slew rate	SR	$R_L \ge 2$ kΩ, $R_S = 50$ kΩ $C_L = 100$ pF		7	0.25		V/μs
Bandwidth	BW	$A_{VCL} = +1$ 3/		7	1		MHz
Large signal bandwidth	LSBW	$V_O = 20\ V_{p-p}$ 4/		7	4		kHz
Input offset voltage match	Delta V_{OS}			1	-1	1	mV
				2,3	-1.5	1.5	
Common mode rejection ratio match	Delta CMRR	$V_{CM} = \pm 10$ V, $R_S \le 100Ω$		1	94		dB
				2,3	90		

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified $V_S = \pm 15$ V	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Input offset voltage	V_{OS}	$R_S \le 20$ kΩ	02	1	-5	5	mV
				2,3	-6	6	
Input offset current	I_{OS}			1	-25	25	nA
				2,3	-50	50	
Input bias current	I_B			1	-100	100	nA
				2,3	-200	200	
Input voltage range	IVR	1/		1	±10		V
				2,3	±10		
Common mode rejection ratio	CMRR	V_{CM} = IVR = ±10 V $R_S \le 20$ kΩ		1	70		dB
				2,3	70		
Power supply rejection ratio	PSRR	$R_S \le 20$ kΩ V_S = 15 V to ±20 V		1		150	uV/V
				2,3		150	
Output voltage swing	V_O	$R_L \ge 2$ kΩ		4	±12		V
				5,6	±10		
Large signal voltage gain	A_{VO}	$R_L \ge 2$ kΩ V_O = ±10 V		4	50		V/mV
				5,6	25		
Power supply current	I_{SY}	No load each amplifier T_A = +25°C		1		3	mA
Power dissipation	P_D	No load each amplifier T_A = +25°C		1		90	mW
Channel separation	CS			7	80		dB
Output short circuit current	I_{SC^-}			1	-60		mA
	I_{SC^+}			2,3		60	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified $V_S = \pm 15$ V	Device type	Group A subgroups	Limits		Unit
					Min	Max	
Input resistance differential mode	R_{IN}	2/	02	1	1.0		MΩ
Rise time	t_r	A_{VCL} = +1, V_{IN} = 50 mV $R_L \ge 2$ kΩ, R_S = 50Ω, C_L = 50 pF		9		350	ns
Overshoot	OS	A_{VCL} = +1, V_{IN} = 50 mV $R_L \ge 2$ kΩ, R_S = 50Ω, C_L = 50 pF		9		10	%
Slew rate	SR	$R_L \ge$ = 2 kΩ, R_S = 50 kΩ C_L = 100 pF		7	0.25		V/μs
Bandwidth	BW	A_{VCL} = +1 3/		7	1		MHz
Large signal bandwidth	LSBW	V_O = 20 V_{p-p} 4/		7	4		kHz
Input offset voltage match	Delta V_{OS}			1	-1	1	mV
				2,3	-1.5	1.5	
Common mode rejection ratio match	Delta CMRR	V_{CM} = ±10 V, $R_S \le 100Ω$		1	94		dB
				2,3	90		

1/ IVR is guaranteed by CMRR test.

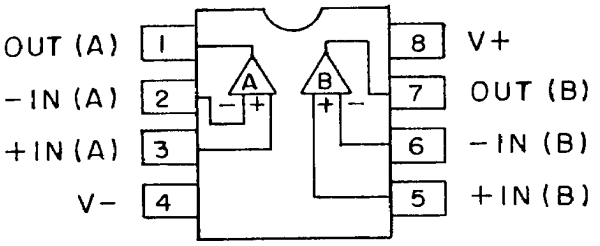
2/ R_{IN} is guaranteed by I_B test. $R_{IN} = 4KT/qI_B$ where KT/q = .026 V at +25°C.

3/ Bandwidth is guaranteed by t_r test. $BW = .35/t_r$.

4/ Large signal bandwidth is guaranteed by SR test. $LSBW = SR/2/(V_{peak})$.

Device types 01 and 02

Case P



Case G

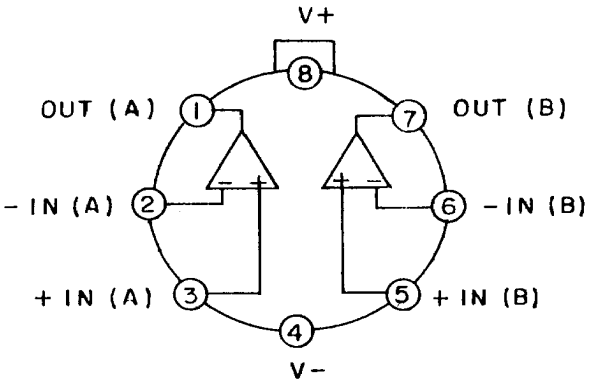


FIGURE 1. Terminal connections and logic diagrams.

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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°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 8, 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 (method 1005 of MIL-STD-883) conditions:

(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 appendix B of MIL-M-38510 and 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, 7,9
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 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 1/
5962-8771401GX	06665	OP14AZ/883
5962-8771401PX	06665	OP14AJ/883
5962-8771402GX	06665	OP14BZ/883
5962-8771402PX	06665	OP14BJ/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