REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

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

PMIC N/A

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DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

STANDARDIZED MILITARY DRAWING

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

AMSC N/A

DRAWING APPROVAL DATE
91-08-16

REVISION LEVEL

MICROCIRCUIT, LINEAR, HIGH SPEED, PRECISION, JFET, OPERATIONAL AMPLIFIER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-89976

SHEET 1

DESC FORM 193
SEP 87

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

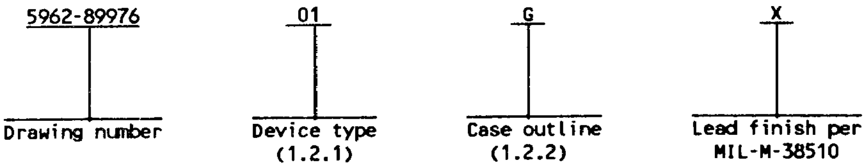
DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

5962-E203

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 or Identifying Number (PIN). The complete PIN shall be as shown in the following example:



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

Device type	Generic number	Circuit function
01	LT1055A	High speed precision JFET operational amplifier
02	LT1056A	High speed precision JFET operational amplifier
03	LT1055	High speed precision JFET operational amplifier
04	LT1056	High speed precision JFET operational amplifier

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

Outline letter	Case outline
G	A-1 (8-lead, .370" x .185"), can

1.3 Absolute maximum ratings.

Supply voltage (V_S) - - - - - - - - - - - - - - - - ±20 V dc
Differential input voltage (V_{ID}) - - - - - - - - - - ±40 V dc
Input voltage (V_{IN}) - - - - - - - - - - - - - - - - ±20 V dc
Output short circuit duration - - - - - - - - - - - Indefinite
Power dissipation (P_D) - - - - - - - - - - - - - - 500 mW
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}) - - 150°C/W
Junction temperature (T_J) - - - - - - - - - - - - +150°C

1.4 Recommended operating conditions.

Supply voltage (V_S) - - - - - - - - - - - - - - - - ±15 V dc
Operating ambient temperature range (T_A) - - - - - -55°C to +125°C
Common mode voltage (V_{CM}) - - - - - - - - - - - - - 0 V

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 Drawings (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 Case outline(s). The case outline(s) shall be in accordance with 1.2.2 herein.

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

3.3 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in table I and shall 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ $V_S = \pm 15$ V, $V_{CM} = 0$ V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input voltage range	V_{IN}	1/	1,2,3	All	-11.0	11.0	V
Input offset voltage	V_{IO}	2/	4	01	-150	150	µV
			2,3		-500	500	
			4	02	-180	180	
			2,3		-550	550	
			4	03	-400	400	
			2,3		-1200	1200	
			4	04	-450	450	
			2,3		-1250	1250	
Average temperature coefficient of input offset voltage	$\frac{\Delta V_{IO}}{\Delta T}$	3/ 4/	2,3	01,02	-4.0	4.0	µV/°C
				03,04	-8.0	8.0	
Input offset current	I_{IO}	2/	1	01	-10	10	pA
			2		-1.2	1.2	nA
			1	02	-10	10	pA
			2		-1.5	1.5	nA
			1	03	-20	20	pA
			2		-1.8	1.8	nA
			1	04	-20	20	pA
			2		-2.4	2.4	nA
Input bias current	I_{IB}	2/	1	01	-50	50	pA
			2		-2.5	2.5	nA
			1	02	-50	50	pA
			2		-3.0	3.0	nA

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_S = ±15 V, V_{CM} = 0 V unless otherwise specified	Group A subgroups	Device type	Limits Min	Limits Max	Unit
Input bias current (Continued)	I_{IB}	2/	1	03	-50	50	pA
			2		-4.0	4.0	nA
			1	04	-50	50	pA
			2		-5.0	5.0	nA
		V_{CM} = +10 V	1	01,02		100	pA
				03,04		150	
Common mode rejection ratio	CMRR	V_{CM} = ±11 V	1	01,02	86		dB
		V_{CM} = ±10.5 V	2,3		85		
		V_{CM} = ±11 V	1	03,04	83		
		V_{CM} = ±10.5 V	2,3		82		
Power supply rejection ratio	PSRR	V_S = ±10 V to ±18 V	1	01,02	90		dB
		V_S = ±10 V to ±17 V	2,3		88		
		V_S = ±10 V to ±18 V	1	03,04	88		
		V_S = ±10 V to ±17 V	2,3		86		
Supply current	I_S		1	01		4.0	mA
			2,3			14.0	
			1	02		6.5	
			2,3			14.0	
			1	03		4.0	
			2,3			14.0	
			1	04		7.0	
			2,3			14.0	

See footnotes at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ $V_S = \pm15$ V, $V_{CM} = 0$ V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Large signal 5/ voltage gain	A_{VOL}	$R_L = 2$ kΩ, $V_O = \pm10$ V	4	01	150		V/mV
		$R_L = 1$ kΩ, $V_O = \pm10$ V			130		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	5,6		40		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	4	02	150		
		$R_L = 1$ kΩ, $V_O = \pm10$ V			130		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	5,6		40		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	4	03	120		
		$R_L = 1$ kΩ, $V_O = \pm10$ V			100		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	5,6		35		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	4	04	120		
		$R_L = 1$ kΩ, $V_O = \pm10$ V			100		
		$R_L = 2$ kΩ, $V_O = \pm10$ V	5,6		35		
Output voltage swing	V_{OUT}	$R_L = 2$ kΩ	4,5,6	All	-12	12	V
Input noise current density 3/ 5/ 6/	I_N	$f_O = 10$ Hz	7	All		4.0	fA/√Hz
		$f_O = 1$ kHz				4.0	

See footnotes at end of table.

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		REVISION LEVEL	**SHEET** 6

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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, $V_{CM} = 0$ V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input noise voltage density 3/ 7/	E_N	f_O = 10 Hz	7	01,02		50	nV/√Hz
		f_O = 1 kΩ				20	
		f_O = 10 Hz		03,04		60	
		f_O = 1 kΩ				22	
Slew rate 3/	SR	R_L = 2 kΩ minimum, C_L = 100 pF, A_V = +5, V_{IN} = ±2 V, measured at -7 V and +7 V	7,8b	01	10.0		V/µs
			8a		5.0		
			7,8b	02	12.0		
			8a		6.0		
			7,8b	03	7.5		
			8a		3.5		
			7,8b	04	9.0		
			8a		4.0		

1/ Input voltage range is guaranteed by CMRR testing.

2/ Offset voltage is measured under two different conditions. The first, approximately 0.5 seconds after application of power. The second, at T_A = +25°C only, with the chip heated to approximately 38°C for devices 01 and 03, and 45°C for devices 02 and 04, to account for chip temperature rise when the device is fully warmed up. I_{IO} and I_{IB} are measured fully warmed up also.

3/ If not tested, shall be guaranteed to the limits specified in table I herein.

4/ f_O symbolizes output frequency and V_O symbolizes output voltage.

5/ Offset voltage drift with temperature is practically unchanged when the offset voltage is trimmed to zero with a 100 kΩ potentiometer between the balance terminals and the wiper tied to V_{S+}.

6/ Current noise is calculated using the formula: $I_N = (2 \times q \times I_{IB}) \times 1/2$ where $q = 1.6 \times 10^{-19}$ coulomb. The noise of source resistors up to 1 GΩ swamps the contribution of current noise.

7/ Input noise voltage density at f_O = 10Hz is sample tested on every lot to an LTPD of 15.

Device types	01, 02, 03, and 04
Case outline	G
Terminal number	Terminal symbol
1	BALANCE
2	INPUT-
3	INPUT+
4	V_{S-}
5	BALANCE
6	OUT
7	V_{S+}
8	NC

NC = No connection

FIGURE 1. Terminal connections.

3.5 Marking. Marking shall be in accordance with MIL-STD-883 (see 3.1 herein). The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked as listed in MIL-BUL-103 (see 6.6 herein).

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.

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 C 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 9, 10, and 11 in table I, method 5005 of MIL-STD-883 shall be omitted.

TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (per method 5005, table I)
Interim electrical parameters (method 5004)	---
Final electrical test parameters (method 5004)	1*, 2, 3, 4, 5, 6, 7
Group A test requirements (method 5005)	1, 2, 3, 4, 5, 6, 7, 8a, 8b
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.

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 C 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.

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.

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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) 296-5375.

6.6 Approved sources of supply. Approved sources of supply are listed in MIL-BUL-103. The vendors listed in MIL-BUL-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DESC-ECS.