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

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

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
17 MAY 1990

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, LINEAR, CURRENT FEEDBACK AMPLIFIER, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-89620

SHEET 1

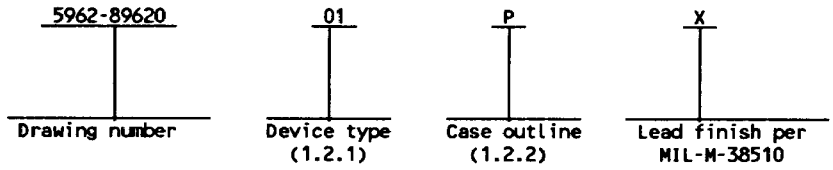
DESC FORM 193
SEP 87

* 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	EL2020	Current feedback 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
P	D-4 (8-lead, .405" x .310" x .200"), dual-in-line package
2	C-2 (20-lead, .358" x .358" x .100"), square chip carrier package

1.3 Absolute maximum ratings.

Supply voltage (±V)	±18 V or 36 V
Input voltage (V_{IN})	±15 V or V_S
Differential input voltage	±10 V
Input current (I_{IN}) (-INPUT or +INPUT pins)	±10 mA
Input current (I_{IN}) (BALANCE or DISABLE pins)	±5 mA
Maximum power dissipation (P_D)	1.25 W
Peak output current (I_{OP})	Short circuit protected
Output short circuit duration (I_{OS}) 1/	Continuous
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 5 seconds)	+300°C
Junction temperature (T_J)	+175°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-M-38510, appendix C
Thermal resistance, junction-to-ambient (θ_{JA})	
Case P	125°C/W
Case 2	100°C/W

1.4 Recommended operating conditions.

Positive supply voltage (+V)	+15 V
Negative supply voltage (-V)	-15 V
Ambient operating temperature range (T_A)	-55°C to +125°C

1/ A heat sink is required to keep the junction temperature below the absolute maximum when the output is short circuited.

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 Terminal connections. The terminal connections 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 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.

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 Min	Limits Max	Unit
Open loop characteristics						
Input offset voltage 2/	V_{OS}	V_{CM} = 0 V	1	-10	+10	mV
			2,3	-15	+15	
Common mode rejection ratio	CMRR	V_{CM} = ±10 V	1,2,3	50		dB
Power supply rejection ratio	PSRR	±4.5 V ≤ V_S ≤ ±18 V	1	65		
			2,3	60		
Positive input resistance	$+R_{IN}$		1,2,3	1		MΩ
Positive input current	$+I_{IN}$	V_{CM} = 0 V	1,2	-15	+15	µA
			3	-25	+25	
Negative input current 2/	$-I_{IN}$		1,2	-40	+40	
			3	-50	+50	
Positive input current power supply rejection ratio	+IPSRR	±4.5 V ≤ V_S ≤ ±18 V	1,2		0.5	µA/V
			3		1.0	
Negative input current power supply rejection ratio	-IPSRR	±4.5 V ≤ V_S ≤ ±18 V	1,2		0.5	
			3		1.0	
Negative input current common mode rejection ratio	-ICMRR	V_{CM} = ±10 V	1,2		2.0	
			3		4.0	

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 Min	Limits Max	Unit
Open loop characteristics						
Trans-impedence 3/	R_{OL}	$R_L = 400\Omega$, $V_{OUT} = \pm 10$ V	4,5	300		V/mA
			6	50		
Open loop dc voltage gain	A_{VOL1}	$R_L = 400\Omega$, $V_{OUT} = \pm 10$ V	4,5	70		dB
			6	60		
	A_{VOL2}	$R_L = 100\Omega$, $V_{OUT} = \pm 2.5$ V	4,5	60		
			6	55		
Output voltage swing	V_O	$R_L = 400\Omega$	4,5	±12		V
			6	±11		
Output current	I_{OUT}	$R_L = 400\Omega$	4,5	±30		mA
			6	±27.5		
Quiescent supply current	I_S		1		12	
			2,3		15	
Supply current, disabled	$I_{S\ off}$	$\overline{\text{DISABLE}}$ voltage = 0 V	1,2,3		7.5	
$\overline{\text{DISABLE}}$ current	I_{logic}	$\overline{\text{DISABLE}}$ voltage = 0 V	1,2,3		1.5	
Minimum $\overline{\text{DISABLE}}$ current to disable	I_d		1,2,3		250	µA
Maximum $\overline{\text{DISABLE}}$ current to enable	I_e		1,2,3		30	

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 Min	Limits Max	Unit
AC closed loop characteristics						
Slew rate	SR1	Closed loop gain of 1 V/V (0 dB), R_L = 400Ω, V_O = ±10 V, R_F = 1 kΩ	7	300		V/μs
			8 5/	250		
Slew rate	SR10	R_L = 400Ω, V_O = ±10 V, R_F = 1 kΩ, R_G = 111Ω, Closed loop gain of 10 V/V (20 dB)	7	300		
			8 5/	250		
Full power bandwidth 4/	FPBW1	R_F = 1 kΩ, T_A = +25°C, Closed loop gain of 1 V/V (0 dB)	7	4.77		MHz
Full power bandwidth 4/	FPBW10	R_F = 1 kΩ, R_G = 111Ω, Closed loop gain of 10 V/V (20 dB), T_A = +25°C	7	4.77		

1/ V_S = ±15 V, R_S = 50Ω, R_L = ∞

2/ The offset voltage and inverting input current can be adjusted with an external 10 kΩ pot between the BALANCE pins with the wiper connected to V+ to make the output offset voltage zero.

3/ Trans-impedence is defined as delta V_{OUT}/delta $(-I_{IN})$

4/ Full power bandwidth is guaranteed based on slew rate measurement. $FPBW = SR/2\pi V_{peak}$

5/ Guaranteed if not tested to the limits specified.

Device type	01	
Case outlines	P	2
Terminal number	Terminal symbol	
1	BALANCE	NC
2	-INPUT	BALANCE
3	+INPUT	NC
4	V-	NC
5	BALANCE	NC
6	OUTPUT	-INPUT
7	$\overline{\text{V+}}$	NC
8	DISABLE	+INPUT
9	---	V-
10	---	NC
11	---	NC
12	---	BALANCE
13	---	NC
14	---	OUTPUT
15	---	NC
16	---	V+
17	---	NC
18	---	NC
19	---	$\overline{\text{NC}}$
20	---	DISABLE

FIGURE 1. Terminal connections.

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 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 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)	----
Final electrical test parameters (method 5004)	1*,2,3,4,7
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.
**Subgroup 8 is guaranteed if not tested.

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 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 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 of supply 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 similar part number 1/
5962-8962001PX	64762	EL2020J/883B
5962-89620012X	64762	EL2020L/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
64762	Elantec, Incorporated 1996 Tarob Ct. Milpitas, CA 95035