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																

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
07 DECEMBER 1990

REVISION LEVEL

DEFENSE ELECTRONICS SUPPLY CENTER
DAYTON, OHIO 45444

MICROCIRCUIT, LINEAR, PRECISION VOLTAGE REFERENCE, MONOLITHIC SILICON

SIZE	CAGE CODE	
A	67268	5962-90595

SHEET 1

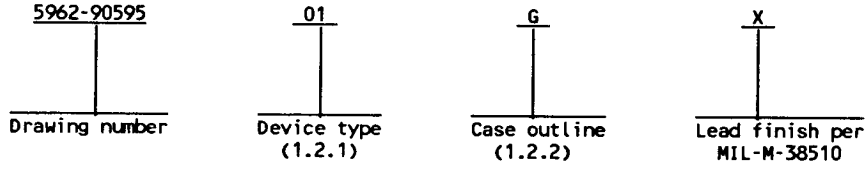
DESC FORM 193
SEP 87

* 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 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	LT1019A-10	10 V precision reference
02	LT1019A-5	5 V precision reference
03	LT1019A-4.5	4.5 V precision reference
04	LT1019A-2.5	2.5 V precision reference
05	LT1019-10	10 V precision reference
06	LT1019-5	5 V precision reference
07	LT1019-4.5	4.5 V precision reference
08	LT1019-2.5	2.5 V precision reference

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 package

1.3 Absolute maximum ratings.

Input voltage (V_{IN})	40 V dc
Output voltage (V_{OUT}) ($V_{IN} \geq V_{OUT}$)	16 V dc
Output short circuit duration (I_{OS}):	
$V_{IN} \geq 20$ V	Indefinite
$20 V \leq V_{IN} \leq 35$ V	10 seconds
Trim pin voltage	±30 V dc
Temperature pin voltage	5 V dc
Heater voltage:	
(Continuous)	18 V dc
(Intermittent, 30 seconds)	32 V dc
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

1.4 Recommended operating conditions.

Differential voltage (V_{DIFF}) ($V_{IN} - V_{OUT}$)	5 V dc
Load current (I_L)	5 mA
Ambient operating temperature range (T_A)	-55°C to +125°C

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.

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).

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output voltage tolerance		T_A = +25°C	1	01-04		0.05	%
				05-08		0.20	
Output voltage temperature coefficient	T_C	1/	2,3	01-04		10	ppm/°C
				05-08		25	
Line regulation	VR_{LN}	V_{OUT} = +1.5 V to +40 V 2/	1	All		3	ppm/V
			2,3			5	
Load regulation, series	VR_{LD1}	I_L = 0 mA to 10 mA 2/ 3/	1	All		0.05	mV/mA
			2,3			0.08	
Load regulation, shunt	VR_{LD2}	I_L = 1 mA to 10 mA 2/ 3/	1,2,3	All		0.80	mV/mA
Thermal regulation		Delta P_D = 200 mW, 4/ T_A = +25°C, t = 50 ms	1	All		0.50	ppm/mW
Quiescent current, series mode	I_{CC}		1	01-04		1.0	mA
			2,3			1.3	
			1	05-08		1.2	
			2,3			1.5	
Minimum shunt current		5/	1,2,3	All		0.8	mA
Minimum input-output voltage differential	V_{DIFF}	$I_{OUT} \le 1$ mA 6/	1,2,3	All		1.1	V
		I_{OUT} = 10 mA				1.3	
Trim range		T_A = +25°C	1	All	±4.0		%
Heater resistance	R_{HT}	T_A = +25°C	1	All	300	500	Ω

See footnotes at end of table.

* U.S. GOVERNMENT PRINTING OFFICE 1988—550-547

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Short circuit current (output connected to GND)	I_{OS}	V_{IN} = 2 V to 35 V	1	All	15		mA
			2,3		10		
Output voltage noise	N_O	f = 10 Hz to 10 kHz, 7/ T_A = +25°C	4	All		4	ppm(rms)

1/ Output voltage drift is measured using the box method: Output voltage is recorded at T_{MIN}, +25°C, and T_{MAX}. The lowest of these three readings is subtracted from the highest and the resultant difference is divided by $(T_{MAX} - T_{MIN})$.

2/ Line regulation and load regulation are measured on a pulsed-basis using low duty cycle. Effects due to die heating must be taken into account separately; refer to the thermal regulation test.

3/ Load regulation is measured at a point 0.125 inch below the base of the package and is Kelvin-contacted.

4/ Thermal regulation is caused by die temperature gradients created by load current or input voltage changes. The result of this effect must be taken into account when computing both line and load regulation performance.

5/ Minimum shunt current is measured with shunt voltage held 20 mV below the value measured at 1 mA shunt current.

6/ Minimum input-output voltage differential is measured by forcing the input voltage 0.5 V above the nominal output voltage while measuring V_{IN} to V_{OUT}.

7/ RMS noise is measured with a single high-pass filter at 10 Hz and a 2-pole low-pass filter at 1 kHz. The resulting output is full-wave rectified and then integrated for a fixed period, making the final reading an averaged value; not rms. To obtain the rms value, a correction factor of 1.1 is used to convert from average to rms, and a second factor of 0.88 is used to compensate for the non-ideal behavior of the filters. 0.1 Hz to 10 Hz peak-to-peak noise is usually 2.5 ppm.

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.

Device types	01, 02, 03, 04, 05, 06, 07, 08
Case outline	G
Terminal number	Terminal symbol
1	NC (see note)
2	INPUT
3	TEMP
4	GND
5	TRIM
6	OUTPUT
7	HEATER
8	NC (see note)

NC = No connection

NOTE: Internally connected. Do not connect externally.

FIGURE 1. Terminal connections.

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 5, 6, 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 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.

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
Group A test requirements (method 5005)	1, 2, 3, 4
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 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.