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															

PMIC N/A	PREPARED BY	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444	
STANDARDIZED MILITARY DRAWING	CHECKED BY	MICROCIRCUIT, LINEAR, PRECISION, 10 VOLT, VOLTAGE REFERENCE, MONOLITHIC SILICON	
THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	APPROVED BY	SIZE: A	CAGE CODE: 67268
AMSC N/A	DRAWING APPROVAL DATE: 31 MARCH 1988		5962-88600
	REVISION LEVEL	SHEET 1 OF 9	

DESC FORM 193
SEP 87

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

5962-E843

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

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:

5962-88600	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 type. The device type shall identify the circuit function as follows:

Device type	Generic number	Circuit function	ΔV_{OUT}(V)	$\Delta V_{OUT}/\Delta T$(ppm/°C)
01	LT1021BM-10	10 V voltage reference	±.05 V	5.0
02	LT1021CM-10	10 V voltage reference	±.005 V	20
03	LT1021DM-10	10 V voltage reference	±.05 V	20

1.2.2 Case outline. The case outline 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	40 V dc
Input-output voltage differential	35 V dc
Output to ground voltage 1/	16 V dc
Trim pin to ground voltage:	
Positive	Equal to V_{OUT}
Negative	-20 V dc
Output short-circuit duration:	
at V_{IN} = 35 V	10 seconds
at $V_{IN} \leq$ 20 V	Indefinite
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Power dissipation (P_D)	500 mW
Thermal resistance, junction-to-case (θ_{JC}):	
Case G	See MIL-M-38510, appendix C
Junction temperature	+175°C

1.4 Recommended operating conditions.

Ambient operating temperature range (T_A)	-55°C to +125°C

1/ Shunt mode current limit.

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

3.2.2 Case outline. The case outline 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

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.

3.7 Notification of change. Notification of change to DESC-ECS shall be required in accordance with MIL-STD-883 (see 3.1 herein).

☆ U.S. GOVERNMENT PRINTING OFFICE: 1987—549-096

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$, V_{IN} = 15 V, I_{OUT} = 0 mA unless otherwise specified	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Output voltage 1/	V_{OUT}	T_A = +25°C	1	01,03	9.95	10.05	V
				02	9.995	10.005	
Output voltage temperature coefficient 2/	$\frac{\Delta V_{OUT}}{\Delta T}$	T_A = +125°C, -55°C	2,3	01		5.0	ppm/°C
				02,03		20	
Line regulation 3/	V_{RLN}	11.5 V $\le V_{IN} \le$ 14.5 V	1	All		4.0	ppm/V
			2,3	All		6.0	
		14.5 V $\le V_{IN} \le$ 40 V	1	All		2.0	
			2,3	All		4.0	
Load regulation (sourcing mode) 3/	V_{RLD1}	0 mA $\le I_{OUT} \le$ 10 mA	1	All		25	ppm/mA
			2,3	All		40	
Load regulation (shunt mode) 3/ 4/	V_{RLD2}	1.7 mA $\le I_{SHUNT} \le$ 10 mA	1	All		100	
			2,3	All		150	
Supply current (series mode)	I_{CC}		1	All		1.7	mA
			2,3	All		2.0	

See footnotes at end of table.

☆ U.S. GOVERNMENT PRINTING OFFICE 1987 549-096

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C < T_A < +125°C$, V_{IN} = 15 V, I_{OUT} = 0 mA unless otherwise specified	Group A subgroups	Device types	Limits Min	Limits Max	Unit
Minimum current (shunt mode)	I_{MIN}	V_{IN} = Open	1	All		1.5	mA
			2,3	All		1.7	
Output voltage noise 5/	N_O	10 Hz $\leq f_O \leq$ 1.0 kHz, T_A = +25°C	4	All		6.0	µV rms
Long term stability of output voltage 6/	$\Delta V_{OUT}/\Delta T$	t = 1000 hrs, T_A = +25°C	4	All		60	ppm

1/ Output voltage is measured immediately after turn-on. Changes due to chip warm-up are typically less than 0.005 percent.

2/ Temperature coefficient is measured by dividing the change in output voltage over the temperature range by the change in temperature. Separate tests are done for hot and cold; -55°C to +25°C, and +25°C to +125°C. Incremental slope is also measured at +25°C.

3/ Line and load regulation are measured on a pulse basis. Output changes due to die temperature change must be taken into account separately. Package thermal resistance is 150°C/W.

4/ Shunt mode regulation is measured with the input open. With the input connected, shunt mode current can be reduced to 0 mA. Load regulation will remain the same.

5/ The 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 average as opposed to rms, and a second correction of 0.88 is used to correct for the non-ideal bandpass of the filters.

6/ Guaranteed if not tested.

Device types 01 through 03

Package G

Pin number	Description
1	No connection 1/
2	Input voltage
4	No connection 1/
5	Ground
6	Trim
7	No connection 1/
8	No connection 1/

1/ These pins are connected internally. Do not connect external circuitry to these pins.

FIGURE 1. Terminal connections.

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 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 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 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 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/
5962-8860001GX	64155	LT1021BMH-10/883B
5962-8860002GX	64155	LT1021CMH-10/883B
5962-8860003GX	64155	LT1021DMH-10/883B

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

Vendor CAGE number	Vendor name and address
64155	Linear Technology Corp. 1630 McCarthy Blvd. Milpitas, CA 95035-7487