

REVISIONS																			
LTR	DESCRIPTION										DATE (YR-MO-DA)					APPROVED			
A	Add one vendor, CAGE 06665. Make changes to table I and throughout the drawing. Remove one vendor, CAGE 34333.										90-02-01					M. A. FRYE			
B	Add device type 02. Add case outlines G and P. Table I changes. Add one vendor, CAGE 64155. Editorial changes throughout.										94-08-09					M. A. FRYE			
C	Make change to V _{OL1} test as specified in table I. - ro										99-06-10					R. MONNIN			
THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.																			
REV																			
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REV STATUS					REV		C	C	C	C	C	C	C	C	C	C			
OF SHEETS					SHEET		1	2	3	4	5	6	7	8	9	10			
PMIC N/A					PREPARED BY RICK C. OFFICER					DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216									
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A					CHECKED BY CHARLES E. BESORE														
					APPROVED BY MICHAEL A. FRYE					MICROCIRCUIT, LINEAR, PRECISION VOLTAGE COMPARATOR / BUFFER, MONOLITHIC SILICON									
					DRAWING APPROVAL DATE 87-07-15														
					REVISION LEVEL C					SIZE A		CAGE CODE 67268			5962-86877				
SHEET										1 OF 10									

1. SCOPE

1.1 Scope. This drawing describes device requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A.

1.2 Part or Identifying Number (PIN). The complete PIN is as shown in the following example:

<u>5962-86877</u>	<u>01</u>	<u>G</u>	<u>X</u>
*	*	*	*
*	*	*	*
*	*	*	*
*	*	*	*
Drawing number	Device type (see 1.2.1)	Case outline (see 1.2.2)	Lead finish (see 1.2.3)

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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	PM111, LM111	Precision voltage comparator / buffer
02	LT111A	Precision voltage comparator / buffer

1.2.2 Case outline(s). The case outline(s) are as designated in MIL-STD-1835 and as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
G	MACY1-X8	8	Can
P	GDIP1-T8 or CDIP2-T8	8	Dual-in-line
2	CQCC1-N20	20	Square leadless chip carrier

1.2.3 Lead finish. The lead finish is as specified in MIL-PRF-38535, appendix A.

1.3 Absolute maximum ratings.

Ground to negative supply voltage.....	-30.0 V
Total supply voltage (V+ to V-).....	±36.0 V
Output to negative supply voltage.....	-50.0 V
Input voltage.....	±15 V <u>1/</u>
Differential input voltage.....	±30.0 V
Output sink current.....	50 mA
Output short circuit duration.....	10 seconds
Maximum strobe current.....	10 mA
Power dissipation (P _D).....	500 mW
Thermal resistance, junction-to-case (θ _{JC}).....	See MIL-STD-1835
Storage temperature range.....	-65°C to +150°C
Junction temperature (T _J).....	+175°C <u>2/</u>
Lead temperature (soldering, 60 seconds).....	+300°C

1/ Rating applies to V_S = ±15 V. The positive input voltage limit is 30 V above the negative supply. The negative input voltage limit is equal to the negative supply voltage or 30 V below the positive supply, whichever is less negative.

2/ For short term test (in the specific burn-in and life test configuration when required and up to 138 hours maximum)
T_J = +275°C.

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1.4 Recommended operating conditions.

Supply voltage (V_S) ± 15 V
Ambient operating temperature range (T_A) -55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbooks. The following specification, standards, and handbooks form a part of this drawing to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-38535 - Integrated Circuits, Manufacturing, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-973 - Configuration Management.
MIL-STD-1835 - Interface Standard For Microcircuit Case Outlines.

HANDBOOKS

DEPARTMENT OF DEFENSE

MIL-HDBK-103 - List of Standard Microcircuit Drawings (SMD's).
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

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 takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified herein. Product built to this drawing that is produced by a Qualified Manufacturer Listing (QML) certified and qualified manufacturer or a manufacturer who has been granted transitional certification to MIL-PRF-38535 may be processed as QML product in accordance with the manufacturers approved program plan and qualifying activity approval in accordance with MIL-PRF-38535. This QML flow as documented in the Quality Management (QM) plan may make modifications to the requirements herein. These modifications shall not affect form, fit, or function of the device. These modifications shall not affect the PIN as described herein. A "Q" or "QML" certification mark in accordance with MIL-PRF-38535 is required to identify when the QML flow option is used.

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3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535, appendix A 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-PRF-38535, appendix A. 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-HDBK-103 (see 6.6 herein). For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device.

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-HDBK-103 (see 6.6 herein). The certificate of compliance submitted to DSCC-VA prior to listing as an approved source of supply shall affirm that the manufacturer's product meets the requirements of MIL-PRF-38535, appendix A and the requirements herein.

3.7 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38535, appendix A shall be provided with each lot of microcircuits delivered to this drawing.

3.8 Notification of change. Notification of change to DSCC-VA shall be required in accordance with MIL-PRF-38535, appendix A.

3.9 Verification and review. DSCC, DSCC'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 MIL-PRF-38535, appendix A.

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. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1015 of MIL-STD-883.

(2) $T_A = +125^{\circ}\text{C}$, 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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input offset voltage	V _{IO}	R _S = 50 Ω, V _{IC} = 0 V, 13 V, and -14.5 V	1	01		±3.0	mV
			2,3			±4.0	
			1	02		±1.0	
			2,3			±2.0	
		R _S = 50 Ω, V _{IC} = 0 V, V _S = ±2.5 V	1	01		±3.0	
			2,3			±4.0	
			1	02		±1.0	
			2,3			±2.0	
Raised input offset <u>3/</u> voltage	V _{IO(R)}	R _S = 50 Ω, V _{IC} = 0 V, 13 V, and -14.5 V V _{BAL} = V _{BAL/STB} = V+	1	01		±3.0	mV
				02		±1.0	
			2,3	01		±4.5	
				02		±2.5	
Input offset voltage temperature coefficient	ΔV _{IO} / ΔT	R _S = 50 Ω <u>4/</u>	2,3	01,02		±25	μV/°C
Input offset current	I _{IO}	V _{IC} = 0 V, 13 V, and -14.5 V	1,2	01		±10	nA
			3			±20	
			1,2	02		±5	
			3			±10	
Raised input offset <u>3/</u> current	I _{IO(R)}	V _{IC} = 0 V, V _{BAL} = V _{BAL/STB} = V+	1,2	01,02		±25	nA
			3			±50	
Input offset current temperature coefficient	ΔI _{IO} /ΔT	+25°C to +125°C <u>4/</u>	1,2	01,02		±100	pA/°C
		+25°C to -55°C <u>4/</u>	1,3			±200	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input bias current	+I _{IB}	V _{IC} = 0 V	1,2	All	-100	+0.1	nA
			3		-150	+0.1	
		V _{IC} = 13 V and -14.5 V	1,2		-150	+0.1	
			3		-200	+0.1	
	-I _{IB}	V _{IC} = 0 V	1,2	All	-100	+0.1	
			3		-150	+0.1	
		V _{IC} = 13 V and -14.5 V	1,2		-150	+0.1	
			3		-200	+0.1	
Collector output voltage (STROBED)	V _{O(STB)}	R _S = 50 Ω, I _{STB} = -3.0 mA	1,2,3	All	14		V
Common mode rejection	CMR	R _S = 50 Ω, V _{IC} = 13 V and -14.5 V	1,2,3	All	80		dB
Output leakage current	I _{CEX}	V _S = ±18 V, V _{IN} = 5 mV, V _O = 32 V	1	All	-1	10	nA
			2		-1	500	
Input leakage current	I _{I1}	V _S = ±18 V, V _{ID} = -29 V	1,2,3	All	-5	500	nA
	I _{I2}	V _S = ±18 V, V _{ID} = -29 V			-5	500	
Positive supply current	I ₊		1	All		6.0	mA
			2			6.0	
			3			7.0	
Negative supply current	I ₋		1	All		-5.0	mA
			2			-5.0	
			3			-6.0	
Output short circuit current	I _{OS}	10 ms maximum test duration	1	All	0	200	mA
			2		0	150	
			3		0	250	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Adjustment for input offset voltage	V _{IO} (ADJ)+	R _S = 50 Ω, T _A = +25°C	1	All	+5.0		mV
	V _{IO} (ADJ)-				-5.0		
Low level output voltage	V _{OL1}	V ₊ = 4.5 V, V ₋ = 0 V, V _{IC} = 0.71 V, I _O = 8 mA, V _{ID} = -6.0 mV	1,2,3	All	0	0.4	V
	V _{OL2}	V ₊ = 4.5 V, V ₋ = 0 V, V _{IC} = -1.75 V, I _O = 8 mA, V _{ID} = -6.0 mV			0	0.4	
Low level output voltage	V _{OL3}	V _S = ±15 V, V _{ID} = -5.0 mV V _{IC} = 13 V, I _O = 50 mA	1,2,3	All	0	1.5	V
	V _{OL4}	V _S = ±15 V, V _{ID} = -5.0 mV V _{IC} = -14 V, I _O = 50 mA			0	1.5	
Voltage gain (emitter output)	+AVE	R _L = 600 Ω	4	All	10		V/mV
			5,6		8		
Response time, low-to- high, collector output	t _{RLHC}	V _{OD(overdrive)} = -5 mA, C _L = 50 pF(min), V _{IN} = 100 mV	7,8B	All	0	300	ns
			8A		0	640	
Response time, high-to- low collector output	t _{RHLC}	V _{OD(overdrive)} = +5 mA, C _L = 50 pF(min), V _{IN} = 100 mV	7,8B	All	0	300	ns
			8A		0	500	

1/ Unless otherwise specified, V_{IC} = 0 V and V_S = ±15 V.

2/ V_{IC} is achieved by algebraically subtracting the common mode voltage from each V_S (power supplies) and algebraically adding it to V_{IN}. V_{IC} can be calculated by using the following formula:

$$V_{IC} = \frac{-(V_{+}) + (V_{-})}{2} + V_{IN}$$

3/ Subscript (R) indicates tests which are performed with input stage current raised by connecting BAL and BAL/STB terminals to V₊.

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

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Device types	01 and 02	02
Case outlines	2	G and P
Terminal number	Terminal symbol	
1	NC	GROUND
2	EMIT OUT	IN+
3	NC	IN-
4	NC	V-
5	IN+	BALANCE
6	NC	BAL/STRB
7	IN-	OUT
8	NC	V+
9	NC	---
10	V-	---
11	NC	---
12	BALANCE	---
13	NC	---
14	NC	---
15	BAL/STRB	---
16	NC	---
17	COL OUT	---
18	NC	---
19	NC	---
20	V+	---

NC = No connection, no external connection should be made to these pins.

FIGURE 1. Terminal connections.

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TABLE II. Electrical test requirements.

MIL-STD-883 test requirements	Subgroups (in accordance with MIL-STD-883, method 5005, table I)
Interim electrical parameters (method 5004)	1
Final electrical test parameters (method 5004)	1*,2,3,4
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 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. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring activity upon request. The test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1005 of MIL-STD-883.
 - (2) $T_A = +125^{\circ}\text{C}$, 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-PRF-38535, appendix A.

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6. NOTES

6.1 Intended use. Microcircuits conforming to this drawing are intended for use for Government microcircuit applications (original equipment), design applications, and logistics purposes.

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-973 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus when a system application requires configuration control and the applicable SMD. DSCC 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 DSCC-VA, telephone (614) 692-0525.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43216-5000, or telephone (614) 692-0674.

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

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 99-06-10

Approved sources of supply for SMD 5962-86877 are listed below for immediate acquisition information only and shall be added to MIL-HDBK-103 and QML-38535 during the next revision. MIL-HDBK-103 and QML-38535 will be revised to include the addition or deletion of sources. The vendors listed below have agreed to this drawing and a certificate of compliance has been submitted to and accepted by DSCC-VA. This bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535.

Standard microcircuit drawing PIN <u>1</u> /	Vendor CAGE number	Vendor similar PIN <u>2</u> /	Replacement military specification
5962-8687701GA	64155	LM111H/883	M38510/10304BGA
5962-8687701PA	64155	LM111J8/883	M38510/10304BPA
	<u>3</u> /	PM111RC	
5962-86877012A	24355	PM111RCMDA	M38510/10304B2A
5962-8687702GA	64155	LT111AH/883	
5962-8687702PA	64155	LT111AJ8/883	

- 1/ The lead finish shown for each PIN representing a hermetic package is the most readily available from the manufacturer listed for that part. If the desired lead finish is not listed contact the vendor to determine its availability.
- 2/ Caution. Do not use this number for item acquisition. Items acquired to this number may not satisfy the performance requirements of this drawing.
- 3/ Not available from an approved source of supply.

Vendor CAGE
number

24355

Vendor name
and address

Analog Devices
Route 1 Industrial Park
P.O. Box 9106
Norwood, MA 02062
Point of contact: 1500 Space Park Drive
P.O. Box 58020
Santa Clara, CA 95050-8020

64155

Linear Technology
1630 McCarthy Boulevard
Milpitas, CA 95035-7487

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