

REVISIONS																			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED																
C	Add test limits at temperature for $I_{CC+}$ and $I_{CC-}$ . Add vendor CAGE 06665. Add case outline 2. Editorial changes throughout.	90-01-24	M.A. Frye																
D	Changes in accordance with NOR 5962-R156-92.	92-04-03	M.A. Frye																
E	Add case outline "X". Changes to the thermal resistance, junction-to-ambient values. Update boilerplate. Vendor CAGE 06665 is being replaced by 24355. -rrp	97-07-15	R. Monnin																
F	Case outline "X" dimensions L, R, and R1 are updated. -rrp	97-12-11	R. Monnin																
<p>THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.</p> <p>CURRENT CAGE CODE 67268</p>																			
REV																			
SHEET																			
REV																			
SHEET																			
REV STATUS OF SHEETS		REV	F	F	F	F	F	F	F	F	F	F	F						
		SHEET	1	2	3	4	5	6	7	8	9	10							
<b>PMIC N/A</b>  <b>STANDARD MICROCIRCUIT DRAWING</b>  THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE  AMSC N/A		PREPARED BY Rajesh Pithadia				<b>DEFENSE SUPPLY CENTER COLUMBUS</b> <b>COLUMBUS, OHIO 43216</b>													
		CHECKED BY Rajesh Pithadia																	
		APPROVED BY Raymond Monnin				MICROCIRCUIT, LINEAR, DUAL, HIGH SPEED, VOLTAGE COMPARATOR, MONOLITHIC SILICON													
		DRAWING APPROVAL DATE 86-02-06																	
		REVISION LEVEL  F				SIZE <b>A</b>	CAGE CODE <b>14933</b>	<b>86014</b>											
				SHEET		1	OF		10										

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

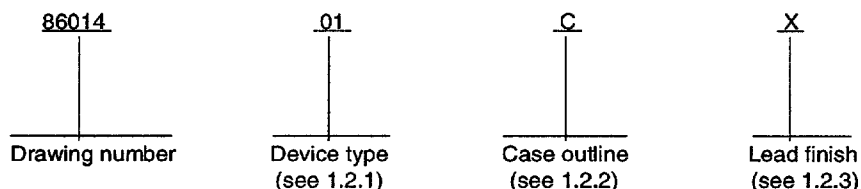
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## 1. SCOPE

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:



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

Device type	Generic number	Circuit function
01	LM119	High speed, dual, voltage comparator
02	LM119A	High speed, dual, voltage comparator

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

Outline letter	Descriptive designator	Terminals	Package style
C	GDIP1-T14 or CDIP2-T14	14	Dual-in-line
D	GDFP1-F14 or CDFP2-F14	14	Flat pack
H	GDFP1-F10 or CDFP2-F10	10	Flat pack
I	MACY1-X10	10	Can
2	CQCC1-N20	20	Square leadless chip carrier
X	See figure 1	10	Flat pack

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

## 1.3 Absolute maximum ratings.

Total supply voltage .....	36 V dc
Output to negative supply voltage .....	36 V dc
Ground to negative supply voltage .....	25 V dc
Ground to positive supply voltage .....	18 V dc
Differential input voltage .....	±5 V dc
Input voltage .....	±15 V dc 1/
Power dissipation .....	500 mW
Output short circuit duration .....	10 seconds
Storage temperature range .....	-65°C to +150°C
Lead temperature (soldering, 10 seconds) .....	+300°C
Junction temperature (T <sub>J</sub> ) .....	+175°C
Thermal resistance, junction-to-case (θ <sub>JC</sub> ) .....	See MIL-STD-1835
Thermal resistance, junction-to-ambient (θ <sub>JA</sub> ):	
Case C .....	94°C/W
Case D .....	150°C/W
Case I .....	162°C/W
Case H and X .....	215°C/W
Case 2 .....	89°C/W

1/ For supply voltages less than ±15 V, the absolute maximum input voltage is equal to the supply voltage.

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#### 1.4 Recommended operating conditions.

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.

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 and figure 1.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 2.

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.

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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).

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.

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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $V_S = \pm 15\text{ V}$ $-55^\circ\text{C} \leq T_A \leq +125^\circ\text{C}$ unless otherwise specified	Group A subgroups	Device Type	Limits		Unit
					Min	Max	
Input offset voltage	$V_{IO}$	$R_S = 5\text{ k}\Omega$	1	01		4	mV
			2, 3			7	
			1	02		1	
			2, 3			2	
Input offset current	$I_{IO}$		1	01		75	nA
			2, 3			100	
			1	02		40	
			2, 3			75	
Input bias current	$I_B$		1	All		500	nA
			2, 3			1000	
Voltage gain	$A_V$	$T_A = +25^\circ\text{C}$	4	01	10		V/mV
				02	20		
Saturation voltage	$V_{SAT}$	$T_A = +25^\circ\text{C}$ , $V_{IN} \leq -5\text{ mV}$ , $I_{OUT} = 25\text{ mA}$	1	All		1.5	V
		$V_+ \geq 4.5\text{ V}$ , $V_- = 0\text{ V}$ , $V_{IN} \leq -6\text{ mV}$ , $I_{SINK} \leq 3.2\text{ mA}$	1, 2			0.4	
			3			0.6	
Output leakage current	$I_O$	$V_{IN} \geq 5\text{ mV}$ , $V_{OUT} = 35\text{ V}$	1	All		2	$\mu\text{A}$
			2, 3			10	
Input voltage range	$V_I$	$V_+ = 5\text{ V}$ , $V_- = 0\text{ V}$	1, 2, 3	All	1	3	V
					-12	+12	
Supply current	$I_{CC+}$	$V_+ = 15\text{ V}$	1	All		11.5	mA
			2, 3			12.5	
	$I_{CC-}$	$V_- = -15\text{ V}$	1			-4.5	
			2, 3			-6.0	
Common mode rejection ratio	CMRR	$T_A = +25^\circ\text{C}$	4	All	80		dB

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DEFENSE SUPPLY CENTER COLUMBUS  
COLUMBUS, OHIO 43216-5000

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5

Case X

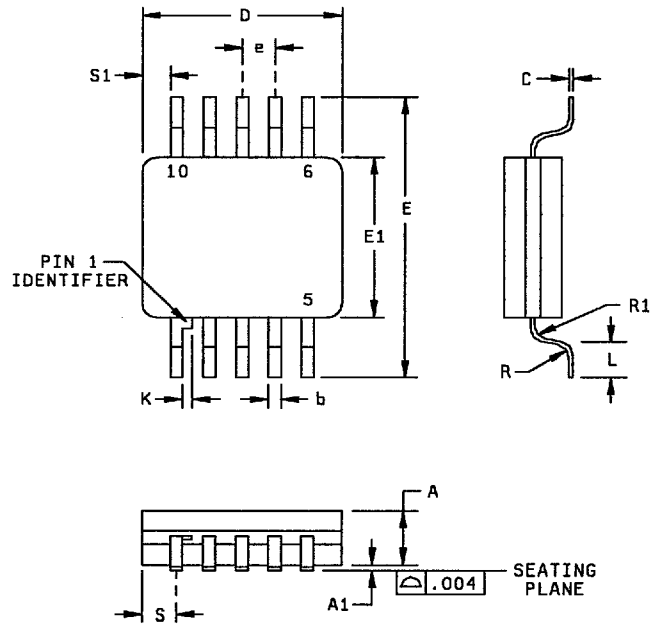


FIGURE 1. Case outline.

<b>STANDARD MICROCIRCUIT DRAWING</b> DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	<b>SIZE A</b>		<b>86014</b>
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Case X

Letter	Inches		Millimeters		Notes
	Min	Max	Min	Max	
A	.050	.080	1.27	2.03	
A1	.004	.012	0.10	0.30	
b	.015	.019	0.38	0.48	2
C	.004	.008	0.10	0.20	2
D		.270		6.86	
E	.400	.420	10.16	10.67	
E1	.236	.261	5.99	6.63	
e	.048	.052	1.22	1.32	
K	.008	.012	0.20	0.30	
L	.037	.043	0.94	1.09	
R	.013	.017	0.33	0.43	
R1	.013	.017	0.33	0.43	
S		.045		1.14	
S1	.005		0.13		

NOTES:

1. The U.S. government preferred system of measurement is the metric SI system. However, since this item was originally designed using inch pound units of measurement, in the event of conflict between the metric and inch-pound units, the inch-pound units shall take precedence.
2. Maximum limit may be increased by .003 inches after lead finish is applied.

FIGURE 1. Case outline - continued.

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Device types	01			02	
Case outlines	C, D	H, I, X	2	C	I
Terminal number	Terminal symbol				
1	NC	OUT1	NC	NC	OUT1
2	NC	GND1	NC	NC	GND1
3	GND1	+IN1	NC	GND1	+IN1
4	+IN1	-IN1	GND1	+IN1	-IN1
5	-IN1	V-	NC	-IN1	V-
6	V-	OUT2	+IN1	V-	OUT2
7	OUT2	GND2	NC	OUT2	GND2
8	GND2	+IN2	-IN1	GND2	+IN2
9	+IN2	-IN2	V-	+IN2	-IN2
10	-IN2	V+	OUT2	-IN2	V+
11	V+	----	NC	V+	----
12	OUT1	----	GND2	OUT1	----
13	NC	----	+IN2	NC	----
14	NC	----	-IN2	NC	----
15	----	----	NC	----	----
16	----	----	V+	----	----
17	----	----	NC	----	----
18	----	----	OUT1	----	----
19	----	----	NC	----	----
20	----	----	NC	----	----

FIGURE 2. Terminal connections.

<b>STANDARD MICROCIRCUIT DRAWING</b> DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000	SIZE <b>A</b>		86014
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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)	----
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.

#### 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.

#### 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.

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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 SOURCE APPROVAL BULLETIN

DATE: 97-12-11

Approved sources of supply for SMD 86014 are listed below for immediate acquisition 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 1/	Vendor CAGE number	Vendor similar PIN 2/	Equivalent device specification part number
8601401CA	24355 64155 27014	PM119Y/883 LM119J/883 LM119J/883	M38510/10306BCX
8601401DA	3/	LM119/BDA	----
8601401HA	64155 27014	LM119W/883 LM119W/883	M38510/10306BHX
8601401IA	64155 27014	LM119H/883 LM119H/883	M38510/10306BIX
86014012A	24355 27014	PM119RC/883 LM119E/883	----
8601401XA	27014	LM119WG/883	----
8601402CA	64155	LT119AJ/883	M38510/10307BCX
8601402IA	64155	LT119AH/883	M38510/10307BIX

- 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/ No longer available from an approved source of supply.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN - Continued

Vendor CAGE  
number

Vendor name  
and address

24355

Analog Devices  
RT 1 Industrial Park  
PO Box 9106  
Norwood, MA 02062  
Point of contact: 1500 Space Park Drive  
PO Box 58020  
Santa Clara, CA 95052-8020

27014

National Semiconductor  
2900 Semiconductor Drive  
P O Box 58090  
Santa Clara, CA 95052-8090

64155

Linear Technology Corporation  
1630 McCarthy Boulevard  
Milpitas, CA 95035-7487

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