REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change to approved source. Table I changes; burn-in and life test condition changes.	84-08-27	M. A. FRYE
B	Page 4 change test condition R_S, V_{CC}, and V_{IN} for CMR test. Page 5 delete footnote 4 for t_{PLH}, t_{PHL}. Page 5 add special subgroup 12 for t_S. Page 5 footnote 5 change $\leq$ 500 LFPM to $\geq$ 500 LFPM. Editorial changes throughout.	85-07-12	M. A. FRYE
C	Pages 4 and 5, table I: change test conditions for V_{IO}, I_{IO}, I_{IB}, CMR and PSRR. Add footnote for $\Delta V_{IO} / \Delta T$. Page 8, table II: change subgroups for final electrical, groups A, C, and D test. Guarantee subgroups 10 and 11. Add subgroup 12. Page 9, 6.8: change similar vendor type. Editorial changes throughout.	86-05-15	M. A. FRYE
D	Change to standardized military drawing format. Change CAGE code to 67268. Add device types 02 and 03. Add vendor CAGE 34031. Delete latch setup time test. Change test conditions for I_{IO} and I_{IB}. Add maximum and minimum temperature testing to CMRR and PSRR. Change footnote 2/ for 1.3. Add footnotes 3/ and 4/ to 1.4. Add case outline 2. Add footnotes 4/, 5/, and 6/ to table I. Add latch enable voltage to the recommended operating conditions. Add latch enable propagation delay to table I to be tested. Editorial changes throughout.	89-05-09	M. A. FRYE
E	Drawing updated to reflect current requirements. - ro	06-10-03	R. MONNIN

CURRENT CAGE CODE 67268

THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED.

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

PMIC N/A	PREPARED BY JOE W. DENNIS	**DEFENSE SUPPLY CENTER COLUMBUS** **COLUMBUS, OHIO 43218-3990** **http://www.dscc.dla.mil**
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	CHECKED BY C. R. JACKSON	
	APPROVED BY N. A. HAUCK	MICROCIRCUIT, LINEAR, DUAL, HIGH SPEED, VOLTAGE COMPARATOR, MONOLITHIC SILICON
	DRAWING APPROVAL DATE 79-01-25	
	REVISION LEVEL E	SIZE: A; CAGE CODE: **14933**; **78019** 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:

78019	01	E	X
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:

Device type	Generic number	Circuit function
01	AM687	Dual voltage comparator
02	AM6687	Dual voltage comparator
03	AD96687	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
E	GDIP1-T16 or CDIP2-T16	16	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. 1/

Supply voltage range (V_{CC}):
- Device types 01 and 02 ..... -7 V dc to +7 V dc
- Device type 03 ..... -6.5 V dc to +6.5 V dc

Input voltage range (V_I):
- Device types 01 and 02 ..... -4 V dc to +4 V dc
- Device type 03 ..... -5 V dc to +5 V dc 2/

Storage temperature range ..... -65°C to +150°C

Maximum power dissipation (P_D):
- Device types 01 and 02 ..... 450 mW
- Device type 03 ..... 500 mW

Output current (I_O) ..... 30 mA

Lead temperature (soldering, 10 seconds) ..... +300°C

Junction temperature (T_J) ..... +175°C

Differential input voltage (V_{ID}):
- Device types 01 and 02 ..... -6 V dc to +6 V dc
- Device type 03 ..... -5.5 V dc to +5.5 V dc

Thermal resistance, junction-to-case (θ_{JC}) ..... See MIL-STD-1835

Thermal resistance, junction-to-ambient (θ_{JA}):
- Case E ..... 93°C/W
- Case 2 ..... 82°C/W

1/ The device performance shall not be impaired when subjected to maximum rating conditions.

2/ $V_I \le V_{CC}$.

1.4 Recommended operating conditions.

Supply voltage (V_{CC}) ..... $+V_{CC}$ = +5.0 V dc,
$-V_{CC}$ = -5.2 V dc
Minimum operating voltage ($+V_{CC}$ to $-V_{CC}$) ..... 9.7 V dc 3/
Latch enable voltage:
V_{IH} ..... -1.1 V
V_{IL} ..... -1.5 V
Ambient operating temperature range (T_A) ..... -55°C to +125°C 4/

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 cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATION

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

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard Microcircuits.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

DEPARTMENT OF DEFENSE HANDBOOKS

MIL-HDBK-103 - List of Standard Microcircuit Drawings.
MIL-HDBK-780 - Standard Microcircuit Drawings.

(Copies of these documents are available online at http://assist.daps.dla.mil/quicksearch/ or http://assist.daps.dla.mil or 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/ The information is provided under the recommended operating conditions for design references only. Device is guaranteed to function at 9.7 V dc. However, this parameter is not tested.
4/ Devices require a thermal equilibrium to be established with transverse airflow of ≥ 500 LFPM.

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 outlines. The case outlines 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.

3.5.1 Certification/compliance mark. A compliance indicator “C” shall be marked on all non-JAN devices built in compliance to MIL-PRF-38535, appendix A. The compliance indicator “C” shall be replaced with a "Q" or "QML" certification mark in accordance with MIL-PRF-38535 to identify when the QML flow option is used.

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 for any change that affects this drawing.

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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ 2/ 3/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input offset voltage	V_{IO}	R_S = 100 Ω, V_{CM} = 0 V dc	1	All		±2.0	mV
			2,3			±3.0	
Input offset voltage 4/ temperature coefficient	$\Delta V_{IO} / \Delta T$		1,2,3	01		±10	
				02		±15.0	
				03		±20	
Input offset current	I_{IO}	R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = 2.7 V dc, V_{CM} = -3.3 V dc, T_A = +25°C, +125°C	1,2	01		±1.0	µA
				02		±1.5	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = ±0.5 V dc, T_A = +25°C	1	03		±1.0	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = 2.7 V dc, V_{CM} = -3.3 V dc, T_A = -55°C	3	01		±1.6	
				02		±3.0	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = ±0.5 V dc, T_A = -55°C, +125°C	2,3	03		±1.2	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ 2/ 3/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input bias current	I_{IB}	R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = 2.7 V dc, V_{CM} = -3.3 V dc, T_A = +25°C, +125°C	1,2	01		10	µA
				02		15	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = ±0.5 V dc, T_A = +25°C	1	03		10	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = 2.7 V dc, V_{CM} = -3.3 V dc, T_A = -55°C	3	01		16	
				02		30	
		R_S = 100 Ω, V_{CM} = 0 V dc, V_{CM} = ±0.5 V dc, T_A = -55°C, +125°C	2,3	03		16	
Input voltage range	V_{CM}		1,2,3	01,02	-3.3	2.7	V
				03	-2.5	+5.0	
Input voltage common mode rejection ratio	CMRR	-3.3 V ≤ V_{CM} ≤ 2.7 V, R_S = 100 Ω	4,5,6	01,02	80		dB
		-2.5 V ≤ V_{CM} ≤ 5 V, R_S = 100 Ω		03	80		
Power supply rejection ratio	PSRR	R_S = 100 Ω, ΔV_S = ±5%	4,5,6	All	60		dB
High level output voltage	V_{OH}	T_A = +25°C	1	01,02	-.960	-.810	V
		T_A = +125°C	2		-.850	-.620	
		T_A = -55°C	3		-1.10	-.920	
			1,2,3	03	-1.10		
Low level output voltage	V_{OL}	T_A = +25°C	1	01,02	-1.85	-1.65	V
		T_A = +125°C	2		-1.81	-1.57	
		T_A = -55°C	3		-1.91	-1.69	
			1,2,3	03		-1.50	

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ 2/ 3/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Positive supply current	$+I_{CC}$		1,2,3	01,02		32	mA
				03		18	
Negative supply current	$-I_{CC}$		1,2,3	01,02		44	mA
				03		36	
Propagation delay time	$t_{PD}\pm$	T_A = +25°C and T_A = -55°C 5/	9,11	01		10	ns
		T_A = +125°C 5/	10			20	
		T_A = +25°C and T_A = -55°C 6/	9,11	02		4.0	
		T_A = +125°C 6/	10		1.5	6.0	
		T_A = +25°C and T_A = -55°C 6/	9,11	03	1.5	3.5	
		T_A = +125°C 6/	10		1.5	6.0	
Propagation delay time, latch enable to output	$t_{PD}\pm$ (E)	T_A = +25°C and T_A = -55°C	9,11	01,02		8	ns
		T_A = +125°C	10			12.5	
		T_A = +25°C	9	03		3.5	
		T_A = +125°C and T_A = -55°C	10,11			7	

1/ Unless otherwise specified, $+V_{CC}$ = +5.0 V, $-V_{CC}$ = -5.2 V, V_T = -2.0 V dc, and R_L = 50 Ω.

2/ Devices require a thermal equilibrium to be established with transverse airflow of 500 LFPM.

3/ Production pulse tests devices at correlated temperatures of -35°C and +150°C to compensate for high power steady state operation for device type 01.

4/ Guaranteed, if not tested.

5/ 100 mV step input with 5 mV overdrive, t_{PD}+ on output Q, t_{PD}- on output of $\overline{Q}$.

6/ 100 mV step input with 10 mV overdrive, t_{PD}+ on output Q, t_{PD}- on output of $\overline{Q}$.

Device types	01, 02, 03	03
Case outlines	E	2
Terminal number	Terminal	symbol
1	OUTPUT A	NC
2	OUTPUT $\overline{A}$	OUTPUT A
3	GROUND	OUTPUT $\overline{A}$
4	LATCH ENABLE A	GROUND
5	LATCH ENABLE $\overline{A}$	LATCH ENABLE A
6	$-V_{CC}$	NC
7	INVERTING INPUT A	LATCH ENABLE $\overline{A}$
8	NONINVERTING INPUT A	$-V_{CC}$
9	NONINVERTING INPUT B	INVERTING INPUT A
10	INVERTING INPUT B	NONINVERTING INPUT A
11	$+V_{CC}$	NC
12	LATCH ENABLE $\overline{B}$	NONINVERTING INPUT B
13	LATCH ENABLE B	INVERTING INPUT B
14	GROUND	$+V_{CC}$
15	OUTPUT $\overline{B}$	LATCH ENABLE $\overline{B}$
16	OUTPUT B	NC
17	---	LATCH ENABLE B
18	---	GROUND
19	---	OUTPUT $\overline{B}$
20	---	OUTPUT B

NC = No connection

FIGURE 1. Terminal connections.

4. VERIFICATION

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 method 1015 of MIL-STD-883.

(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 7 and 8 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 method 1005 of MIL-STD-883.

(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 (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, 9, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.
** Subgroups 10 and 11, if not tested, shall be guaranteed to the specified limits in table I.

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 using DD Form 1692, Engineering Change Proposal.

6.4 Record of users. Military and industrial users shall inform Defense Supply Center Columbus (DSCC) 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) 692-0544.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0547.

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.

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 06-10-03

Approved sources of supply for SMD 78019 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 information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DSCC maintains an online database of all current sources of supply at http://www.dscc.dla.mil/Programs/Smcr/.

Standard microcircuit drawing PIN 1/	Vendor CAGE number	Vendor similar PIN 2/
7801901EA	3/	AM687/BEA
7801902EA	3/	AM6687/BEA
7801903EA	3/	AD96687TQ/883B
78019032A	3/	AD96687TE/883B

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. The last known suppliers are listed below.

Vendor CAGE number	Vendor name and address
34335	Advanced Micro Devices, Incorporated 901 Thompson Place Sunnyvale, CA 94086-3453
24355 (4)	Analog Devices Route 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: 7910 Triad Center Drive Greensboro, NC 27409-9605