REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Change to military drawing format. Page 2, add device type 02. Page 6, table I, add device type 02 characteristic. Page 8, 6.4 add vendor. Editorial changes throughout.	87-05-11	M. A.FRYE
B	Add device types 03 and 04. Add case outline 2. Add vendors CAGE 34031 and 64155. For 1.3 change footnotes 1/ and 2/ and delete footnotes 3/ and 4/. Change vendor similar part number for CAGE 07263 and change vendor CAGE 07263 to 27014. Add footnotes 7/, 8/, and 9/ to table I and change footnote 1/. Delete latch setup test and subgroup 12. Change drawing CAGE to 67268. Editorial changes throughout. Add latch enable voltage to the recommended operating conditions. Add latch enable propagation delay to table I to be tested. Delete vendor CAGE 27014.	89-05-09	M. A. FRYE
C	Changes in accordance with NOR 5962-R054-93.	93-04-07	M. A. FRYE
D	Drawing updated to reflect current requirements. -rrp	07-12-03	R. HEBER

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED.

CURRENT CAGE CODE 67268

REV																				
SHEET																				
REV																				
SHEET																				

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

PMIC N/A

PREPARED BY
JOSEPH A. KERBY

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
RAY MONNIN

APPROVED BY
MICHAEL A. FRYE

DRAWING APPROVAL DATE
85-11-14

MICROCIRCUIT, LINEAR, HIGH-SPEED VOLTAGE COMPARATOR, MONOLITHIC SILICON

REVISION LEVEL
D

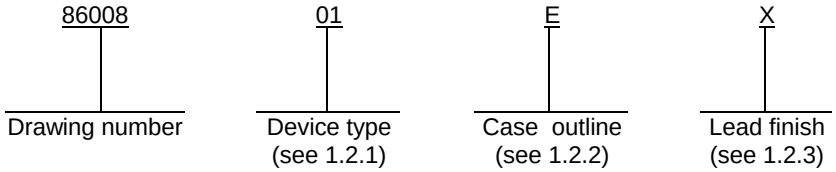
SIZE	CAGE CODE	
A	**14933**	**86008**

SHEET 1 OF 9

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	t_{PD}± (at T_A = +25°C) Min	Max
01	685	Open-emitter output	4.5	6.5 ns
02	685	Open-emitter output	0.5	6.5 ns
03	6685	Open-emitter output	2.0	4.0 ns
04	96685	Open-emitter output	1.5	3.5 ns

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
I	MACY1-X10	10	Can
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.

Positive supply voltage (V+):
- Device types 01, 02, 03 ..... +7 V dc
- Device type 04 ..... +6.5 V dc

Negative supply voltage (V-):
- Device types 01, 02, 03 ..... -7 V dc
- Device type 04 ..... -6.5 V dc

Input voltage range (V_I):
- Device types 01, 02, 03 ..... ±4 V dc
- Device type 04 ..... ±5 V dc

Differential input voltage (V_{ID}):
- Device types 01, 02, 03 ..... ±6 V dc
- Device type 04 ..... ±5.5 V dc

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

Maximum power dissipation (P_D):
- Device types 01, 02 ..... 500 mW
- Device types 03, 04 ..... 300 mW

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

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

Thermal resistance, junction-to-ambient (θ_{JA}):
- Case E ..... 120°C/W
- Case I ..... 140°C/W
- Case 2 ..... 92.3°C/W

Output current ..... 30 mA

1.4 Recommended operating conditions.

Positive supply voltage (V+):
Device types 01, 02, 03 ..... +6.0 V dc
Device type 04 ..... +5.0 V dc 1/
Negative supply voltage (V-):
Device types 01, 02, 03 ..... -5.2 V dc
Device type 04 ..... -5.2 V dc 1/
Minimum operating voltage (V+ to V-) ..... 9.7 V dc
Latch enable voltage:
V_{IH} ..... -0.85 V
V_{IL} ..... -1.65 V
Ambient operating temperature range (T_A) ..... -55°C to +125°C 2/

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. 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.

1/ $V_{IN} \leq$ positive supply and negative supply voltage.

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

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. The case outline 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.

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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ 2/ 3/ 4/ $-55°C \le T_A \le +125°C$ 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 temperature coefficient 5/	$\Delta V_{IO}/\Delta T$	R_S = 100 Ω, V_{CM} = 0 V	1, 2, 3	01,02		±10	µV/°C
				03		±15.0	
				04		±20	
Input offset current	I_{IO}	V_{CM} = 3.3 V, T_A = +25°C	1	01,02		±1.0	µA
				03		±1.5	
		V_{CM} = +0.5 V, T_A = +25°C		04		±1.0	
		$-V_{CM}$ = -3.3 V, T_A = +125°C, -55°C	2, 3	01,02		±1.6	
				03		±3.0	
		$-V_{CM}$ = -0.5 V, T_A = +125°C, -55°C		04		±1.6	
Input bias current	I_{IB}	V_{CM} = 3.3 V, T_A = +25°C	1	01,02		10	µA
				03		15	
		V_{CM} = +0.5 V, T_A = +25°C		04		10	
		$-V_{CM}$ = -3.3 V, T_A = +125°C, -55°C	2, 3	01,02		16	
				03		30	
		$-V_{CM}$ = -0.5 V, T_A = +125°C, -55°C		04		16	
Input voltage range	V_{CM}		1, 2, 3	01,02, 03	-3.3	3.3	V
				04	-2.5	+5.0	
Input voltage common mode rejection ratio	CMRR	R_S = 100 Ω, $-3.3 V \le V_{CM} \le +3.3 V$	4, 5, 6	01,02, 03	80		dB
		$-2.5 V \le V_{CM} \le +5.0 V$		04	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, 03	-0.960	-0.810	V
		T_A = +125°C	2		-0.850	-0.620	
		T_A = -55°C	3		-1.10	-0.920	
			1, 2, 3	04	-1.10		

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

Test	Symbol	Conditions 1/ 2/ 3/ 4/ $-55°C \le T_A \le +125°C$ unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Low level output voltage	V_{OL}	$T_A = +25°C$	1	01,02, 03	-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	04		-1.50	
Positive supply current	I+		1, 2, 3	01, 02, 03		22	mA
				04		9	
Negative supply current	I-		1, 2, 3	01, 02,		-26	mA
				03,04		-18	
Propagation delay time	$t_{PD}\pm$	$T_A = -55°C, +25°C$ 6/ 7/	9, 11	01	3.5	6.5	ns
		$T_A = +125°C$ 6/ 7/	10		5.5	12	
		$T_A = +25°C, -55°C$ 6/ 7/	9, 11	02	0.5	6.5	
		$T_A = +125°C$ 6/ 7/	10		0.5	12	
		$T_A = +25°C, -55°C$ 7/ 8/	9, 11	03	2.0	4.0	
		$T_A = +125°C$ 7/ 8/	10		1.5	6.0	
		$T_A = +25°C, -55°C$ 9/	9, 11	04	1.5	3.5	
		$T_A = +125°C$ 9/	10		1.5	6.0	
Propagation delay time latch enable to output 5/	$t_{PD}\pm$ (E)	$T_A = +25°C, -55°C$	9, 11	01,03		8	ns
		$T_A = +125°C$	10			12.5	
		$T_A = +25°C, -55°C$	9, 11	02		8	
		$T_A = +125°C$	10			12.5	
		$T_A = +25°C$	9	04		3.5	
		$T_A = +125°C, -55°C$	10, 11			7	

1/ For device types 01, 02, and 03 unless otherwise specified: V+ = +6.0 V dc, V- = -5.2 V dc, V_T = -2.0 V dc, and R_L = 50 Ω.
2/ Devices require a thermal equilibrium to be established with a transverse airflow of >500 LFPM.
3/ Production pulse test devices at correlated temperatures of -35°C and +145°C to compensate for high power steady-state operation.
4/ For device type 04 unless otherwise specified: V+ = +5.0 V dc, V- = -5.2 V dc, V_T = -2.0 V dc, and R_L = 50 Ω.
5/ Guaranteed if not tested to the limits specified.
6/ 100 mV step input with 5 mV overdrive.
7/ a. This parameter tested with V_{CM} = 0 V and supplies V+ = 6.0 V, V- = -5.2 V.
b. t_{PD}+ on either output Q or $\overline{Q}$ is performed.
c. t_{PD}- on either output $\overline{Q}$ or Q is performed.
8/ 100 mV step input with 10 mV overdrive V+ = +5.0 V, V- = -5.2 V for 03.
9/ This parameter measured with 100 mV pulse (10 mV overdrive), to 50 percent of the transition output point.

Device types	01, 02, 03, and 04		04
Case outlines	I	E	2
Terminal number	Terminal symbol		
1	V+	GROUND 1	NC
2	NONINVERTING INPUT	V+	GROUND 1
3	INVERTING INPUT	NONINVERTING INPUT	V+
4	LATCH ENABLE	INVERTING INPUT	NONINVERTING INPUT
5	V-	NC	INVERTING INPUT
6	NC/HYSTERESIS	LATCH ENABLE	NC
7	Q OUTPUT	NC	NC
8	$\overline{Q}$ OUTPUT	V-	LATCH ENABLE
9	GROUND 2	NC/HYSTERESIS	NC
10	GROUND 1	NC	V-
11	----	Q OUTPUT	NC
12	----	$\overline{Q}$ OUTPUT	NC
13	----	NC	NC
14	----	NC	Q OUTPUT
15	----	NC	$\overline{Q}$ OUTPUT
16	----	GROUND 2	NC
17	----	----	NC
18	----	----	NC
19	----	----	NC
20	----	----	GROUND 2

NC = No connection

FIGURE 1. Terminal connections.

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, 5, 6, 9**, 10**, 11**
Groups C and D end-point electrical parameters (method 5005)	1

* PDA applies to subgroup 1.
** Subgroups 9, 10 and 11, if not tested, shall be guaranteed to the limits in table I herein.

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.

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: 07-12-03

Approved sources of supply for SMD 86008 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 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/
8600801EA	3/ 3/	AM685/BEA LT685J/883
8600801IA	3/ 3/	AM685/BIC LT685H/883
8600802EA	3/	LT685J/883
8600802IA	3/	LT685H/883
8600803EA	3/	AM6685/BEA
8600803IA	3/	AM6685/BIC
8600804EA	3/	AD96685TQ/883B
8600804IA	3/	AD96685TH/883B
86008042A	3/	AD96685TE/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 available sources of supply are listed below.

Vendor CAGE number	Vendor name and address
24355	Analog Devices Route 1 Industrial Park P.O. Box 9106 Norwood, MA 02062 Point of contact: 7910 Triad Center Drive Greensboro, NC 27409-9605
34335	Advance Micro Devices, Incorporated 901 Thompson Place P.O. Box 3453 Sunnyvale, CA 94086
64155	Linear Technology Corp. 1630 McCarthy Blvd. Milpitas, CA 95035-7417