

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Add device type 02 and vendor CAGE 51651. Rewrite entire document.	94-09-01	K. A. Cottongim
B	Changes to table I. Correction to figure 1, terminal connections.	99-02-18	K. A. Cottongim

THE ORIGINAL FIRST PAGE OF THIS DRAWING HAS BEEN REPLACED

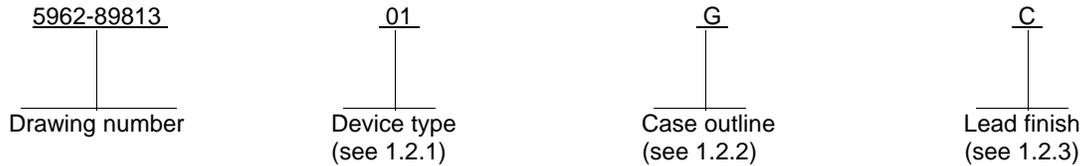
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REV STATUS OF SHEETS	REV	B	B	B	B	B	B	B	B	B	B									
	SHEET	1	2	3	4	5	6	7	8	9										

PMIC N/A STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE AMSC N/A	PREPARED BY Steve Duncan	DEFENSE SUPPLY CENTER COLUMBUS P. O. BOX 3990 COLUMBUS, OHIO 43216-5000			
	CHECKED BY Robert M. Heber				
	APPROVED BY William H. Heckman	MICROCIRCUITS, HYBRID, LINEAR, FAST SETTLING, WIDEBAND OPERATIONAL AMPLIFIER			
	DRAWING APPROVAL DATE 90-08-20				
	REVISION LEVEL B	SIZE A	CAGE CODE 67268	5962-89813	
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1. SCOPE

1.1 Scope. This drawing documents one product assurance class, class H (high reliability) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN).

1.2 PIN. The PIN shall be as shown in the following example:



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

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	HC1437, MSK 437B	Wideband operational amplifier
02	MSK 438B	Wideband operational amplifier

1.2.2 Case outline(s). The case outline(s) shall be 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
3	CQCC1-N28	28	Leadless chip carrier

1.2.3 Lead finish. The lead finish shall be as specified in MIL-PRF-38534.

1.3 Absolute maximum ratings. 1/

Supply voltage ($\pm V_{CC}$)	± 20 V dc
Differential input voltage	$\pm V_{CC}$
Common mode input voltage (V_{CM})	$\pm V_{CC}$
Power dissipation (P_D)	500 mW 2/
Junction temperature (T_J)	$+150^\circ\text{C}$
Thermal resistance, junction-to-case (θ_{JC}):	
Case G	200° C/W
Case 3	75° C/W
Lead temperature (soldering, 10 seconds)	$+300^\circ\text{C}$
Storage temperature range	-65°C to $+150^\circ\text{C}$

1.4 Recommended operating conditions.

Supply voltage ($\pm V_{CC}$)	± 15 V dc
Ambient operating temperature range (T_A)	-55°C to $+125^\circ\text{C}$

1/ Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrade performance and affect reliability.

2/ $T_C = +25^\circ\text{C}$.

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2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. The following specification, standards, and handbook 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-38534 - Hybrid Microcircuits, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Methods and Procedures for Microelectronics.
 MIL-STD-973 - Configuration Management.
 MIL-STD-1835 - Microcircuit Case Outlines.

HANDBOOK

DEPARTMENT OF DEFENSE

MIL-HDBK-780 - Standard Microcircuit Drawings.

(Unless otherwise indicated, copies of the specification, standards, and handbook 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 performance requirements for device class H shall be in accordance with MIL-PRF-38534. Compliance with MIL-PRF-38534 may include the performance of all tests herein or as designated in the device manufacturer's Quality Management (QM) plan or as designated for applicable device class. Therefore, the tests and inspections herein may not be performed for applicable device class (see MIL-PRF-38534). Furthermore, the manufacturers may take exceptions or use alternate methods to the tests and inspections herein and not perform them. However, the performance requirements as defined in MIL-PRF-38534 shall be met for the applicable device class. The modification in the QM plan shall not affect the form, fit, or function as described herein.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-H-38534 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 specified 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 of device(s). Marking of device(s) shall be in accordance with MIL-PRF-38534. The device shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's vendor similar PIN may also be marked as listed in QML-38534.

3.6 Data. In addition to the general performance requirements of MIL-PRF-38534, the manufacturer of the device described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, for each device type listed herein. Also, the data should include a summary of all parameters manually tested, and for those which, if any, are guaranteed. This data shall be maintained under document revision level control by the manufacturer and be made available to the preparing activity (DSCC-VA) upon request.

3.7 Certificate of compliance. A certificate of compliance shall be required from a manufacturer in order to supply to this drawing. The certificate of compliance (original copy) submitted to DSCC-VA shall affirm that the manufacturer's product meets the performance requirements of MIL-PRF-38534 and herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-PRF-38534 shall be provided with each lot of microcircuits delivered to this drawing.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection procedures shall be in accordance with MIL-PRF-38534 or as modified in the device manufacturer's Quality Management (QM) plan. The modification in the QM plan shall not affect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with MIL-PRF-38534. The following additional criteria shall apply:

- a. Preseal burn-in test, method 1030 of MIL-STD-883. (optional for class H)
 - (1) Test condition C or D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to either DSCC-VA or the acquiring activity upon request. Also, the test circuit shall specify the inputs, outputs, biases, and power dissipation, as applicable, in accordance with the intent specified in test method 1030 of MIL-STD-883.
 - (2) T_A as specified in accordance with table I of method 1015 of MIL-STD-883.
- b. 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 either DSCC-VA or the acquiring activity upon request. Also, 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 as specified in accordance with table I of method 1015 of MIL-STD-883.
- c. 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/</u> -55° C ≤ T _C ≤ +125° C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Input offset voltage	V _{IO}	T _A = +25° C, no external trim resistor	1	All	-2	+2	mV
Input offset voltage drift <u>2/</u>	DV _{IO} ---- DT	R _L = infinity T _A = -55° C and +125° C	2,3	All	-50	+50	μV/° C
Input bias current	I _{IB}		1	01	-200	+200	pA
			2,3		-200	+200	nA
			1	02	-5	+5	μA
			2,3		-10	+10	
Input offset current	I _{IO}		1	01	-100	+100	pA
			2,3		-100	+100	nA
			1	02	-2.5	+2.5	μA
			2,3		-5	+5	
Power supply rejection ratio <u>2/</u>	+PSSR	+15 V dc ≤ +V _{CC} ≤ +20 V dc -V _{CC} = -15 V dc	1	All	-200	+200	μV/V
			2,3		-400	+400	
	-PSSR	-15 V dc ≤ -V _{CC} ≤ -20 V dc +V _{CC} = +15 V dc	1	All	-200	+200	
			2,3		-400	+400	
Common mode rejection ratio <u>2/</u>	CMRR	V _{CM} = ±10 V dc, f = 10 Hz	4	All	60		db
			5,6		40		
Supply current	±I _{CC}	V _{CM} = 0 V, no load	1,2,3	01	-15	+15	mA
				02	-17	+17	

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions <u>1/</u> -55°C ≤ T _C ≤ +125°C unless otherwise specified	Group A subgroups	Device types	Limits		Unit
					Min	Max	
Output voltage (peak)	V _{OP}	I _O = 0.020 A(peak), R _L = 500 Ω	4	All	±10		V
		R _L = 1 kΩ	5,6 <u>3/</u>		±10		
Output current (peak)	I _{OP}	R _L = 500 Ω	4	All	±20		mA
		R _L = 1 kΩ, V _{OUT} = ±10 V	5,6 <u>3/</u>		±10		
Voltage gain <u>2/</u>	A _{VS}	R _L = 1 kΩ, f = 10 Hz	4	All	88		dB
			5,6 <u>3/</u>		60		
Slew rate	SR	R _L = 1 kΩ, T _A = +25°C	4	01	±200		V/μs
		R _L = 1 kΩ, T _A = +25°C <u>4/</u>	4	02	±300		

1/ ±V_{CC} = ±15 V dc.

2/ Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

3/ Subgroups 5 and 6 shall be tested as part of device initial characterization and after design and process changes. Parameter shall be guaranteed to the limits specified in table I for all lots not specifically tested.

4/ Device type 02 is tested at a gain of 2 V/V.

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Device types	01 and 02	01 (only)
Case outlines	G	3
Terminal number	Terminal symbol <u>1/</u>	
1	Offset trim	NC
2	Inverting input	NC
3	Noninverting input	NC
4	-VCC	Inverting input
5	Offset trim	NC
6	Output	Noninverting input
7	+VCC	NC
8 <u>2/</u>	Compensation	Offset trim
9	---	NC
10	---	-VCC
11	---	NC
12	---	NC
13	---	NC
14	---	NC
15	---	NC
16	---	NC
17	---	NC
18	---	Output
19	---	NC
20	---	NC
21	---	+VCC
22	---	NC
23	---	NC
24	---	NC
25 <u>2/</u>	---	Compensation
26	---	NC
27	---	Offset trim
28	---	NC

NOTES:

1/ NC is no internal connection.

2/ Device types supplied by CAGE code 51651, pins 8 and 25 are NC. The amplifier is unity gain stable without external compensation.

FIGURE 1. Terminal connections.

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TABLE II. Electrical test requirements.

MIL-PRF-38534 test requirements	Subgroups (in accordance with MIL-PRF-38534, group A test table)
Interim electrical parameters	1
Final electrical parameters	1*, 2, 3, 4, 5, 6
Group A test requirements	1, 2, 3, 4, 5, 6
Group C end-point electrical parameters	1

* PDA applies to subgroup 1.

4.3 Conformance and periodic inspections. Conformance inspection (CI) and periodic inspection (PI) shall be in accordance with MIL-PRF-38534 and as specified herein.

4.3.1 Group A inspection (CI). Group A inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. Tests shall be as specified in table II herein.
- b. Subgroups 7, 8, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection (PI). Group B inspection shall be in accordance with MIL-PRF-38534.

4.3.3 Group C inspection (PI). Group C inspection shall be in accordance with MIL-PRF-38534 and as follows:

- a. End-point electrical parameters shall be as specified in table II herein.
- b. Steady-state life test, 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 either DSCC-VA or the acquiring activity upon request. Also, 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 as specified in accordance with table I of method 1005 of MIL-STD-883.
 - (3) Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

4.3.4 Group D inspection (PI). Group D inspection shall be in accordance with MIL-PRF-38534.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38534.

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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 microelectronic devices (FSC 5962) should contact DSCC-VA, telephone (614) 692-7603.

6.5 Comments. Comments on this drawing should be directed to DSCC-VA, P. O. Box 3990, Columbus, Ohio 43216-5000, or telephone (614) 692-0676.

6.6 Sources of supply. Sources of supply are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DSCC-VA and have agreed to this drawing.

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STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 99-02-18

Approved sources of supply for SMD 5962-89813 are listed below for immediate acquisition only and shall be added to QML-38534 during the next revision. QML-38534 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 QML-38534.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962-8981301GC 5962-8981301GA	51651 51651	MSK 437B MSK 437B
5962-89813013A	34707	HC1437L/883
5962-8981302GC 5962-8981302GA	51651 51651	MSK 438B MSK 438B

- 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 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.

Vendor CAGE
number

34707

51651

Vendor name
and address

Hycomp, Incorporated
165 Cedar Hill Street
Marlborough, MA 01752-3035

M. S. Kennedy Corporation
8170 Thompson Road
Cicero, NY 13039-9393

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