

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Correct symbol for junction temperature in paragraph 1.3.	98-11-13	K. A. Cottongim

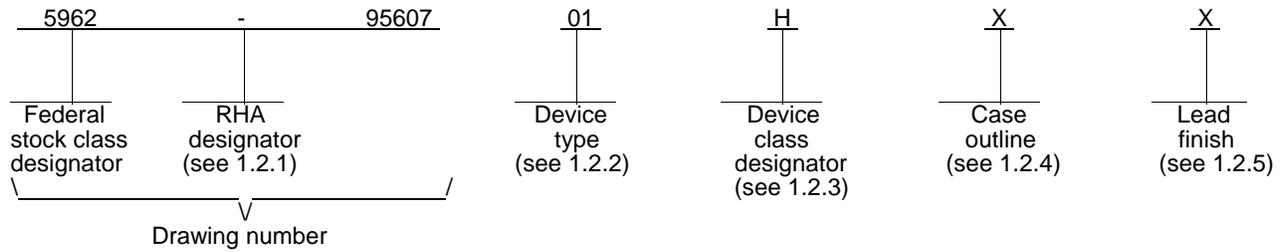
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REV STATUS OF SHEETS	REV	A	A	A	A	A	A	A	A	A	A	A	A	A	A					
	SHEET	1	2	3	4	5	6	7	8	9	10	11	12							

PMIC N/A	PREPARED BY Steve L. Duncan	DEFENSE SUPPLY CENTER COLUMBUS P. O. BOX 3990 COLUMBUS, OHIO 43216-5000			
<p align="center">STANDARD MICROCIRCUIT DRAWING</p> <p>THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE</p> <p align="center">AMSC N/A</p>	CHECKED BY Michael Jones			MICROCIRCUIT, HYBRID, LINEAR, 5 VOLT, SINGLE OUTPUT WITH INTEGRAL EMI FILTER, DC/DC CONVERTER	
	APPROVED BY Kendall A. Cottongim				
	DRAWING APPROVAL DATE 97-10-30				
	REVISION LEVEL A	<table border="1"> <tr> <td>SIZE A</td> <td>CAGE CODE 67268</td> <td>5962-95607</td> </tr> </table>	SIZE A		CAGE CODE 67268
SIZE A	CAGE CODE 67268	5962-95607			
		SHEET	1	OF	12

1. SCOPE

1.1 Scope. This drawing documents five product assurance classes, class D (lowest reliability), class E, (exceptions), class G (lowest high reliability), class H (high reliability), and class K, (highest reliability) and a choice of case outlines and lead finishes are available and are reflected in the Part or Identifying Number (PIN). When available, a choice of radiation hardness assurance levels are reflected in the PIN.

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



1.2.1 Radiation hardness assurance (RHA) designator. Device classes H and K RHA marked devices shall meet the MIL-PRF-38534 specified RHA levels and shall be marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 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	ADDC02805SATV	DC/DC converter, 5 V, 100 W output, with integral EMI filter and output overvoltage protection

1.2.3 Device class designator. This device class designator shall be a single letter identifying the product assurance level as follows:

<u>Device class</u>	<u>Device performance documentation</u>
D, E, G, H, or K	Certification and qualification to MIL-PRF-38534

1.2.4 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>
X	See figure 1	17	Flat package

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

1.3 Absolute maximum ratings. 1/

Input voltage	+55 V dc
Inhibit voltage range (pin 6)	-0.5 V dc to +50 V dc
Sync voltage range (pin 7)	-0.5 V dc to +8 V dc
Ishare voltage range (pin 8)	-0.5 V dc to +6 V dc
Temp voltage range (pin 9)	-0.3 V dc to +12 V dc
Power dissipation (P _D)	35 W <u>2/</u>
Output power	100 W <u>2/</u>
Lead temperature (soldering, 10 seconds)	+300° C
Storage temperature range	-65° C to +150° C
Junction temperature (T _J)	+150° C

1/ Absolute maximum ratings are limiting values, to be applied individually. Stresses above the absolute maximum rating may cause permanent damage to the device. Extended operation at the maximum levels may degrad performance and affect reliability.

2/ Case temperature must be maintained at less than or equal to +90° C.

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1.4 Recommended operating conditions.

Input voltage range (V_{IN}) +18 V dc to +40 V dc
 Case operating temperature range (T_C) -55° C to +125° C

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-461 - Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility.
- 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 classes D, E, G, H, and K 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 the applicable device class. Therefore, the tests and inspections herein may not be performed for the 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. Constant acceleration, method 2001 of MIL-STD-883, is performed at 1200g's for screening (see 4.2.c) and at 2500g's for group C periodic inspection (see 4.3.3.c).

3.1.1 EMI filter. Product includes an integral differential and common-mode EMI filter designed to meet all applicable requirements in MIL-STD-461 when the power converter is installed in a typical system setup. The product has been tested as part of design characterization. Reference the typical EMI curves and test setup indicated in the vendor's commercial data sheet for additional information.

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3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38534 and herein.

3.2.1 Case outline(s). The case outline(s) shall be in accordance with 1.2.4 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 specified 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 defined 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 or by the manufacturers Quality Management (QM) plan in accordance with appendix B of MIL-PRF-38534. 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 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.

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.

c. Constant acceleration, method 2001 of MIL-STD-883 is performed at 1200g's.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions -55° C ≤ T _C ≤ +90° C V _{IN} = 28 V dc ±0.5 V dc, V _O = 5 V dc ±2.0%, C _L = 0, unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	

INPUT CHARACTERISTICS

Steady state operating input voltage range	V _{IN}	I _O = 2 A to 20 A	1, 2, 3	01	18	40	V
Abnormal operating input voltage range (per MIL-STD-704) <u>1/</u>	V _{IN1}	I _O = 2 A to 16 A	1, 2, 3	01	16	50	V
Input over voltage shutdown	V _{INS}		1, 2, 3	01	50	55	V
No load input current	I _{IN}	T _C = +25° C	1	01		90	mA
Disabled input current	I _{IN1}		1, 2, 3	01		2	mA

OUTPUT CHARACTERISTICS 2/ 3/

Output voltage	V _O	I _O = 2 A to 20 A, V _{IN} = 18 V dc to 40 V dc	1	01	5.00	5.05	V
			2, 3		4.925	5.125	
		I _O = 2 A to 16 A, V _{IN} = 16 V dc to 50 V dc	1, 2, 3	4.925	5.125		
			2	4.87	5.18		
Output ripple noise	V _{RIP}	I _O = 20 A, BW = 5 kHz to 2 MHz	4, 5, 6	01		50	mVp-p
Output current (I _O)	I _{OUT}	V _{IN} = 18 V dc to 40 V dc	1, 2, 3	01	2	20	A
Output overvoltage protection	OVP	I _O = 20 A, open remote sense connection, T _C = +25° C	7	01		130	%V _O
Output short circuit protection	I _{SCC}	T _C = +25° C	7	01		35	A

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55° C ≤ T _C ≤ +90° C V _{IN} = 28 V dc ±0.5 V dc, V _O = 5 V dc ±2.0%, C _L = 0, unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	

ISOLATION CHARACTERISTICS

Isolation	I _{SO}	Input to output or any pin to case at 500 V dc, T _C = +25° C	1	01	100		MΩ
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DYNAMIC CHARACTERISITICS

Output voltage deviation due to step change in load	V _{TLOAD}	I _O = 10 A to 20 A or 20 A to 10 A, di/dt = 0.5 A/μs, T _C = +25° C	4	01		800	mV
Response time due to step change in load	T _{LOAD}	I _O = 10 A to 20 A or 20 A to 10 A, di/dt = 0.5 A/μs, measured to within 2% of final value, T _C = +25° C	4	01		195	μs
Soft start turn on time	T _{SS}	I _O = 20 A, from INHIBIT high to status high with resistive load, T _C = +25° C	4	01		20	ms

THERMAL CHARACTERISITICS

Efficiency	Eff	I _O = 12 A	1, 2	01	77		%
			3		75		
		I _O = 20 A	1, 2		77		
			3		75		

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions -55° C ≤ T _C ≤ +90° C V _{IN} = 28 V dc ±0.5 V dc, V _O = 5 V dc ±2.0%, C _L = 0, unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
CONTROL CHARACTERISTICS							
Clock frequency	F _S	I _O = 2 A	4, 5, 6	01	0.85	0.99	MHz
ADJUST (pin 3)	V _{ADJ}	T _C = +25° C	1	01	1.92	2.10	V
STATUS (pin 4) Output high voltage	V _{OHSTAT}	I _{OH} = 400 μA, T _C = +25° C	1	01	2.4		V
STATUS (pin 4) Output low voltage	V _{OLSTAT}	I _{OL} = 1 mA, T _C = +25° C	1	01		0.7	V
VAUX (pin 5) Output voltage nominal	V _O	Load current = 20 A I _{AUX} = 5 mA, T _C = +25° C	1	01	14.3	15.3	V
INHIBIT (pin 6) Input low voltage	V _{IL}	Unit inhibited, T _C = +25° C	7	01		0.5	V
INHIBIT (pin 6) Input low current	I _{IL}	V _{IL} = 0.5 V, T _C = +25° C	1	01		1.2	mA
INHIBIT (pin 6), Input voltage (open circuit)	V _I	T _C = +25° C	1	01		15	V
SYNC (pin 7), Input high voltage	V _{IH}	T _C = +25° C	4	01	4.0		V
SYNC (pin 7), Input high current	I _{IH}	V _{IH} = 7.0 V, T _C = +25° C	1	01		175	μA
ISHARE (pin 8)		Load current = 20 A, T _C = +25° C	1	01	2.75	2.95	V
TEMP (pin 9)		T _C = +25° C	1	01	3.5	4.5	V

1/ 50 V dc upper limit rated for transient condition for up to 50 milliseconds. The 16 V dc lower limit rated for continuous operation during emergency condition.

2/ Outputs are measured at remote sense points.

3/ Unit regulates output voltage at no load.

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Case outline X.

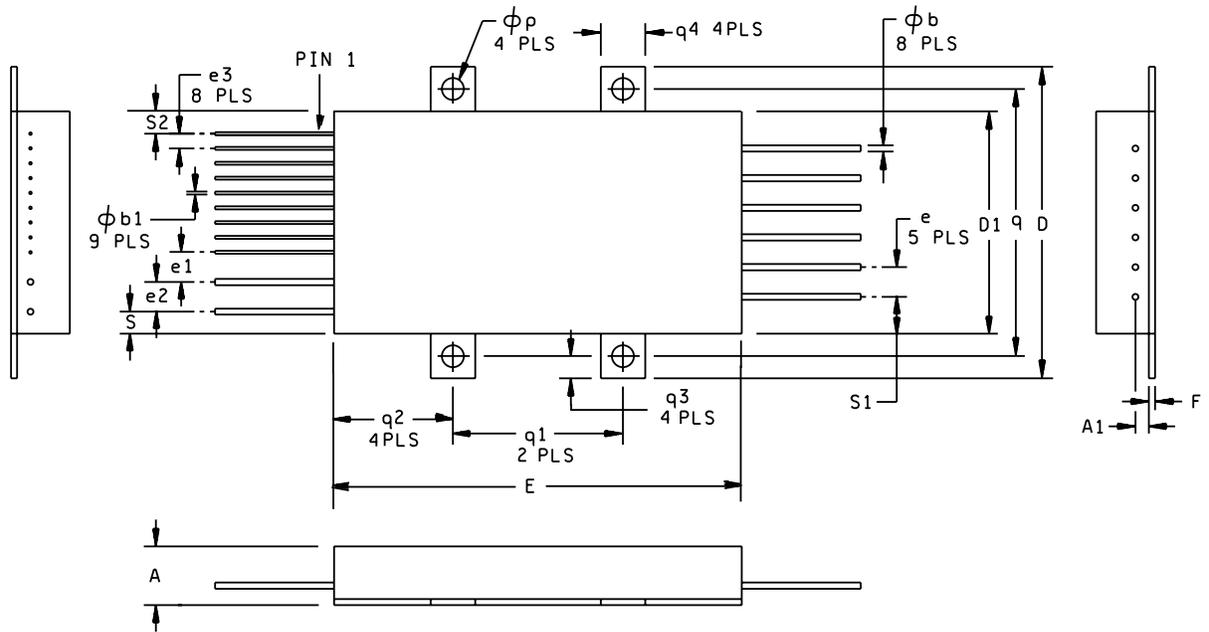


FIGURE 1. Case outline(s).

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Case outline X - Continued.

Symbol	Millimeters		Inches	
	Min	Max	Min	Max
A	9.65	10.16	.380	.400
A1	2.03	2.54	.080	.100
ϕb	.96	1.06	.038	.042
$\phi b1$.40	.50	.016	.020
D	53.09	53.59	2.090	2.110
D1	37.85	38.35	1.490	1.510
e	4.95	5.20	.195	.205
e1	4.95	5.20	.195	.205
e2	4.95	5.20	.195	.205
e3	2.41	2.66	.095	.105
E	69.47	69.98	2.735	2.755
F	.94	1.09	.037	.043
ϕp	3.65	3.91	.144	.154
q	45.59	45.84	1.795	1.805
q1	28.95	29.21	1.140	1.150
q2	20.07	20.57	.790	.810
q3	3.68	3.93	.145	.155
q4	7.36	7.87	.290	.310
S	3.68	3.93	.145	.155
S1	6.22	6.47	.245	.255
S2	3.68	3.93	.145	.155

NOTES:

1. The case outline X was originally designed using the inch-pound units of measurement, in the event of conflict between the metric and inch-pound units, the inch-pound shall take precedence.
2. Minimum pin length is .740 inches (18.80 mm).
3. All pin-to-sidewall spacings are guaranteed for a minimum of 500 V dc breakdown at standard air pressure.
4. The weight of the finished product is 85 grams maximum.

FIGURE 1. Case outline(s) - Continued.

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Device type	01
Case outline	X
Terminal number	Terminal symbol
1	- SENSE
2	+ SENSE
3	ADJUST
4	STATUS
5	VAUX
6	INHIBIT
7	SYNC
8	ISHARE
9	TEMP
10	- V _{IN}
11	+ V _{IN}
12	+ V _{OUT}
13	+ V _{OUT}
14	+ V _{OUT}
15	RETURN
16	RETURN
17	RETURN

FIGURE 2. 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, 7
Group A test requirements	1, 2, 3, 4, 5, 6, 7
Group C end-point electrical parameters	1
MIL-STD-883, group E end-point electrical parameters for RHA devices	Subgroups** (in accordance with method 5005, group A test table)

* PDA applies to subgroup 1.

** When applicable to this standard microcircuit drawing, the subgroups shall be defined.

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 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.
- c. Constant acceleration, method 2001 of MIL-STD-883 is performed at 2500g's.

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

4.3.5 Group E inspection. Group E inspection is required only for parts intended to be marked as radiation hardness assured (see 3.5 herein). RHA levels shall be M, D, R, and H. RHA quality conformance inspection sample tests shall be performed at the RHA level specified in the acquisition document.

- a. RHA tests for levels M, D, R, and H shall be performed through each level to determine at what levels the devices meet the RHA requirements. These RHA tests shall be performed for initial qualification and after design or process changes which may affect the RHA performance of the device.
- b. End-point electrical parameters shall be as specified in table II herein.
- c. Prior to total dose irradiation, each selected sample shall be assembled in its qualified package. It shall pass the specified group A electrical parameters in table I for subgroups specified in table II herein.
- d. The devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at $T_A = +25^\circ\text{C} \pm 5$ percent, after exposure.
- e. Prior to and during total dose irradiation testing, the devices shall be biased to establish a worst case condition as specified in the radiation exposure circuit.
- f. For all device classes, subgroups 1 and 2 in table V, method 5005 of MIL-STD-883 shall be tested as appropriate for device construction.
- g. When specified in the purchase order or contract, a copy of the RHA delta limits shall be supplied.

5. PACKAGING

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

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) 692-0512.

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: 98-11-13

Approved sources of supply for SMD 5962-95607 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>
5962-9560701HXC	34031	ADDC02805SATV/QMLH

- 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.

Vendor CAGE
number

34031

Vendor name
and address

Analog Devices, Incorporated
7910 Triad Center Drive
Greensboro, NC 27409-9605

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