REVISIONS			
LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED

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	SHEET	1	2	3	4	5	6	7	8	9	10					

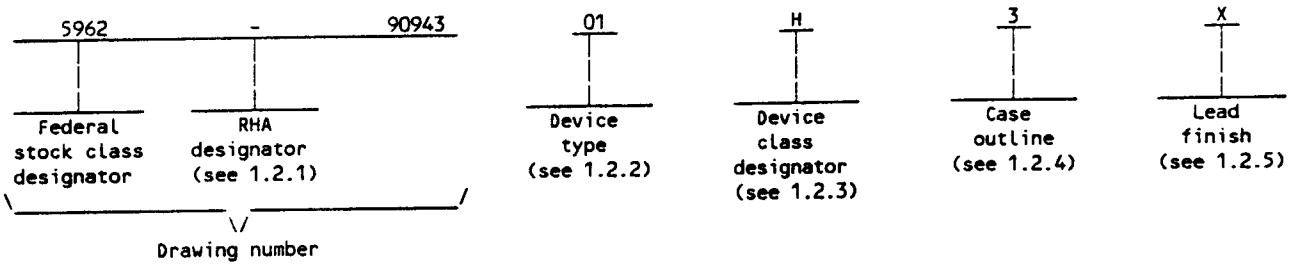
PMIC N/A	PREPARED BY Gary Zahn	DEFENSE ELECTRONICS SUPPLY CENTER DAYTON, OHIO 45444
STANDARD MICROCIRCUIT DRAWING THIS DRAWING IS AVAILABLE FOR USE BY ALL DEPARTMENTS AND AGENCIES OF THE DEPARTMENT OF DEFENSE	CHECKED BY Michael C. Jones	MICROCIRCUIT, LINEAR, +10 VOLT / +1 VOLT, PRECISION VOLTAGE REFERENCE, HYBRID
	APPROVED BY Kendall A. Cottongim	
	DRAWING APPROVAL DATE 94-11-30	SIZE A / CAGE CODE 67268 / 5962-90943
AMSC N/A	REVISION LEVEL	SHEET 1 OF 10

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

1. SCOPE

1.1 Scope. This drawing forms a part of a one part - one part number documentation system (see 6.6 herein). This drawing describes device requirements for hybrid microcircuits to be processed in accordance with MIL-H-38534. Two product assurance classes, military high reliability (device class H) and space application (device class K) 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-H-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:

Device type	Generic number	Circuit function
01	HC9172	+10 V / +1 V precision voltage reference

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

Device class	Device requirements documentation
H or K	Certification and qualification to MIL-H-38534

1.2.4 Case outline(s). The case outline(s) shall be as designated in MIL-STD-1835 and as follows:

Outline letter	Descriptive designator	Terminals	Package style
3	CQCC1-N28	28	Leadless chip carrier

1.2.5 Lead finish. The lead finish shall be as specified in MIL-H-38534 for classes H and K. Finish letter "X" shall not be marked on the microcircuit or its packaging. The "X" designation is for use in specifications when lead finishes A, B, and C are considered acceptable and interchangeable without preference.

1.3 Absolute maximum ratings. 1/

Supply voltage ($+V_{CC}$)	+20 V dc
Output short circuit duration (T_{OS})	Infinite
Total power dissipation (P_D), T_A = +25°C	250 mW
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Thermal resistance, junction-to-case (θ_{JC})	See MIL-STD-1835
Junction temperature (T_J)	+150°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.

1.4 Recommended operating conditions.

Supply voltage ($+V_{CC}$) . . . . . +15 V dc
Ambient operating temperature range (T_A) . . . . . -55°C to +125°C

2. APPLICABLE DOCUMENTS

2.1 Government specification, standards, and handbook. Unless otherwise specified, the following specification, standards, and handbook of the issue listed in that issue of the Department of Defense Index of Specifications and Standards specified in the solicitation, form a part of this drawing to the extent specified herein.

SPECIFICATION

MILITARY

MIL-H-38534 - Hybrid Microcircuits, General Specification for.

STANDARDS

MILITARY

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

HANDBOOK

MILITARY

MIL-HDBK-780 - Standardized Military Drawings.

(Copies of the specification, standards, and handbook required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

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 shall take precedence.

3. REQUIREMENTS

3.1 Item requirements. The individual item requirements shall be in accordance with MIL-H-38534 and as specified 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 1.2.4 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.

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-H-38534. 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 QML-38534.

3.6 Manufacturer eligibility. In addition to the general requirements of MIL-H-38534, the manufacturer of the part described herein shall maintain the electrical test data (variables format) from the initial quality conformance inspection group A lot sample, produced on the certified line, for each device type listed herein. The data should also 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 (DESC-EC) 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 submitted to DESC-EC shall affirm that the manufacturer's product meets the requirements of MIL-H-38534 and the requirements herein.

3.8 Certificate of conformance. A certificate of conformance as required in MIL-H-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-H-38534.

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

a. Preseal burn-in test, method 1030 of MIL-STD-883.

(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 DESC-EC 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 DESC-EC 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.

TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ $V_{IN} = +15$ V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output voltage errors	$+V_R(10)$	R_L = 5 kΩ on +10 V output, T_A = +25°C	4	01	-3.5	+3.5	mV
		R_L = 5 kΩ on +10 V output, $-55°C \le T_A \le -25°C$	6	01	-5.5	+5.5	mV
		R_L = 5 kΩ on +10 V output, $-25°C \le T_A \le +85°C$	12 1/	01	-3.5	+3.5	mV
		R_L = 5 kΩ on +10 V output, $+85°C \le T_A \le +125°C$	5	01	-5.5	+5.5	mV
	$+V_R(1)$	R_L = 5 kΩ on +10 V output, T_A = +25°C	4	01	-200	+200	µV
		R_L = 5 kΩ on +10 V output, $-55°C \le T_A \le -25°C$	6	01	-700	+700	µV
		R_L = 5 kΩ on +10 V output, $-25°C \le T_A \le +85°C$	12 1/	01	-530	+530	µV
		R_L = 5 kΩ on +10 V output, $+85°C \le T_A \le +125°C$	5	01	-700	+700	µV
Line regulation	$V_{RL}(10)$ (line)	R_L = 5 kΩ on +10 V output, $+13 V \le V_{IN} \le +18$ V	1,2,3	01		300	µV/V
	$V_R(1)$ (line)	R_L = 5 kΩ on +10 V output, $+13 V \le V_{IN} \le +18$ V	1,2,3	01		30	µV/V
Load regulation	$V_R(10)$ (load)	$0 mA \le I_L \le 10$ mA, R_L = 1 kΩ for +10 V output, R_L = infinity for +1 V output	1,2,3	01		50	µV/mA

See footnote at end of table.

TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions $-55°C \le T_A \le +125°C$ $V_{IN} = +15$ V unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Output current	$I_O(10)$		1,2,3	01	10		mA
	$I_O(1)$		1,2,3	01	0.1		µA
Output noise 2/	enp-p (10)	0.1 Hz ≤ BW ≤ 10 Hz, R_L = 5 kΩ on +10 V output, T_A = +25°C	4	01		50	µVp-p
	enp-p (1)	0.1 Hz ≤ BW ≤ 10 Hz, R_L = infinity on +10 V output, T_A = +25°C	4	01		50	µVp-p
Long term stability 2/	V_R/V_T	T_A = +25°C, both +10 V and +1 V oututs.	1	01		25	ppm/ 1000 hours
Quiescent current	I_{IN}	R_L = infinity for both +10 V and +1 V outputs	1,2,3	01		14	mA

1/ Subgroup 12 is a special subgroup added to the group A subgroups.
2/ Parameter is guaranteed to specified limits and shall be tested as part of device initial characterization and after design and/or process changes.

Device type	01
Case outline	3
Terminal number	Terminal symbol
1	+10 V sense
2	$-V_{IN}$ (test point)
3	Ground
4	Ground
5	No connection
6	No connection
7	No connection
8	No connection
9	No connection
10	+1 V output
11	No connection
12	No connection
13	No connection
14	+1 V output
15	No connection
16	No connection
17	No connection
18	V_Z (test point)
19	Ground
20	+10 V output (high impedence)
21	+10 V output (high impedence)
22	No connection
23	No connection
24	Ground
25	+15 V supply
26	$+V_{IN}$ (test point)
27	+10 V force
28	+10 V sence

NOTES:
1. Ground pins 3, 4, 19, and 24 are not internally tied to each other. External connection must be made to each ground pin.
2. Pins 1, 27, and 28 must be tied together.

FIGURE 1. Terminal connections.

TABLE II. Electrical test requirements.

MIL-H-38534 test requirements	Subgroups (in accordance with MIL-H-38534, group A test table)
Interim electrical parameters	1
Final electrical test parameters	1*,2,3,4,5,6,12
Group A test requirements	1,2,3,4,5,6,12
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 standardized military drawing, the subgroups shall be defined.

4.3 Quality conformance inspection. Quality conformance inspection shall be in accordance with MIL-H-38534 and as specified herein.

4.3.1 Group A inspection. Group A inspection shall be in accordance with MIL-H-38534 and as follows:

a. Tests shall be as specified in table II herein. Subgroup 12 is a special subgroup added to the group A inspection. Tests, conditions, and limits are specified in table I.

b. Subgroups 7, 8, 9, 10, and 11 shall be omitted.

4.3.2 Group B inspection. Group B inspection shall be in accordance with MIL-H-38534.

4.3.3 Group C inspection. Group C inspection shall be in accordance with MIL-H-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 DESC-EC 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. Group D inspection shall be in accordance with MIL-H-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 for device classes H and K 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 device classes H and K 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. For device classes H and K, the devices shall be subjected to radiation hardness assured tests as specified in MIL-H-38534 for RHA level being tested, and meet the postirradiation end-point electrical parameter limits as defined in table I at T_A = +25°C ±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 device classes H and K, 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-H-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 Electronics Supply Center when a system application requires configuration control and the applicable SMD. DESC 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 DESC-EC, telephone (513) 296-6047.

6.5 Comments. Comments on this drawing should be directed to DESC-EC, Dayton, Ohio 45444, or telephone (513) 296-5373.

6.6 One part - one part number system. The one part - one part number system described below has been developed to allow for transitions between identical generic devices covered by the three major microcircuit requirements documents (MIL-H-38534, MIL-I-38535, and 1.2.1 of MIL-STD-883) without the necessity for the generation of unique PIN's. The three military requirements documents represent different class levels, and previously when a device manufacturer upgraded military product from one class level to another, the benefits of the upgraded product were unavailable to the Original Equipment Manufacturer (OEM), that was contractually locked into the original unique PIN. By establishing a one part number system covering all three documents, the OEM can acquire to the highest class level available for a given generic device to meet system needs without modifying the original contract parts selection criteria.

Military documentation format	Example PIN under new system	Manufacturing source listing	Document listing
New MIL-H-38534 Standard Microcircuit Drawings	5962-XXXXXZZ(H or K)YY	QML-38534	MIL-BUL-103
New MIL-I-38535 Standard Microcircuit Drawings	5962-XXXXXZZ(Q or V)YY	QML-38535	MIL-BUL-103
New 1.2.1 of MIL-STD-883 Standard Microcircuit Drawings	5962-XXXXXZZ(M)YY	MIL-BUL-103	MIL-BUL-103

6.7 Sources of supply for device classes H and K. Sources of supply for device classes H and K are listed in QML-38534. The vendors listed in QML-38534 have submitted a certificate of compliance (see 3.7 herein) to DESC-EC and have agreed to this drawing.

STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 94-11-30

Approved sources of supply for SMD 5962-90943 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 DESC-EC. This bulletin is superseded by the next dated revision of QML-38534.

Standard microcircuit drawing PIN	Vendor CAGE number	Vendor similar PIN 1/
5962-9094301H3X	34707	HC9172

1/ 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	Vendor name and address
34707	Hycomp, Incorporated 165 Cedar Hill Street Marlborough, MA 01752

The information contained herein is disseminated for convenience only and the Government assumes no liability whatsoever for any inaccuracies in this information bulletin.