

REVISIONS

LTR	DESCRIPTION	DATE (YR-MO-DA)	APPROVED
A	Update boilerplate to reflect current requirements. -rrp	01-06-05	R. Monnin
B	Make changes to the conditions for V _{OH} and V _{OL} tests in table I. -rrp	02-05-03	R. Monnin
C	Made changes to 1.5, to footnotes 5/ and 6/ at end of table I, and to group E inspection paragraphs. -rrp	03-04-01	R. Monnin
D	Redrawn. Update paragraphs to MIL-PRF-38535 requirements. Remove Class M requirements. - drw	15-07-23	Charles F. Saffle



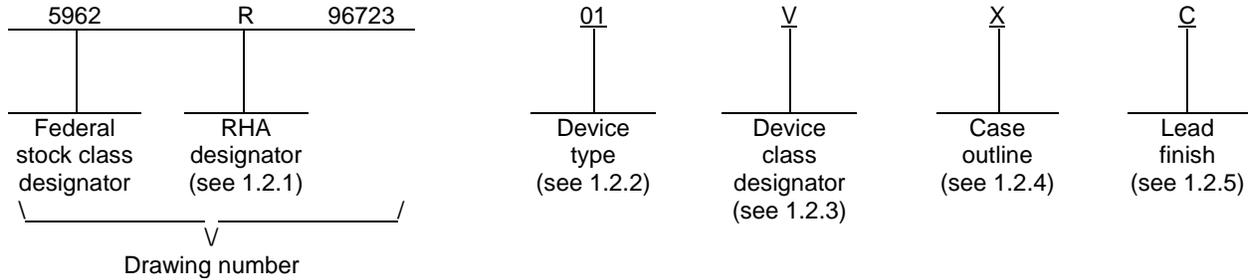
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OF SHEETS	SHEET	1	2	3	4	5	6	7	8	9	10									

PMIC N/A	PREPARED BY Sandra Rooney	<p align="center">DLA LAND AND MARITIME COLUMBUS, OHIO 43218-3990 http://www.landandmaritime.dla.mil</p>		
<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 Sandra Rooney			
	APPROVED BY Michael A. Frye	<p align="center">MICROCIRCUIT, LINEAR, RADIATION HARDENED, TRIPLE LINE RECEIVERS, MONOLITHIC SILICON</p>		
	DRAWING APPROVAL DATE 95-11-20			
	REVISION LEVEL D	SIZE A	CAGE CODE 67268	5962-96723
		SHEET	1	OF 10

1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device class Q) and space application (device class V). 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 (RHA) levels is reflected in the PIN.

1.2 PIN. The PIN is as shown in the following example:



1.2.1 RHA designator. Device classes Q and V RHA marked devices meet the MIL-PRF-38535 specified RHA levels and are marked with the appropriate RHA designator. A dash (-) indicates a non-RHA device.

1.2.2 Device types. The device types identify the circuit function as follows:

<u>Device type</u>	<u>Generic number</u>	<u>Circuit function</u>
01	HS-246RH	Radiation hardened DI triple line receiver
02	HS-248RH	Radiation hardened DI triple party-line receiver

1.2.3 Device class designator. The device class designator is a single letter identifying the product assurance level as follows:

<u>Device class</u>	<u>Device requirements documentation</u>
Q or V	Certification and qualification to MIL-PRF-38535

1.2.4 Case outlines. The case outlines are as designated in MIL-STD-1835 as follows:

<u>Outline letter</u>	<u>Descriptive designator</u>	<u>Terminals</u>	<u>Package style</u>
C	CDIP2-T14	14	Dual-in-line
X	CDFP3-F14	14	Flat package

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V.

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1.3 Absolute maximum ratings. 1/

Supply voltage (V _{CC}).....	-0.5 V dc to +8.0 V dc
Supply voltage (V _{EE})	-8.0 V dc to +0.5 V dc
Output voltage	-0.5 V dc to +6.0 V dc
Input voltage	-1.0 V dc to +1.0 V dc
Input current	-25 mA to +25 mA
Output current	50 mA
Storage temperature range	-65°C to +150°C
Maximum package power dissipation at T _A = +125°C (P _D):	
Case outline C	0.68 W 2/
Case outline X	0.43 W 2/
Thermal resistance, junction-to-case (θ _{JC}):	
Case outline C	24°C/W
Case outline X	30°C/W
Thermal resistance, junction-to-ambient (θ _{JA}):	
Case outline C	74°C/W
Case outline X	116°C/W
Lead temperature (soldering, 10 seconds)	+275°C
Junction temperature (T _J)	+175°C

1.4 Recommended operating conditions.

Operating voltage range	+4.5 V dc to +5.5 V dc
Ambient operating temperature range (T _A)	-55°C to +125°C

1.5 Radiation features

Maximum total dose available (dose rate = 50 – 300 rads/s) 2 x 10⁵ Rads (Si)

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://quicksearch.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

- 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/ If device power exceeds package dissipation capacity, provide heat sinking or derate linearly (the derating is based on θ_{JA}) at the following rates:
- | | |
|----------------------|------------|
| Case outline C | 13.5 mW/°C |
| Case outline X | 8.6 mW/°C |

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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 for device classes Q and V shall be in accordance with MIL-PRF-38535 as specified herein, 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.

3.2 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein for device classes Q and V.

3.2.1 Case outlines. The case outlines shall be in accordance with 1.2.4 herein.

3.2.2 Terminal connections. The terminal connections shall be as specified on figure 1.

3.2.3 Load circuit and switching waveform. The Load circuit and switching waveform shall be as specified on figure 2.

3.2.4 Radiation exposure circuit. The radiation exposure circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing and acquiring activity upon request.

3.3 Electrical performance characteristics and postirradiation parameter limits. Unless otherwise specified herein, the electrical performance characteristics and postirradiation parameter limits 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 IIA. The electrical tests for each subgroup are defined in table I.

3.5 Marking. The part shall be marked with the PIN listed in 1.2 herein. In addition, the manufacturer's PIN may also be marked. For packages where marking of the entire SMD PIN number is not feasible due to space limitations, the manufacturer has the option of not marking the "5962-" on the device. For RHA product using this option, the RHA designator shall still be marked. Marking for device classes Q and V shall be in accordance with MIL-PRF-38535.

3.5.1 Certification/compliance mark. The certification mark for device classes Q and V shall be a "QML" or "Q" as required in MIL-PRF-38535.

3.6 Certificate of compliance. For device classes Q and V, a certificate of compliance shall be required from a QML-38535 listed manufacturer in order to supply to the requirements of this drawing (see 6.6.1 herein). The certificate of compliance submitted to DLA Land and Maritime-VA prior to listing as an approved source of supply for this drawing shall affirm that the manufacturer's product meets, for device classes Q and V, the requirements of MIL-PRF-38535 and herein.

3.7 Certificate of conformance. A certificate of conformance as required for device classes Q and V in MIL-PRF-38535 shall be provided with each lot of microcircuits delivered to this drawing.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions ^{1/} -55°C ≤ T _A ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
Input resistance	R _{IN}	V _{CC} = 5.0 V, V _{EE} = -5.0 V	1, 2, 3	01	39	90	Ω
Pullup resistance	R _{PU}	V _{CC} = 5.0 V, V _{EE} = -5.0 V	1, 2, 3	02	4.1	10.5	kΩ
Logical "1" output voltage	V _{OH}	V _{CC} = 4.5 V, V _{EE} = -4.5 V, I _{OH} = -120 μA ^{2/}	1, 2, 3	02	2.5		V
Logical "0" output voltage	V _{OL}	V _{CC} = 4.5 V, V _{EE} = -4.5 V, I _{OL} = 10 mA ^{3/}	1, 2, 3	01		0.45	V
		V _{CC} = 4.5 V, V _{EE} = -4.5 V, I _{OL} = 9.6 mA ^{3/}		02		0.45	
Logical "0" output voltage, input short circuit	V _{OLSC}	V _{CC} = 4.5 V, V _{EE} = -4.5 V, I _{OL} = 3.2 mA ^{4/}	1	01, 02		0.45	V
Power supply current	I _{CC}	V _{CC} = 5.5 V, V _{EE} = -5.5 V ^{5/} , ^{6/}	1	01		6.6	mA
		V _{CC} = 5.5 V, V _{EE} = -5.5 V ^{5/} , ^{6/}		02		7.8	
Power supply current	I _{EE}	V _{CC} = 5.5 V, V _{EE} = -5.5 V ^{5/} , ^{6/}	1	01, 02		6.0	mA
Propagation delay	T _{PLH}	V _{CC} = 4.5 V, V _{EE} = -4.5 V	9, 10, 11	01, 02		30	ns
	T _{PHL}	See figure 2					

^{1/} Devices supplied to this drawing have been characterized through all levels M, D, P, L, R of irradiation. However, this device is only tested at the "R" level. Pre and Post irradiation values are identical unless otherwise specified in Table I. When performing post irradiation electrical measurements for any RHA level, T_A = +25°C.

^{2/} (+)I_{IN} = 1.5 mA; (-)Input = Open. For device type 02, use external 50Ω resistor or (+)I_{IN} = 0.75 mV. See figure 2.

^{3/} (+)Input = Open; (-)I_{IN} = 1.5 mA. For device type 02, use external 50Ω resistor or (-)I_{IN} = 0.75 mV. See figure 2.

^{4/} Both inputs shorted to GND; or both inputs open such that 50Ω termination resistors are in the circuit.

^{5/} (+)Input = Open; (-)I_{IN} = 3 mA. External 50Ω resistors needed for device type 02.

^{6/} (+)I_{IN} = 3 mA; (-)Input = Open. External 50Ω resistors needed for device type 02.

**STANDARD
MICROCIRCUIT DRAWING**

DLA LAND AND MARITIME
COLUMBUS, OHIO 43218-3990

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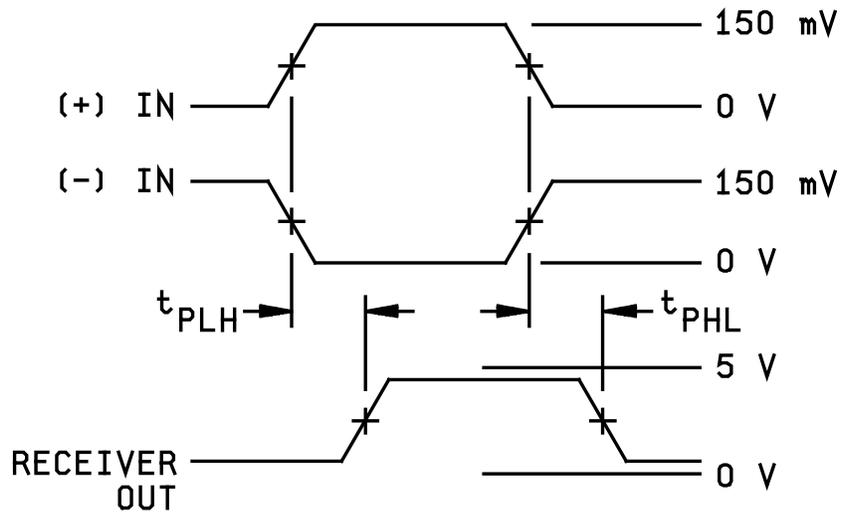
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Device types	01 and 02
Case outlines	C and X
Terminal number	Terminal symbol
1	(-)INPUT 1
2	(+)INPUT 1
3	(R1)OUTPUT 1
4	(-)INPUT 2
5	(+)INPUT 2
6	(R2)OUTPUT 2
7	GND
8	(-)INPUT 3
9	(+)INPUT 3
10	(R3)OUTPUT 3
11	(R3)V _{EE}
12	(R1 & R2)V _{EE}
13	(R3)V _{CC}
14	(R1 & R2)V _{CC}

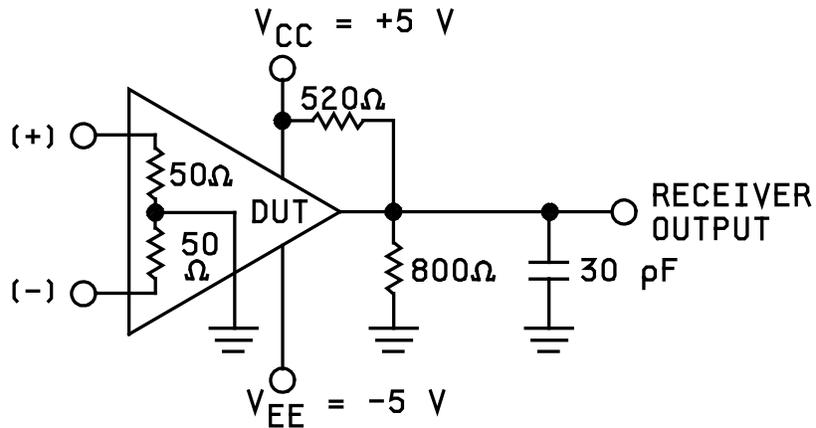
FIGURE 1. Terminal connections.

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NOTES:

Input: $T_{TLH} \leq 10 \text{ ns}$
 $T_{THL} \leq 10 \text{ ns}$
 pw = 500 ns
 f = 1 MHz



NOTE: External 50 Ω resistors needed for device type 02.

FIGURE 2. Load circuit and switching waveform.

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4. VERIFICATION

4.1 Sampling and inspection. For device classes Q and V, sampling and inspection procedures shall be in accordance with MIL-PRF-38535 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. For device classes Q and V, screening shall be in accordance with MIL-PRF-38535, and shall be conducted on all devices prior to qualification and technology conformance inspection.

4.2.2 Additional criteria for device classes Q and V.

- a. The burn-in test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The burn-in test circuit shall be maintained under document revision level control of the device manufacturer's Technology Review Board (TRB) in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing 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.
- b. Interim and final electrical test parameters shall be as specified in table IIA herein.
- c. Additional screening for device class V beyond the requirements of device class Q shall be as specified in MIL-PRF-38535, appendix B.

4.3 Qualification inspection for device classes Q and V. Qualification inspection for device classes Q and V shall be in accordance with MIL-PRF-38535. Inspections to be performed shall be those specified in MIL-PRF-38535 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

4.4 Conformance inspection. Technology conformance inspection for classes Q and V shall be in accordance with MIL-PRF-38535 including groups A, B, C, D, and E inspections and as specified herein.

4.4.1 Group A inspection.

- a. Tests shall be as specified in table IIA herein.
- b. Subgroups 4, 5, 6, 7, and 8 in table I, method 5005 of MIL-STD-883 shall be omitted.

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TABLE IIA. Electrical test requirements.

Test requirements	Subgroups (in accordance with MIL-PRF-38535, table III)	
	Device class Q	Device class V
Interim electrical parameters (see 4.2)	1	1
Final electrical parameters (see 4.2)	1, 2, 3, 9, 10, 11 <u>1/</u>	1, 2, 3, 9, 10, 11 <u>2/, 3/</u>
Group A test requirements (see 4.4)	1, 2, 3, 9, 10, 11	1, 2, 3, 9, 10, 11
Group C end-point electrical parameters (see 4.4)	1, 2, 3, 9	1, 2, 3, 9, 10, 11 <u>3/</u>
Group D end-point electrical parameters (see 4.4)	1	1
Group E end-point electrical parameters (see 4.4)	1	1

1/ PDA applies to subgroup 1.

2/ PDA applies to subgroups 1 and Δ.

3/ Delta limits as specified in table IIB herein shall be required where specified, and the delta values shall be completed with reference to the zero hour electrical parameters (see table I).

TABLE IIB. Burn-in delta parameters and group C delta parameters (+25°C).

PARAMETER	SYMBOL	DELTA LIMITS
Low level output voltage	V _{OL}	±90 mV
High level output voltage	V _{OH}	±500 mV
Power supply current	I _{CC}	±2 mA
Power supply current	I _{EE}	±2 mA

4.4.2 Group C inspection. The group C inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.2.2 Additional criteria for device classes Q and V. The steady-state life test duration, test condition and test temperature, or approved alternatives shall be as specified in the device manufacturer's QM plan in accordance with MIL-PRF-38535. The test circuit shall be maintained under document revision level control by the device manufacturer's TRB in accordance with MIL-PRF-38535 and shall be made available to the acquiring or preparing 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.

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4.4.3 Group D inspection. The group D inspection end-point electrical parameters shall be as specified in table IIA herein.

4.4.4 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 M, Q and V shall be as specified in MIL-PRF-38535. End-point electrical parameters shall be as specified in table IIA herein.

4.4.4.1 Total dose irradiation testing. Total dose irradiation testing shall be performed in accordance with MIL-STD-883 method 1019, condition A and as specified herein.

4.4.4.1.1 Accelerated annealing testing. Accelerated annealing testing shall be performed on all devices requiring a RHA level greater than 5k rads (Si). The post-anneal end-point electrical parameter limits shall be as specified in table I herein and shall be the pre-irradiation end-point electrical parameter limits at 25°C ±5°C. Testing shall be performed at initial qualification and after any design or process changes which may affect the RHA response of the device.

5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V.

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.

6.1.1 Replaceability. Microcircuits covered by this drawing will replace the same generic device covered by a contractor prepared specification or drawing.

6.2 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.

6.3 Record of users. Military and industrial users should inform DLA Land and Maritime when a system application requires configuration control and which SMD's are applicable to that system. DLA Land and Maritime 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 DLA Land and Maritime -VA, telephone (614) 692-8108.

6.4 Comments. Comments on this drawing should be directed to DLA Land and Maritime -VA, Columbus, Ohio 43218-3990, or telephone (614) 692-0540.

6.5 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-PRF-38535 and MIL-HDBK-1331.

6.6 Sources of supply.

6.6.1 Sources of supply for device classes Q and V. Sources of supply for device classes Q and V are listed in MIL-HDBK-103 and QML-38535. The vendors listed in MIL-HDBK-103 and QML-38535 have submitted a certificate of compliance (see 3.6 herein) to DLA Land and Maritime -VA and have agreed to this drawing.

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STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 15-07-23

Approved sources of supply for SMD 5962-96723 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 DLA Land and Maritime -VA. This information bulletin is superseded by the next dated revision of MIL-HDBK-103 and QML-38535. DLA Land and Maritime maintains an online database of all current sources of supply at <http://www.landandmaritime.dla.mil/Programs/Smcr/>.

Standard microcircuit drawing PIN <u>1/</u>	Vendor CAGE number	Vendor similar PIN <u>2/</u>
5962R9672301QCC	34371	HS1-246RH-8
5962R9672301QXC	34371	HS9-246RH-8
5962R9672301VCC	34371	HS1-246RH-Q
5962R9672301VXC	34371	HS9-246RH-Q
5962R9672302QCC	34371	HS1-248RH-8
5962R9672302QXC	34371	HS9-248RH-8
5962R9672302VCC	34371	HS1-248RH-Q
5962R9672302VXC	34371	HS9-248RH-Q

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

34371

Vendor name and address

Intersil Corporation
1650 Robert J. Conlan Blvd. NE
Palm Bay, FL 32905-3406

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