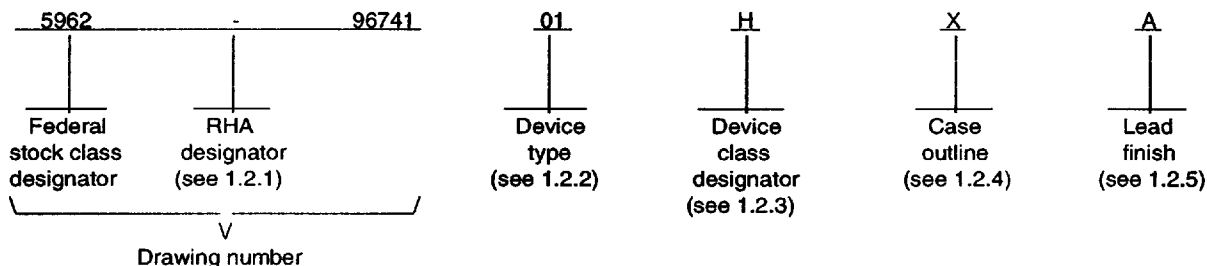




## 1. SCOPE

**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:

Device type	Generic number	Circuit function
01	ACT4455	+5 V, single channel, MIL-STD-1553 transceiver (standby low)
02	ACT4459	+5 V, single channel, MIL-STD-1553 transceiver (standby high)

**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 performance documentation
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:

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-PRF-38534.

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### 1.3 Absolute maximum ratings. 1/

Supply voltage range ( $V_{CC}$ )	-0.3 V dc to +7.0 V dc
Logic input voltage range	-0.3 V dc to +5.5 V dc
Receiver differential input voltage	10 Vp-p
Driver peak output current	+1.0 A
Power dissipation ( $P_D$ ):	
Total hybrid (standby)	200 mW
Total hybrid (100% duty cycle)	2 W
Storage temperature range	-65°C to +150°C
Lead temperature (soldering, 10 seconds)	+300°C
Junction temperature ( $T_J$ )	+135°C
Thermal resistance, junction-to-case ( $\theta_{JC}$ )	5°C/W
Thermal resistance, case-to-air ( $\theta_{CA}$ )	20°C/W (still air)

### 1.4 Recommended operating conditions.

Supply voltage range ( $V_{CC}$ )	+4.75 V dc to +5.5 V dc
Logic input voltage range	0 V dc to +5.0 V dc
Receiver differential voltage	8.0 Vp-p
Driver peak output current	800 mA
Maximum serial data rate	1.0 MHz
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-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.)

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.

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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 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 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-PRF-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.

**3.2.3 Timing waveform(s).** The timing waveform(s) shall be as specified on figure 2.

**3.2.4 Typical bus connections.** The typical bus connections shall be as specified on figure 3.

**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.

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TABLE I. Electrical performance characteristics.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
<b>RECEIVER</b>							
Output low voltage	V <sub>OL</sub>	I <sub>OL</sub> = 4.0 mA	1, 2, 3	01,02		0.5	V
Output high voltage	V <sub>OH</sub>	I <sub>OH</sub> = -0.4 mA	1, 2, 3	01,02	2.5		V
Threshold voltage	V <sub>TH</sub>	1 MHz sine wave	4, 5, 6	01,02	0.56	1.1	V
Receiver delay	t <sub>DR</sub>	From input zero crossing to DATA or DATA. See figure 2.	9,10,11	01,02		500	ns
<b>RECEIVER STROBE</b>							
Input low voltage	V <sub>SIL</sub>		1, 2, 3	01,02		0.7	V
Input high voltage	V <sub>SIH</sub>		1, 2, 3	01,02	2.0		V
Input low current	I <sub>SIL</sub>	V <sub>SIL</sub> = 0.4 V	1, 2, 3	01,02	-0.4		mA
Input high current	I <sub>SIH</sub>	V <sub>SIH</sub> = 2.7 V	1, 2, 3	01,02		40.0	μA
Strobe delay	t <sub>DS</sub>	From strobe rising or falling edge to DATA or DATA. See figure 2.	9,10,11	01,02		200.0	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	
TRANSMITTER							
Input low voltage	V <sub>IL</sub>		1, 2, 3	01,02		0.7	V
Input high voltage	V <sub>IH</sub>		1, 2, 3	01,02	2.0		V
Input low current	I <sub>IL</sub>	V <sub>IL</sub> = 0.4 V	1, 2, 3	01,02	-0.4		mA
Input high current	I <sub>IH</sub>	V <sub>IH</sub> = 2.7 V	1, 2, 3	01,02		40.0	μA
Differential output voltage	V <sub>O</sub>	35Ω load, see point A on figure 3.	4, 5, 6	01,02	6.5	9.0	V <sub>P-P</sub>
		140Ω load, see point B on figure 3.			26.0	36.0	
Differential input impedence	Z <sub>oi</sub>	1 MHz sine wave. In accordance with MIL-STD- 1553B, paragraph 4.5.2.2.2.3, see figure 3.	4, 5, 6	01,02	2.0		kΩ
Differential output noise	V <sub>ON</sub>	Inhibited	4, 5, 6	01,02		10.0	mV <sub>P-P</sub>
Differential offset voltage	V <sub>OS</sub>	35Ω load, see point A on figure 3.	4, 5, 6	01,02	-90.0	+90.0	mV-pk
		140Ω load, see point B on figure 3.			-360.0	+360.0	
Rise time	t <sub>r</sub>	35Ω load, see figure 2.	9,10,11	01,02	100.0	300.0	ns
Fall time	t <sub>f</sub>	35Ω load, see figure 2.	9,10,11	01,02	100.0	300.0	ns
Driver delay	t <sub>DT</sub>	TX IN to TX OUT, see figure 2.	9,10,11	01,02		250.0	ns

See footnotes at end of table.

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TABLE I. Electrical performance characteristics - Continued.

Test	Symbol	Conditions 1/ -55°C ≤ T <sub>C</sub> ≤ +125°C unless otherwise specified	Group A subgroups	Device type	Limits		Unit
					Min	Max	

**TRANSMITTER INHIBIT**

Input low voltage	V <sub>IIL</sub>		1, 2, 3	01,02		0.7	V
Input high voltage	V <sub>IHH</sub>		1, 2, 3	01,02	2.0		V
Input low current	I <sub>IIL</sub>	V <sub>IIL</sub> = 0.4 V	1, 2, 3	01,02	-0.4		mA
Input high current	I <sub>IHH</sub>	V <sub>IHH</sub> = 2.7 V	1, 2, 3	01,02		40.0	μA
Inhibit delay	t <sub>DI-H</sub>	Inhibited output, see figure 2.	9,10,11	01,02		450.0	ns
	t <sub>DI-L</sub>	Active output, see figure 2.				250.0	

**POWER SUPPLY**

Supply current 2/	I <sub>CC1</sub>	Standby, data applied, Inhibit high	1, 2, 3	01,02		30.0	mA
	I <sub>CC2</sub>	25% duty cycle, 1 MHz	4, 5, 6	01,02		220.0	mA
	I <sub>CC3</sub>	50% duty cycle, 1 MHz	4, 5, 6	01,02		395.0	mA
	I <sub>CC4</sub>	100% duty cycle, 1 MHz	4, 5, 6	01,02		745.0	mA

1/ V<sub>CC</sub> = +5.0 V dc ±0.1 V dc unless otherwise specified.

2/ Use Technitrol part number 1553-45, turns ratio 1 : 2.5 or equivalent.

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Device type	All	Device type	All
Terminal number	Terminal symbol	Terminal number	Terminal symbol
1	TX DATA OUT	15	+5 V supply
2	+5 V supply	16	Ground 3
3	+5 V supply	17	No connect
4	TX DATA OUT	18	RX DATA IN
5	TX DATA OUT	19	RX DATA IN
6	Ground 1	20	No connect
7	No connect	21	No connect
8	No connect	22	Ground 4
9	+5 V supply	23	+5 V supply
10	RX DATA OUT	24	INHIBIT
11	Strobe	25	TX DATA IN
12	No connect	26	TX DATA IN
13	RX DATA OUT	27	Ground 2
14	No connect	28	TX DATA OUT

FIGURE 1. Terminal connections.

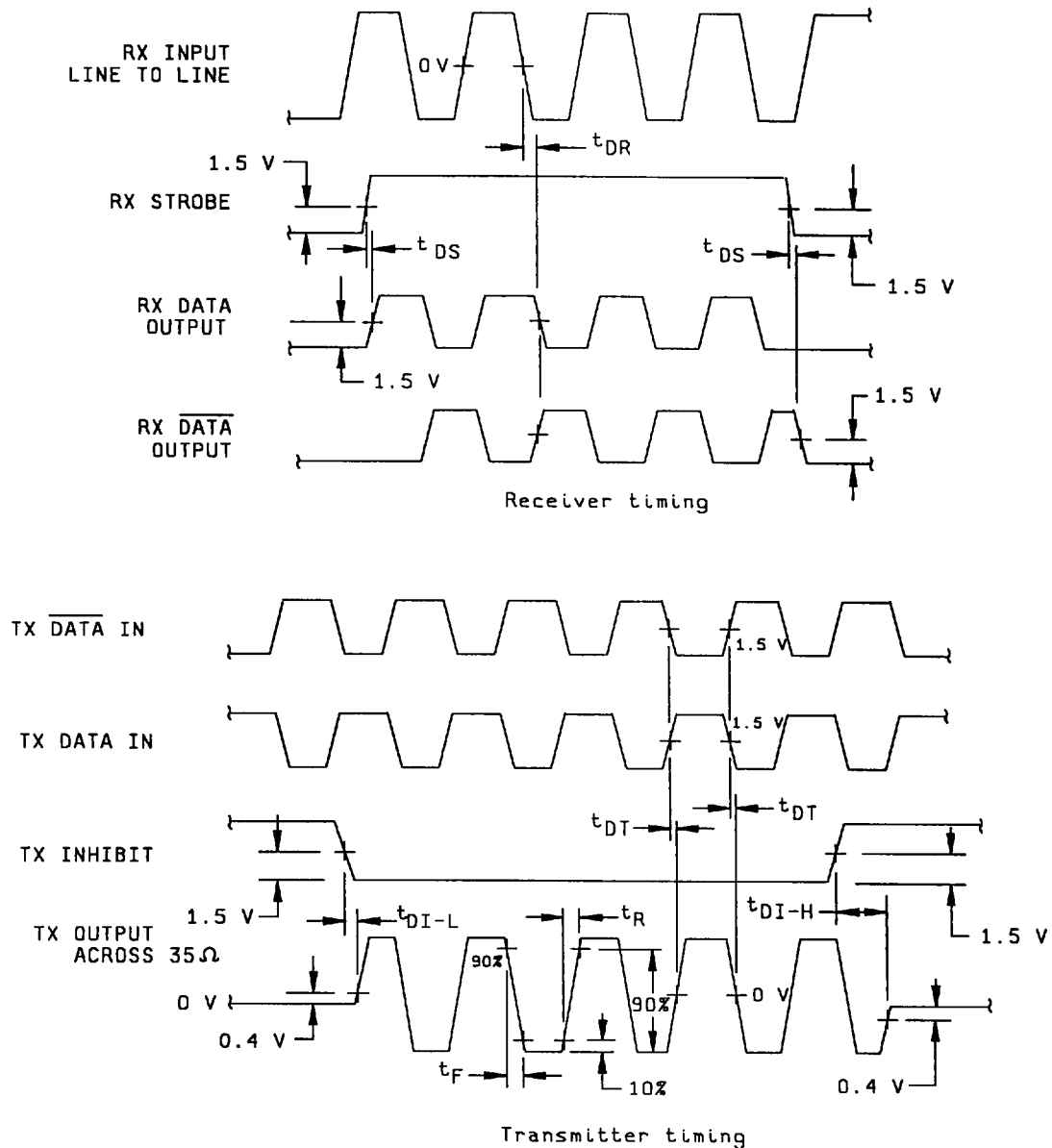
<b>STANDARD MICROCIRCUIT DRAWING DEFENSE SUPPLY CENTER COLUMBUS COLUMBUS, OHIO 43216-5000</b>	SIZE <b>A</b>		<b>5962-96741</b>
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Device type 01.



NOTE: Both inputs "TX DATA IN" and "TX DATA IN" must be in the same logic states during off times.

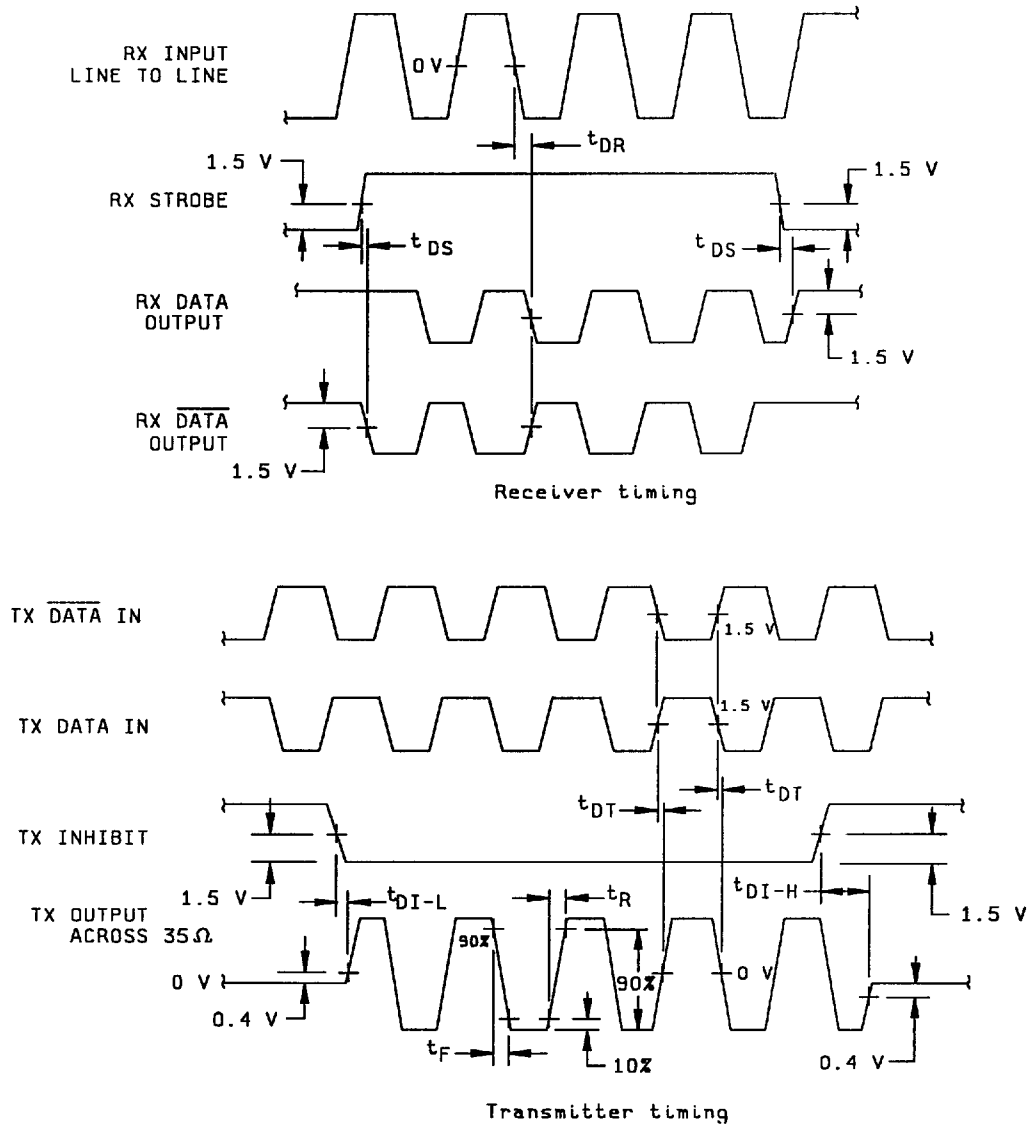
FIGURE 2. Timing waveforms.

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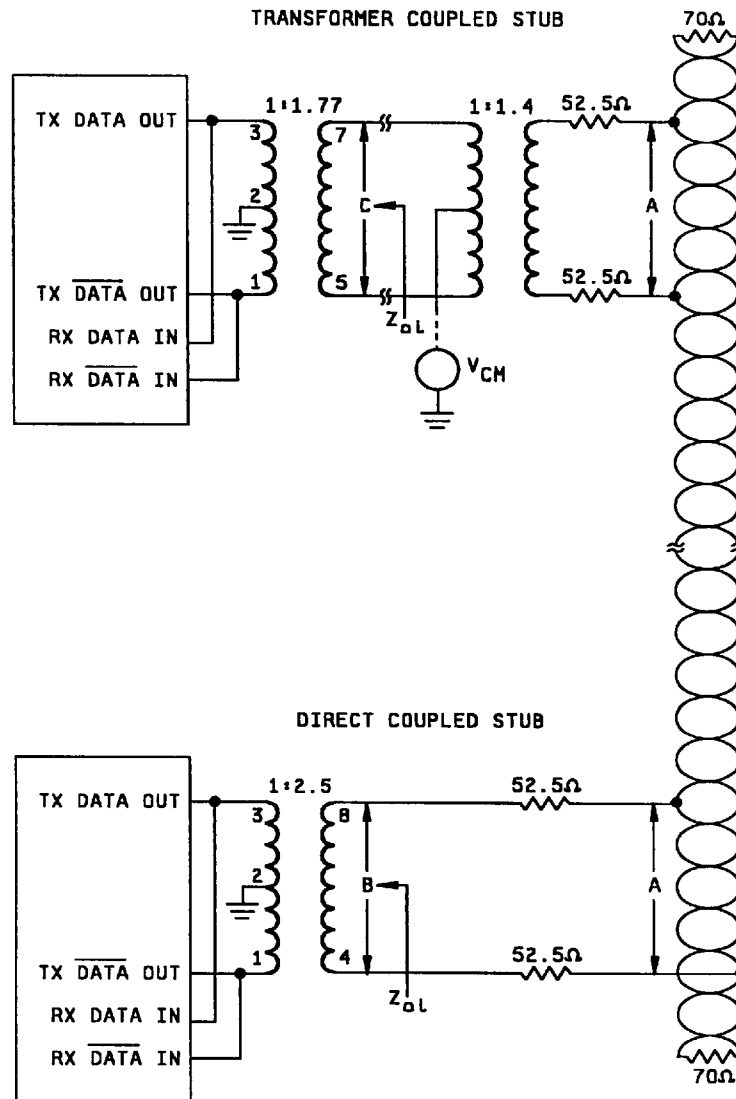
Device type 02.



NOTE: Both inputs "TX DATA IN" and "TX DATA IN" must be in the same logic states during off times.

FIGURE 2. Timing waveforms - Continued.

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**NOTE:**

1. Transformer is a Technitrol, part number 1553-45 or equivalent.

FIGURE 3. Typical bus 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	3, 6, 11
Final electrical parameters	1*, 2, 3, 4, 5, 6, 9, 10, 11
Group A test requirements	1, 2, 3, 4, 5, 6, 9, 10, 11
Group C end-point electrical parameters	1, 2, 3
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.

4.2 Screening. Screening shall be in accordance with 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)  $T_C$  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.

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 and 8 shall be omitted.

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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)  $T_C$  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.

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-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 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.

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## 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) 692-0676.

6.6 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 DSCC-VA and have agreed to this drawing.

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# STANDARD MICROCIRCUIT DRAWING SOURCE APPROVAL BULLETIN

DATE: 97-10-29

Approved sources of supply for SMD 5962-96741 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 1/	Vendor CAGE number	Vendor similar PIN 2/
5962-9674101H3A 5962-9674101H3C	88379 88379	ACT 4455 ACT 4455
5962-9674102H3A 5962-9674102H3C	88379 88379	ACT 4459 ACT 4459

- 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

88379

Vendor name  
and address

Aeroflex Circuit Technology Corporation  
35 South Service Road  
Plainview, NY 11803-4193

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

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