

REVISIONS

| LTR | DESCRIPTION  | DATE (YR-MO-DA) | APPROVED          |
|-----|--|-----------------|-------------------|
| A   | Drawing updated to reflect current requirements. - gt            | 02-07-03        | Raymond Monnin    |
| B   | Redrawn. Paragraphs updated to MIL-PRF-38535 requirements. - drw | 14-09-23        | Charles F. Saffle |

THE ORIGINAL FIRST SHEET OF THIS DRAWING HAS BEEN REPLACED

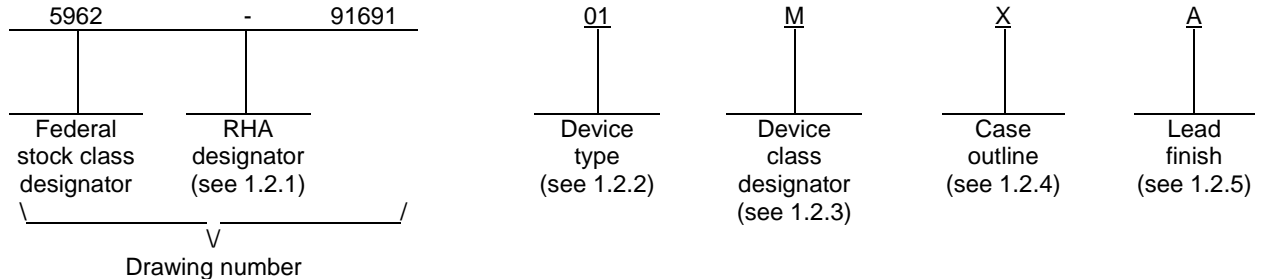
|            |       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |   |   |   |   |
|------------|-------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|---|---|---|---|
| REV        |       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |   |   |   |   |
| SHEET      |       |   |   |   |   |   |   |   |   |   |    |    |    |    |    |   |   |   |   |
| REV        | B     |   |   |   |   |   |   |   |   |   |    |    |    |    |    |   |   |   |   |
| SHEET      | 15    |   |   |   |   |   |   |   |   |   |    |    |    |    |    |   |   |   |   |
| REV STATUS | REV   | B | B | B | B | B | B | B | B | B | B  | B  | B  | B  | B  | B | B | B | B |
| OF SHEETS  | SHEET | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 |   |   |   |   |

|   |                                   |   |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|---|-----------------------------------|---|-----------|---------------------------|-------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| PMIC N/A  | PREPARED BY<br>Dan Wonnell        | <p align="center"><b>DLA LAND AND MARITIME</b><br/> <b>COLUMBUS, OHIO 43218-3990</b><br/> <a href="http://www.landandmaritime.dla.mil">http://www.landandmaritime.dla.mil</a></p> |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <p align="center"><b>STANDARD<br/>MICROCIRCUIT<br/>DRAWING</b></p> <p>THIS DRAWING IS AVAILABLE<br/>FOR USE BY ALL<br/>DEPARTMENTS<br/>AND AGENCIES OF THE<br/>DEPARTMENT OF DEFENSE</p> <p align="center">AMSC N/A</p> | CHECKED BY<br>Sandra Rooney       |   |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | APPROVED BY<br>Michael A. Frye    | <p align="center"><b>MICROCIRCUIT, LINEAR, ANALOG-TO-DIGITAL<br/>CONVERTER, 16-BIT, MONOLITHIC SILICON</b></p>  |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | DRAWING APPROVAL DATE<br>92-09-15 |   |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   | REVISION LEVEL<br>B               |   | SIZE<br>A | CAGE CODE<br><b>67268</b> | <b>5962-91691</b> |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |                                   | SHEET 1 OF 15   |           |                           |                   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. SCOPE

1.1 Scope. This drawing documents two product assurance class levels consisting of high reliability (device classes Q and M) 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. Device class M RHA marked devices meet the MIL-PRF-38535, appendix A 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>                     | <u>Linearity error</u> |
|--------------------|-----------------------|---|------------------------|
| 01                 | CS5101A-SD            | 16-Bit, 100 kHz Analog to Digital Converter | ±3.0 LSB               |
| 02                 | CS5101A-TD            | 16-Bit, 100 kHz Analog to Digital Converter | ±2.0 LSB               |

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>  |
|---------------------|---|
| M                   | Vendor self-certification to the requirements for MIL-STD-883 compliant, non-JAN class level B microcircuits in accordance with MIL-PRF-38535, appendix A |
| 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>         |
|-----------------------|-------------------------------|------------------|------------------------------|
| X                     | GDIP1-T28 or CDIP2-T28        | 28               | Dual-in-line                 |
| 3                     | CQCC1-N28                     | 28               | Square leadless chip carrier |

1.2.5 Lead finish. The lead finish is as specified in MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

|  |                  |                            |                   |
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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br><b>2</b> |

1.3 Absolute maximum ratings. 1/

|  |  |
|--|--|
| Positive digital supply voltage range ( $V_{D+}$ ) .....     | -0.3 V dc to 6.0 V dc 2/                           |
| Negative digital supply voltage range ( $V_{D-}$ ) .....     | +0.3 V dc to -6.0 V dc                             |
| Positive analog supply voltage range ( $V_{A+}$ ) .....      | -0.3 V dc to 6.0 V dc                              |
| Negative analog supply voltage range ( $V_{A-}$ ) .....      | +0.3 V dc to -6.0 V dc                             |
| Input current, any pin except supplies.....                  | $\pm 10$ mA 3/                                     |
| Analog input voltage range (AIN and $V_{REF}$ pins) .....    | ( $V_{A-}$ ) - 0.3 V dc to ( $V_{A+}$ ) + 0.3 V dc |
| Digital input voltage range.....                             | -0.3 V dc to ( $V_{D+}$ ) + 0.3 V dc               |
| Storage temperature range.....                               | -65°C to +150°C                                    |
| Lead temperature (soldering 10 seconds) .....                | +260°C   |
| Junction temperature ( $T_J$ ) .....                         | +160°C   |
| Thermal resistance, junction-to-case ( $\theta_{JC}$ ) ..... | See MIL-STD-1835                                   |
| Thermal resistance, junction-to-ambient ( $\theta_{JA}$ )    |  |
| Case X .....   | 40°C/W   |
| Case 3 .....   | 60°C/W   |
| Power dissipation.....                                       | 480 mW   |

1.4 Recommended operating conditions. 4/

|  |                                       |
|--|---------------------------------------|
| Ambient operating temperature range ( $T_A$ ).....       | -55°C to +125°C                       |
| Positive digital supply voltage range ( $V_{D+}$ ).....  | +4.50 V dc to $V_{A+}$                |
| Negative digital supply voltage range ( $V_{D-}$ ) ..... | -4.50 V dc to -5.50 V dc              |
| Positive analog supply voltage range ( $V_{A+}$ ).....   | +4.50 V dc to +5.50 V dc              |
| Negative analog supply voltage range ( $V_{A-}$ ).....   | -4.50 V dc to -5.50 V dc              |
| Analog reference voltage range ( $V_{REF}$ ) .....       | +2.50 V dc to ( $V_{A+}$ ) - 0.5 V dc |
| Analog input voltage range:                              |                                       |
| Unipolar .....   | AGND to $V_{REF}$                     |
| Bipolar .....  | - $V_{REF}$ to $V_{REF}$              |

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.

- 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/ In addition,  $V_{D+}$  must not be greater than ( $V_{A+}$ ) + 0.3 V dc.
- 3/ Transient currents of up to 100 mA will not cause latch-up.
- 4/ All voltages referenced to AGND and DGND tied together.

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|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br><b>3</b> |

(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.)

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. The individual item requirements for device class M shall be in accordance with MIL-PRF-38535, appendix A for non-JAN class level B devices and as specified 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 or MIL-PRF-38535, appendix A and herein for device class M.

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 Block diagram. The block diagram shall be as specified on figure 2.

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 II. 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. Marking for device class M shall be in accordance with MIL-PRF-38535, appendix A.

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. The compliance mark for device class M shall be a "C" as required in MIL-PRF-38535, appendix A.

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). For device class M, a certificate of compliance shall be required from a manufacturer in order to be listed as an approved source of supply in MIL-HDBK-103 (see 6.6.2 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 or for device class M, the requirements of MIL-PRF-38535, appendix A and herein.

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

3.8 Notification of change for device class M. For device class M, notification to DLA Land and Maritime -VA of change of product (see 6.2 herein) involving devices acquired to this drawing is required for any change that affects this drawing.

3.9 Verification and review for device class M. For device class M, DLA Land and Maritime, DLA Land and Maritime's agent, and the acquiring activity retain the option to review the manufacturer's facility and applicable required documentation. Offshore documentation shall be made available onshore at the option of the reviewer.

3.10 Microcircuit group assignment for device class M. Device class M devices covered by this drawing shall be in microcircuit group number 81 (see MIL-PRF-38535, appendix A).

|  |                  |                            |                   |
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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br><b>4</b> |

TABLE I. Electrical performance characteristics.

| Test  | Symbol          | Conditions<br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>unless otherwise specified | Group A<br>subgroups | Device<br>type | Limits<br><u>1/</u> |       | Unit |
|---|-----------------|---|----------------------|----------------|---------------------|-------|------|
|   |                 |   |                      |                | Min                 | Max   |      |
| Resolution for which no missing codes is guaranteed | RES             | <u>2/</u> , <u>3/</u>   | 1, 2, 3              | All            | 16                  |       | Bits |
| Integral linearity error                            | INL             | <u>2/</u>   | 1, 2, 3              | 01             |                     | ±3.0  | LSB  |
|   |                 |   |                      | 02             |                     | ±2.0  |      |
| Full-scale error                                    | FSE             | <u>2/</u>   | 1, 2, 3              | 01             |                     | ±5.0  | LSB  |
|   |                 |   |                      | 02             |                     | ±4.0  |      |
| Full-scale error drift                              | dFSE/dt         | <u>2/</u> , <u>4/</u> , <u>5/</u>   | 2, 3                 | All            |                     | ±5.0  | LSB  |
| Unipolar offset error                               | VOFF            | <u>2/</u>   | 1, 2, 3              | 01             |                     | ±5.0  | LSB  |
|   |                 |   |                      | 02             |                     | ±4.0  |      |
| Unipolar offset error drift                         | dVOFF/dt        | <u>2/</u> , <u>4/</u> , <u>5/</u>   | 2, 3                 | All            |                     | ±6.0  | LSB  |
| Bipolar offset error                                | BOFF            | <u>2/</u>   | 1, 2, 3              | 01             |                     | ±5.0  | LSB  |
|   |                 |   |                      | 02             |                     | ±3.0  |      |
| Bipolar offset error drift                          | dBOFF/dt        | <u>2/</u> , <u>4/</u> , <u>5/</u>   | 2, 3                 | All            |                     | ±5.0  | LSB  |
| Bipolar negative full-scale error                   | BNFSE           | <u>2/</u>   | 1, 2, 3              | 01             |                     | ±5.0  | LSB  |
|   |                 |   |                      | 02             |                     | ±3.0  |      |
| Bipolar negative full-scale error drift             | dBNFSE/dt       | <u>2/</u> , <u>4/</u> , <u>5/</u>   | 2, 3                 | All            |                     | ±2.0  | LSB  |
| Digital input voltage                               | V <sub>IH</sub> | <u>6/</u> , <u>7/</u>   | 1, 2, 3              | All            | 2.0                 |       | V    |
|   | V <sub>IL</sub> |   |                      |                |                     | 0.8   |      |
| Digital input current                               | I <sub>IN</sub> | <u>6/</u> , <u>7/</u>   | 1, 2, 3              | All            |                     | ±10   | μA   |
| Digital output voltage                              | V <sub>OL</sub> | Logic "0", I <sub>SINK</sub> = -1.6 mA<br><u>6/</u> , <u>7/</u>             | 1, 2, 3              | All            |                     | 0.4   | V    |
|   | V <sub>OH</sub> | Logic "1", I <sub>SOURCE</sub> = 100 μA<br><u>6/</u> , <u>7/</u>            |                      |                | (VD+)<br>-1.0       |       |      |
| Positive analog supply current                      | I <sub>A+</sub> | V <sub>A+</sub> = 5.5 V dc <u>2/</u> , <u>7/</u> , <u>8/</u>                | 1, 2, 3              | All            |                     | 28.0  | mA   |
| Negative analog supply current                      | I <sub>A-</sub> | V <sub>A-</sub> = -5.5 V dc <u>2/</u> , <u>7/</u> , <u>8/</u>               | 1, 2, 3              | All            |                     | -28.0 | mA   |
| Positive digital supply current                     | I <sub>D+</sub> | V <sub>D+</sub> = 5.5 V dc <u>2/</u> , <u>7/</u> , <u>8/</u>                | 1, 2, 3              | All            |                     | 15.0  | mA   |
| Negative digital supply current                     | I <sub>D-</sub> | V <sub>D-</sub> = -5.5 V dc <u>2/</u> , <u>7/</u> , <u>8/</u>               | 1, 2, 3              | All            |                     | -15.0 | mA   |
| Analog input capacitance in fine mode               | C <sub>IN</sub> | Unipolar mode <u>2/</u> , <u>4/</u>   | 4                    | All            |                     | 425   | pF   |
|   |                 | Bipolar mode <u>2/</u> , <u>4/</u>  |                      |                |                     | 265   |      |

See footnotes at end of table.

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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>5        |

TABLE I. Electrical performance characteristics – continued.

| Test  | Symbol             | Conditions<br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>unless otherwise specified | Group A<br>subgroups | Device<br>type | Limits<br><u>1/</u>        |                             | Unit |
|---|--------------------|---|----------------------|----------------|----------------------------|-----------------------------|------|
|   |                    |   |                      |                | Min                        | Max                         |      |
| Peak harmonic or spurious<br>noise              | S/PN               | Bipolar mode, full scale<br>amplitude, 1 kHz input <u>2/</u>                | 4, 5, 6              | 01             | 94                         |                             | dB   |
|   |                    |   |                      | 02             | 98                         |                             |      |
|   |                    | Bipolar mode, full scale<br>amplitude, 12 kHz input <u>2/</u>               |                      | 01             | 83                         |                             |      |
|   |                    |   |                      | 02             | 85                         |                             |      |
| Signal to noise ratio                           | S/(N+D)            | Bipolar mode, full scale<br>amplitude, 0 dB input <u>2/</u>                 | 4, 5, 6              | 01             | 87                         |                             | dB   |
|   |                    |   |                      | 02             | 90                         |                             |      |
| Acquisition time                                | t <sub>ACQ</sub>   | <u>2/</u> , <u>4/</u> , <u>9/</u>   | 9                    | All            |                            | 1.88                        | μs   |
| Conversion time                                 | t <sub>c</sub>     | <u>2/</u> , <u>7/</u>   | 9, 10, 11            | All            |                            | 8.12                        | μs   |
| Throughput                                      | f <sub>tp</sub>    | <u>2/</u> , <u>7/</u>   | 9, 10, 11            | All            | 100                        |                             | kHz  |
| RST pulse width                                 | t <sub>RST</sub>   | <u>4/</u> , <u>6/</u> , <u>10/</u> , <u>11/</u>                             | 9, 10, 11            | All            | 150                        |                             | ns   |
| CH1/2 edge to SSH,<br>TRK1, TRK2 falling        | t <sub>DFSH4</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>12/</u> , <u>13/</u>                | 9, 10, 11            | All            |                            | 68 t <sub>CLK</sub><br>+260 | ns   |
| HOLD to TRK1, TRK2,<br>falling                  | t <sub>DFSH1</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>14/</u> , <u>15/</u>                | 9, 10, 11            | All            | 66 t <sub>CLK</sub>        | 68 t <sub>CLK</sub><br>+260 | ns   |
| HOLD pulse width                                | t <sub>HOLD</sub>  | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>14/</u> , <u>16/</u>                | 9, 10, 11            | All            | 1 t <sub>CLK</sub><br>+20  | 63 t <sub>CLK</sub>         | ns   |
| HOLD to CH1/2 edge                              | t <sub>DHLRI</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>14/</u> , <u>16/</u>                | 9, 10, 11            | All            | 15                         | 64 t <sub>CLK</sub>         | ns   |
| HOLD falling to CLKIN<br>falling                | t <sub>HCF</sub>   | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>14/</u> , <u>17/</u>                | 9, 10, 11            | All            | 95                         | 1 t <sub>CLK</sub><br>+10   | ns   |
| SCLK input pulse period                         | t <sub>SCLK</sub>  | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>18/</u>                             | 9, 10, 11            | All            | 200                        |                             | ns   |
| SCLK input pulse width<br>low                   | t <sub>SCLKL</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>18/</u>                             | 9, 10, 11            | All            | 50                         |                             | ns   |
| SCLK input pulse width<br>high                  | t <sub>SCLKH</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>18/</u>                             | 9, 10, 11            | All            | 50                         |                             | ns   |
| SCLK input falling to<br>SDATA valid            | t <sub>DSS</sub>   | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>18/</u> , <u>19/</u>                | 9, 10, 11            | All            |                            | 150                         | ns   |
| SDATA valid before rising<br>SCLK               | t <sub>SS</sub>    | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>20/</u>                             | 9, 10, 11            | All            | 2 t <sub>CLK</sub><br>-100 |                             | ns   |
| SDATA valid after rising<br>SCLK                | t <sub>SH</sub>    | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>20/</u>                             | 9, 10, 11            | All            | 2 t <sub>CLK</sub><br>-100 |                             | ns   |
| Last rising SCLK to SDL<br>rising               | t <sub>RSDL</sub>  | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>20/</u>                             | 9, 10, 11            | All            |                            | 2 t <sub>CLK</sub><br>+165  | ns   |
| HOLD falling to 1 <sup>st</sup> falling<br>SCLK | t <sub>HFS</sub>   | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>20/</u>                             | 9, 10, 11            | All            | 6 t <sub>CLK</sub>         | 8 t <sub>CLK</sub><br>+165  | ns   |

See footnotes at end of table.

|  |                  |                            |                   |
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|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>6        |

TABLE I. Electrical performance characteristics – continued.

| Test   | Symbol            | Conditions<br>-55°C ≤ T <sub>A</sub> ≤ +125°C<br>unless otherwise specified | Group A<br>subgroups | Device<br>type | Limits<br><u>1/</u> |       | Unit |
|--|-------------------|---|----------------------|----------------|---------------------|-------|------|
|  |                   |   |                      |                | Min                 | Max   |      |
| $\overline{\text{HOLD}}$ falling to SDATA valid                            | t <sub>DHS</sub>  | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>21/</u>                             | 9, 10, 11            | All            |                     | 230   | ns   |
| $\overline{\text{TRK1}}$ , $\overline{\text{TRK2}}$ falling to SDATA valid | t <sub>DTS</sub>  | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>13/</u> , <u>19/</u> , <u>22/</u>   | 9, 10, 11            | All            |                     | 125   | ns   |
| CLKIN period   | t <sub>CLK</sub>  | <u>3/</u> , <u>4/</u> , <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>17/</u>     | 9, 10, 11            | All            | 108                 | 10000 | ns   |
| CLKIN low time   | t <sub>CLKL</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>17/</u>                             | 9, 10, 11            | All            | 37.5                |       | ns   |
| CLKIN high time  | t <sub>CLKH</sub> | <u>6/</u> , <u>7/</u> , <u>10/</u> , <u>17/</u>                             | 9, 10, 11            | All            | 37.5                |       | ns   |

- 1/ The limiting terms "min" (minimum) and "max" (maximum) shall be considered to apply to magnitudes only. Negative current shall be defined as conventional current flow out of a device terminal.
- 2/ Unless otherwise specified, V<sub>A+</sub>, V<sub>D+</sub> = +5.0 V; V<sub>A-</sub>, V<sub>D-</sub> = -5.0 V; V<sub>REF</sub> = +4.5 V dc; CLKIN = 8 MHz; f<sub>s</sub> = 100 kHz; analog source impedance = 50Ω with 1000 pF to ground; 1 kHz full scale input sine wave; bipolar mode; FRN mode; AIN1 and AIN2 tied together; each channel tested separately. Error tests are done after calibration at the temperature of interest.
- 3/ Clock speeds of less than 1.0 MHz at temperatures > +100°C, will degrade DNL performance.
- 4/ This parameter shall be measured only for initial characterization and after process or design changes which may affect this parameter.
- 5/ Total drift over -55°C to +125°C since calibration at power-up at +25°C.
- 6/ V<sub>A+</sub>, V<sub>D+</sub> = +5.0 V dc ± 10%; V<sub>A-</sub>, V<sub>D-</sub> = -5.0 V dc ± 10%.
- 7/ This parameter is guaranteed, if not tested, at T<sub>A</sub> = +25°C. This parameter is tested at T<sub>A</sub> = -55°C and +125°C.
- 8/ All outputs unloaded; inputs: Logic "0" = 0 V, logic "1" = V<sub>D+</sub>.
- 9/ Acquisition time is the time allowed by the converter for acquisition of the input voltage prior to conversion.
- 10/ Inputs: Logic "0" = 0 V, logic "1" = V<sub>D+</sub>; CL = 50 pF.
- 11/ See figure 3, rest timing diagram.
- 12/ These times are for FRN mode.
- 13/ See figure 4, FRN mode; control output timing diagram.
- 14/ These times are for SSC, PDT and RBT modes
- 15/ See figure 4, SSC, PDT, RBT modes, control output timing diagram.
- 16/ See figure 5, channel selection timing diagram.
- 17/ See figure 6, start conversion timing diagram.
- 18/ See figure 7, SCLK input (RBT and PDT mode); serial data timing diagram.
- 19/ See figure 8, register burst transmission (RBT mode); serial data timing diagram.
- 20/ See figure 7, SCLK output (SSC and FRN modes); serial data timing diagram.
- 21/ See figure 8, pipelined data transmission (PDT mode); data transmission timing diagram.
- 22/ Only valid for  $\overline{\text{TRK1}}$ ,  $\overline{\text{TRK2}}$  falling when SCLK is low. If SCLK is high when  $\overline{\text{TRK1}}$ ,  $\overline{\text{TRK2}}$  falls, then SDATA is valid t<sub>bss</sub> time after the next falling SCLK.

|  |                  |                            |                   |
|--|------------------|----------------------------|-------------------|
| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br><b>7</b> |

|                 |                       |
|-----------------|-----------------------|
| Device types    | 01 and 02             |
| Case outlines   | X and 3               |
| Terminal number | Terminal symbol       |
| 1               | $V_{D-}$              |
| 2               | $\overline{RST}$      |
| 3               | CLKIN                 |
| 4               | XOUT                  |
| 5               | $\overline{STBY}$     |
| 6               | DGND                  |
| 7               | $V_{D+}$              |
| 8               | $\overline{TRK1}$     |
| 9               | $\overline{TRK2}$     |
| 10              | CRS/ $\overline{FIN}$ |
| 11              | SSH/SDL               |
| 12              | $\overline{HOLD}$     |
| 13              | CH1/ $\sqrt{2}$       |
| 14              | SCLK                  |
| 15              | SDATA                 |
| 16              | CODE                  |
| 17              | BP/ $\overline{UP}$   |
| 18              | OUTMOD                |
| 19              | AIN1                  |
| 20              | $V_{REF}$             |
| 21              | REFBUF                |
| 22              | AGND                  |
| 23              | $V_{A-}$              |
| 24              | AIN2                  |
| 25              | $V_{A+}$              |
| 26              | $\overline{TEST}$     |
| 27              | SCKMOD                |
| 28              | $\overline{SLEEP}$    |

FIGURE 1. Terminal connections.

|  |                  |                            |                   |
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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br><b>8</b> |



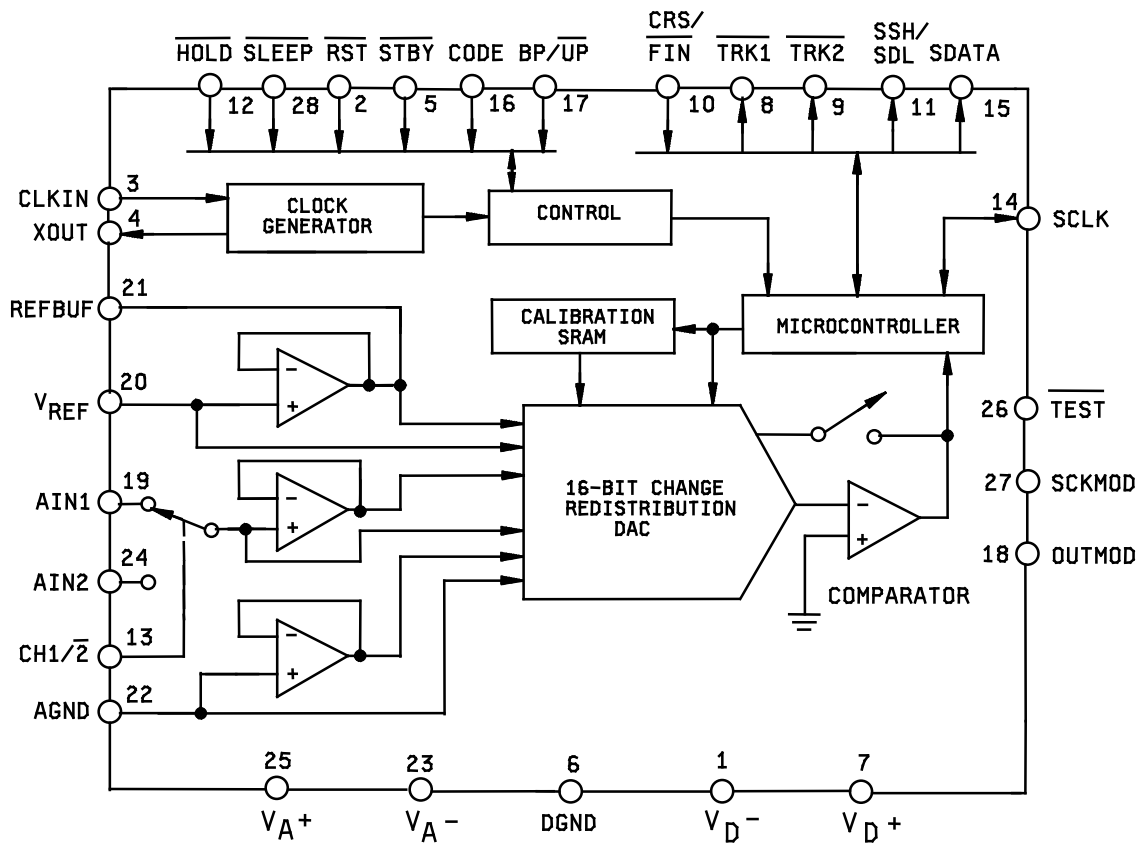


FIGURE 2. Block diagram.

**STANDARD  
MICROCIRCUIT DRAWING**  
DLA LAND AND MARITIME  
COLUMBUS, OHIO 43218-3990

SIZE  
**A**

**5962-91691**

REVISION LEVEL  
**B**

SHEET  
**9**

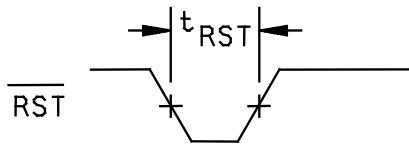


FIGURE 3. Reset timing diagram.

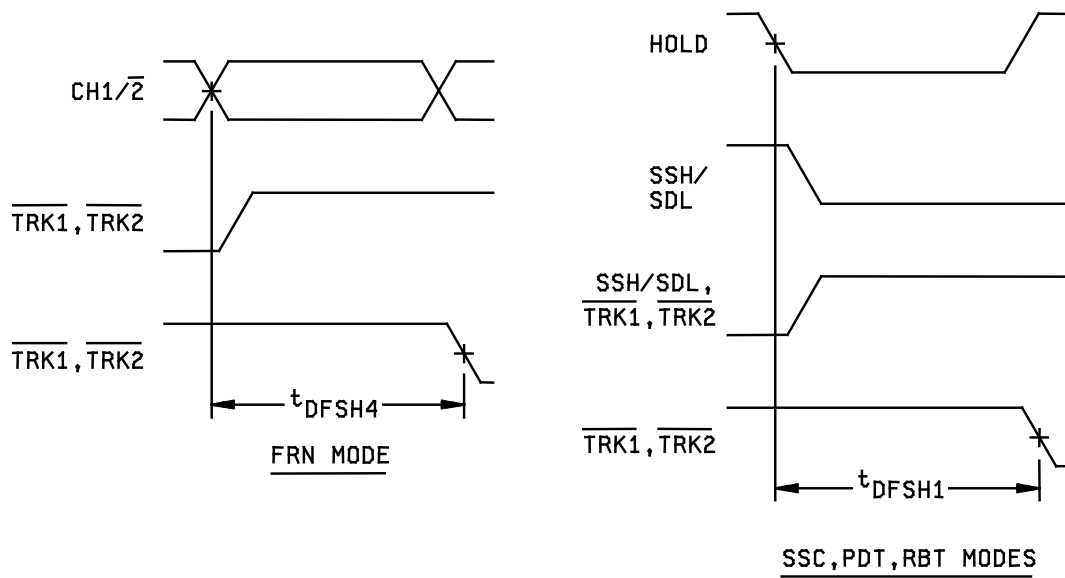


FIGURE 4. Control output timing diagram.

|  |                  |                            |                   |
|--|------------------|----------------------------|-------------------|
| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>10       |

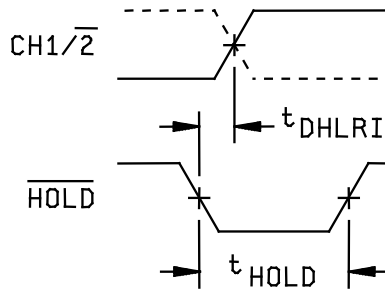


FIGURE 5. Channel selection timing diagram.

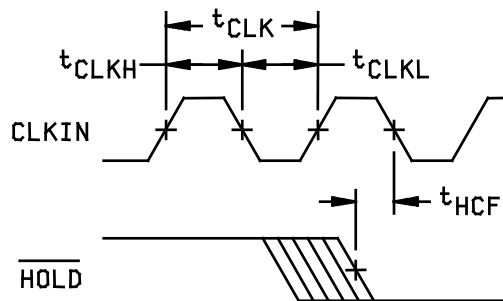


FIGURE 6. Start conversion timing diagram.

NOTE: All measurements are taken at 50 percent of the rise and fall edges.

|  |                  |                            |                   |
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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>11       |

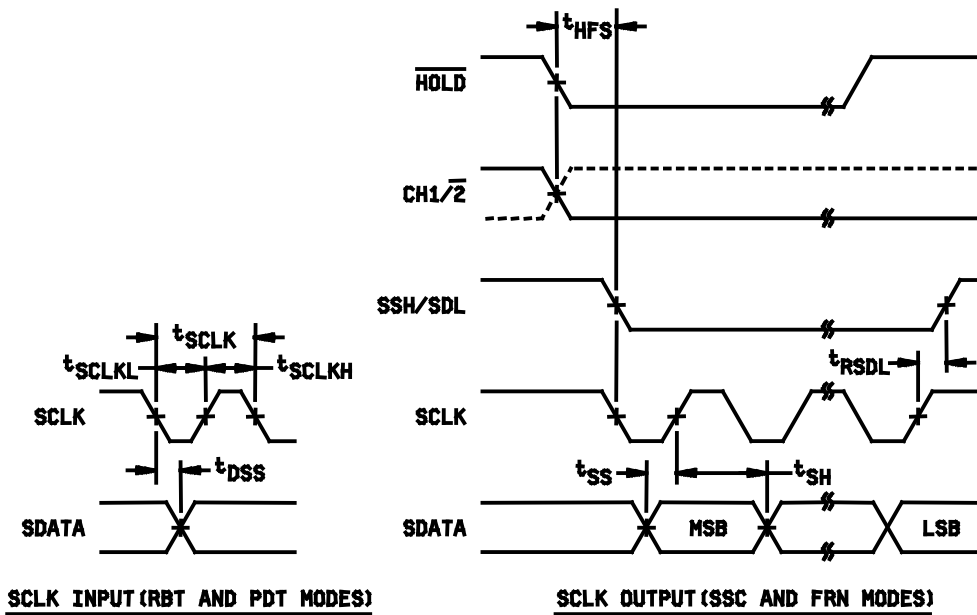


FIGURE 7. Serial data timing diagram.

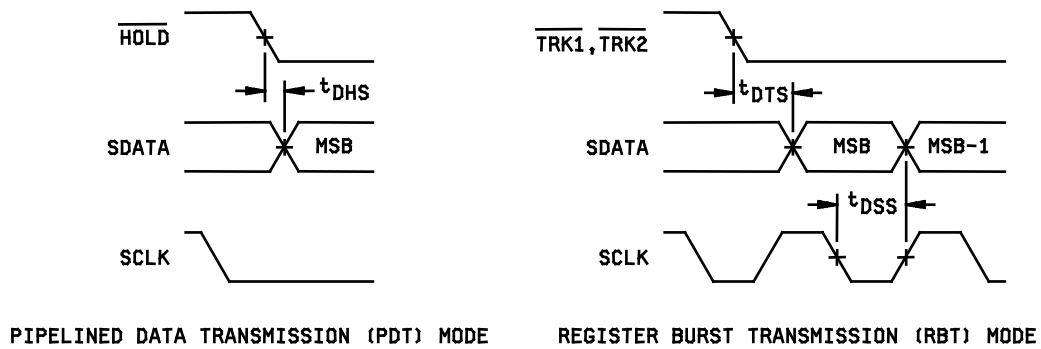


FIGURE 8. Data transmission timing diagram.

NOTE: All measurements are taken at 50 percent of the rise and fall edges.

|  |                  |                            |                   |
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| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>12       |

#### 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. For device class M, sampling and inspection procedures shall be in accordance with MIL-PRF-38535, appendix A.

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. For device class M, screening shall be in accordance with method 5004 of MIL-STD-883, and shall be conducted on all devices prior to quality conformance inspection.

##### 4.2.1 Additional criteria for device class M.

- a. Burn-in test, method 1015 of MIL-STD-883.
  - (1) Test condition D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.
  - (2)  $T_A = +125^{\circ}\text{C}$ , minimum.
- b. Interim and final electrical test parameters shall be as specified in table II herein.

##### 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 II 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. Quality conformance inspection for device class M shall be in accordance with MIL-PRF-38535, appendix A and as specified herein. Inspections to be performed for device class M shall be those specified in method 5005 of MIL-STD-883 and herein for groups A, B, C, D, and E inspections (see 4.4.1 through 4.4.4).

|  |                  |                            |                   |
|--|------------------|----------------------------|-------------------|
| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>13       |

4.4.1 Group A inspection.

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

TABLE II. Electrical test requirements.

| Test requirements                                    | Subgroups<br>(in accordance with<br>MIL-STD-883, method<br>5005, table I) | Subgroups<br>(in accordance with<br>MIL-PRF-38535, table III) |  |
|--|---|---|--|
|  | Device<br>class M   | Device<br>class Q   | Device<br>class V                        |
| Interim electrical<br>parameters (see 4.2)           | 1, 4  | 1, 4  | 1, 4                                     |
| Final electrical<br>parameters (see 4.2)             | 1, 2, 3, 4, 5, 6, 10, 11<br><u>1/</u>                                     | 1, 2, 3, 4, 5, 6,<br>10, 11 <u>1/</u>                         | 1, 2, 3, 4, 5, 6,<br>10, 11 <u>1/</u>    |
| Group A test<br>requirements (see 4.4)               | 1, 2, 3, 4, 5, 6, 9, 10, 11<br><u>2/</u>                                  | 1, 2, 3, 4, 5, 6,<br>9, 10, 11 <u>2/</u>                      | 1, 2, 3, 4, 5, 6,<br>9, 10, 11 <u>2/</u> |
| Group C end-point electrical<br>parameters (see 4.4) | 1, 4, 9   | 1, 4, 9   | ---                                      |
| Group D end-point electrical<br>parameters (see 4.4) | 1, 4, 9   | 1, 4, 9   | 1, 4, 9                                  |
| Group E end-point electrical<br>parameters (see 4.4) | ---   | ---   | ---                                      |

- 1/ PDA applies to subgroup 1.
- 2/ Subgroups 9 will be guaranteed if not tested.

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

4.4.2.1 Additional criteria for device class M. Steady-state life test conditions, method 1005 of MIL-STD-883:

- a. Test condition D. The test circuit shall be maintained by the manufacturer under document revision level control and shall be made available to the preparing or acquiring 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.
- b.  $T_A = +125^\circ\text{C}$ , minimum.
- c. Test duration: 1,000 hours, except as permitted by method 1005 of MIL-STD-883.

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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|--|------------------|----------------------------|-------------------|
| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>14       |

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

- a. End-point electrical parameters shall be as specified in table II herein.
- b. For device classes Q and V, the devices or test vehicle shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535 for the RHA level being tested. For device class M, the devices shall be subjected to radiation hardness assured tests as specified in MIL-PRF-38535, appendix A for the RHA level being tested. All device classes must meet the postirradiation end-point electrical parameter limits as defined in table I at  $T_A = +25^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , after exposure, to the subgroups specified in table II herein.

## 5. PACKAGING

5.1 Packaging requirements. The requirements for packaging shall be in accordance with MIL-PRF-38535 for device classes Q and V or MIL-PRF-38535, appendix A for device class M.

## 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.

6.1.2 Substitutability. Device class Q devices will replace device class M devices.

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.

6.6.2 Approved sources of supply for device class M. Approved sources of supply for class M are listed in MIL-HDBK-103. The vendors listed in MIL-HDBK-103 have agreed to this drawing and a certificate of compliance (see 3.6 herein) has been submitted to and accepted by DLA Land and Maritime -VA.

|  |                  |                            |                   |
|--|------------------|----------------------------|-------------------|
| <b>STANDARD<br/>MICROCIRCUIT DRAWING</b><br>DLA LAND AND MARITIME<br>COLUMBUS, OHIO 43218-3990 | SIZE<br><b>A</b> |                            | <b>5962-91691</b> |
|  |                  | REVISION LEVEL<br><b>B</b> | SHEET<br>15       |

STANDARD MICROCIRCUIT DRAWING BULLETIN

DATE: 14-09-23

Approved sources of supply for SMD 5962-91691 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<br>PIN <u>1/</u> | Vendor CAGE number | Vendor similar<br>PIN <u>2/</u> |
|--|--------------------|---------------------------------|
| 5962-9169101MXA                                | 68911              | SEI5101A-SD8B                   |
| 5962-9169101QXC                                | 68911              | SEI5101A-SD8B                   |
| 5962-9169101QXC                                | 3RHN0              | 5101A-SD8B                      |
| 5962-9169101M3A                                | 68911              | SEI5101A-SE8B                   |
| 5962-9169101Q3C                                | 68911              | SEI5101A-SE8B                   |
| 5962-9169101Q3C                                | 3RHN0              | 5101A-SE8B                      |
| 5962-9169102MXA                                | 68911              | SEI5101A-TD8B                   |
| 5962-9169102QXC                                | 68911              | SEI5101A-TD8B                   |
| 5962-9169102QXC                                | 3RHN0              | 5101A-TD8B                      |
| 5962-9169102M3A                                | 68911              | SEI5101A-TE8B                   |
| 5962-9169102Q3C                                | 68911              | SEI5101A-TE8B                   |
| 5962-9169102Q3C                                | 3RHN0              | 5101A-TE8B                      |

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

Vendor name and address

68911

Maxwell Technologies Electronics  
Components Group, Inc.  
9244 Balboa Ave.  
San Diego, CA 92123

3RHN0

XTREME Semiconductor  
2801 Oakmont Drive, Bldg. A, Suite 700  
Round Rock, TX 78664

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