INCH-POUND
MIL-M-38510/319C
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SUPERSEDING
MIL-M-38510/319B
4 March 1985

MILITARY SPECIFICATION

# MICROCIRCUITS, DIGITAL, LOW-POWER SCHOTTKY TTL, 4 BY 4 REGISTER FILE, CASCADABLE, MONOLITHIC SILICON

Inactive for new design after 18 April 1997.

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, Schottky TTL, low-power, 4 by 4 register file microcircuits. Two product assurance classes and a choice of case outlines and lead finishes are provided for each type and are reflected in the complete part number. For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).

1.2 Part number. The part number should be in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types should be as follows:

| Device type | Circuit |
|---|---|
| 01 | 4 by 4 register file with 3-state outputs, cascadable |
| 02 | 4 by 4 register file with open collector outputs, cascadable |

1.2.2 Device class. The device class should be the product assurance level as defined in MIL-PRF-38535.

1.2.3 Case outlines. The case outlines should be as designated in MIL-STD-1835 and as follows:

| Outline letter | Descriptive designator | Terminals | Package style |
|---|---|---|---|
| E | GDIP1-T16 or CDIP2-T16 | 16 | Dual-in-line |
| F | GDFP2-F16 or CDFP3-F16 | 16 | Flat pack |
| 2 | CQCC1-N20 | 20 | Square leadless chip carrier |

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, P. O. Box 3990, Columbus, OH 43216-5000, by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A FSC 5962

1.3 Absolute maximum ratings.

| | |
|---|---|
| Supply voltage range | -0.5 V dc to 7.0 V dc |
| Input voltage range | -1.5 V at -18 mA to 5.5 V |
| Storage temperature range | -65° to +150°C |
| Maximum power dissipation ($P_D$) 1/ | |
| Device type 01 | 275 mW |
| Device type 02 | 220 mW |
| Lead temperature (soldering, 10 seconds) | 300°C |
| Thermal resistance, junction to case ($\theta_{JC}$): | |
| Cases E, F, and 2 | (See MIL-STD-1835) |
| Junction temperature ($T_J$) 2/ | +175°C |

1.4 Recommended operating conditions.

| | |
|---|---|
| Supply voltage ($V_{CC}$) | 4.5 V minimum to 5.5 V maximum |
| Minimum high level input voltage ($V_{IH}$) | 2.0 V |
| Maximum low level input voltage ($V_{IL}$) | 0.7 V |
| Case operating temperature range ($T_C$) | -55°C to +125°C |
| Minimum width of write enable or read enable pulse | 25 ns |
| Minimum setup time (data) | 10 ns |
| Minimum setup time (write select) | 15 ns |
| Minimum hold time (data) | 15 ns (with respect to GW) |
| Minimum hold time (write select) | 5 ns |
| Minimum latch time for new data | 25 ns |

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and Standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Departments of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation.

SPECIFICATION

DEPARTMENT OF DEFENSE

MIL-PRF-38535 - Integrated Circuits (Microcircuits) Manufacturing, General Specification for.

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-883 - Test Method Standard for Microelectronics.
MIL-STD-1835 - Interface Standard Electronic Component Case Outlines

(Unless otherwise indicated, copies of the above specifications and standards are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

1/ Must withstand the added $P_D$ due to short-circuit test (e.g., $I_{OS}$).
2/ Maximum junction temperature shall not be exceeded except for allowable short duration burn-in screening conditions in accordance with MIL-PRF-38535.

3. REQUIREMENTS

3.1 Qualification. Microcircuits furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturers list before contract award (see 4.3 and 6.4).

3.2 Item requirements. The individual item requirements shall be in accordance with MIL-PRF-38535 and 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.

3.3 Design, construction, and physical dimensions. The design, construction, and physical dimensions shall be as specified in MIL-PRF-38535 and herein.

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

3.3.2 Truth table. The truth table shall be as specified on figure 2.

3.3.3 Logic diagram. The logic diagram shall be as specified on figure 3.

3.3.4 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity upon request.

3.3.5 Case outlines. The case outlines shall be as specified in 1.2.3.

3.4 Lead material and finish. The lead material and finish shall be in accordance with MIL-PRF-38535 (see 6.6).

3.5 Electrical performance characteristics. The electrical performance characteristics are as specified in table I, and apply over the full recommended case operating temperature range, unless otherwise specified.

3.6 Electrical test requirements. The electrical test requirements for each device class shall be the subgroups specified in table II. The electrical tests for each subgroup are described in table III.

3.7 Marking. Marking shall be in accordance with MIL-PRF-38535.

3.8 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 12 (see MIL-PRF-38535, appendix A).

4. VERIFICATION

4.1 Sampling and inspection. 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 effect the form, fit, or function as described herein.

4.2 Screening. Screening shall be in accordance with, MIL-PRF-38535 and shall be conducted on all devices prior to qualification and quality conformance inspection. The following additional criteria shall apply:

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 control by 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 test method 1015 of MIL-STD-883.

b. Interim and final electrical test parameters shall be as specified in table II, except interim electrical parameters test prior to burn-in is optional at the discretion of the manufacturer.

c. Additional screening for space level product shall be as specified in MIL-PRF-38535, appendix B.

TABLE I. Electrical performance characteristics.

| Test | Symbol | Conditions<br>$-55°C \le T_C \le +125°C$ | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|
| | | | | Min | Max | |
| High level output voltage | $V_{OH}$ | $V_{CC}$ = 4.5 V, $V_{IN}$ = 2.0 V<br>$I_{OH}$ = -1 mA | 01 | 2.4 | | V |
| Collector cutoff current | $I_{CEX}$ | $V_{CC}$ = 4.5 V, $V_{OH}$ = 5.5 V | 02 | | 20 | µA |
| Low level output voltage | $V_{OL}$ | $V_{CC}$ = 4.5 V, $V_{IN}$ = 0.7 V<br>$I_{OL}$ = 4 mA | 01, 02 | | 0.4 | V |
| Input clamp voltage | $V_{IC}$ | $V_{CC}$ = 4.5 V, $I_{IN}$ = -18 mA,<br>$T_C$ = +25°C | 01, 02 | | -1.5 | V |
| High level input current all inputs except GR and GW | $I_{IH1}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 2.7 V | 01, 02 | | 20 | µA |
| High level input current at GR | $I_{IH2}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 2.7 V | 01 | | 60 | µA |
| | | | 02 | | 40 | |
| High level input current at GW | $I_{IH3}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 2.7 V | 01, 02 | | 40 | µA |
| High level input current all inputs except GR and GW | $I_{IH4}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 5.5 V | 01, 02 | | 100 | µA |
| High level input current at GR | $I_{IH5}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 5.5 V | 01 | | 300 | µA |
| | | | 02 | | 200 | |
| High level input current at GW | $I_{IH6}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 5.5 V | 01, 02 | | 200 | µA |
| Off state output current, high level voltage applied | $I_{OZH}$ | $V_{CC}$ = 5.5 V, $V_O$ = 2.7 V | 01 | | 20 | µA |
| Off state output current: low level voltage applied | $I_{OZL}$ | $V_{CC}$ = 5.5 V, $V_O$ = 0.4 V | 01 | | -20 | µA |
| Low level input current at data, read select, and write select | $I_{IL1}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 0.4 V | 01, 02 | -0.5 | -460 | µA |
| Low level input current at read enable | $I_{IL2}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 0.4 V | 01 | -90 | -1300 | µA |
| | | | 02 | -90 | -900 | |
| Low level input current at write enable | $I_{IL3}$ | $V_{CC}$ = 5.5 V, $V_{IN}$ = 0.4 V | 01, 02 | -60 | -840 | µA |
| Short circuit output current | $I_{OS}$ | $V_{CC}$ = 5.5 V 1/ | 01 | -15 | -130 | mA |
| Supply current | $I_{CC}$ | $V_{CC}$ = 5.5 V | 01 | | 50 | mA |
| | | | 02 | | 40 | |

See footnote at end of table.

TABLE I. Electrical performance characteristics - Continued.

| Test | Symbol | Conditions<br>$-55°C \le T_C \le +125°C$ | Device type | Limits | | Unit |
|---|---|---|---|---|---|---|
| | | | | Min | Max | |
| Propagation delay time, low to high level from data | $t_{PLH1}$ | $V_{CC}$ = 5.0 V, $C_L$ = 50 pF ±10%, $R_L$ = 316 Ω ±5% for device type 01, $R_L$ = 2 kΩ ±5% for device type 02 | 01 | 2 | 65 | ns |
| | | | 02 | 2 | 65 | |
| Propagation delay time, low to high level from read select | $t_{PLH2}$ | | 01 | 2 | 58 | ns |
| | | | 02 | 2 | 58 | |
| Propagation delay time, high to low level from data | $t_{PHL1}$ | | 01 | 2 | 58 | ns |
| | | | 02 | 2 | 52 | |
| Propagation delay time, low to high level from read select | $t_{PHL2}$ | | 01 | 2 | 65 | ns |
| | | | 02 | 2 | 58 | |
| Propagation delay time, low to high level from write enable | $t_{PLH3}$ | | 01 | 2 | 65 | ns |
| | | | 02 | 2 | 65 | |
| Propagation delay time, low to high level from read enable | $t_{PLH4}$ | | 02 | 2 | 46 | ns |
| Propagation delay time, high to low level from write enable | $t_{PHL3}$ | | 01 | 2 | 72 | ns |
| | | | 02 | 2 | 58 | |
| Propagation delay time, high to low level from read enable | $t_{PHL4}$ | | 02 | 2 | 46 | ns |
| Output enable time to low level | $t_{PZL}$ | | 01 | 2 | 58 | ns |
| Output enable time to high level | $t_{PZH}$ | | 01 | 2 | 52 | ns |
| Output disable time to low level | $t_{PLZ}$ | | 01 | 2 | 52 | ns |
| Output disable time to high level | $t_{PHZ}$ | | 01 | 2 | 72 | ns |

1/ Not more than one output should be shorted at one time.

TABLE II. Electrical test requirements.

| MIL-PRF-38535 test requirements | Subgroups (see table III) | |
|---|---|---|
| | Class S devices | Class B devices |
| Interim electrical parameters | 1 | 1 |
| Final electrical test parameters | 1*, 2, 3, 7, 9, 10, 11 | 1*, 2, 3, 7, 9 |
| Group A test requirements | 1, 2, 3, 7, 8, 9, 10, 11 | 1, 2, 3, 7, 8, 9, 10, 11 |
| Group B electrical test parameters when using method 5005 QCI option | 1, 2, 3, 7, 8 9, 10, 11 | N/A |
| Group C end-point electrical parameters | 1, 2, 3, 7, 8 9, 10, 11 | 1, 2, 3 |
| Group D end-point electrical parameters | 1, 2, 3 | 1, 2, 3 |

*PDA applies to subgroup 1.

4.3 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-38535.

4.4 Technology Conformance Inspection (TCI). Technology conformance inspection shall be in accordance with MIL-PRF-38535 and herein for groups A, B, C, and D inspections (see 4.4.1 through 4.4.4).

4.4.1 Group A inspection. Group A inspection shall be in accordance with table III of MIL-PRF-38535 and as follows:

a. Tests shall be as specified in table II herein.

b. Subgroups 4, 5, and 6 shall be omitted.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II MIL-PRF-38535.

4.4.3 Group C inspection. Group C inspection shall be in accordance with table IV of MIL-PRF-38535 and as follows:

a. End-point electrical parameters shall be as specified in table II herein.

b. 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 burn-in test circuit shall be maintained under document control by 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 test method 1005 of MIL-STD-883.

4.4.4 Group D inspection. Group D inspection shall be in accordance with table V of MIL-PRF-38535. End-point electrical parameters shall be as specified in table II herein.

4.5 Methods of inspection. Methods of inspection shall be specified and as follows:

4.5.1 Voltage and current. All voltages given are referenced to the microcircuit ground terminal. Currents given are conventional and positive when flowing into the referenced terminal.

| Pin number | Pin identification Device types 01 and 02 | |
|---|---|---|
| | Case 2 | Case E, F |
| 1 | NC | Data D2 |
| 2 | Data D2 | Data D3 |
| 3 | Data D3 | Data D4 |
| 4 | Data D4 | Read Select RB |
| 5 | Read Select RB | Read Select RA |
| 6 | NC | Output Q4 |
| 7 | Read Select RA | Output Q3 |
| 8 | Output Q4 | GND |
| 9 | Output Q3 | Output Q2 |
| 10 | GND | Output Q1 |
| 11 | NC | Read Enable GR |
| 12 | Output Q2 | Write Enable GW |
| 13 | Output Q1 | Write Select WB |
| 14 | Read Enable GR | Write Select WA |
| 15 | Write Enable GW | Data D1 |
| 16 | NC | $V_{CC}$ |
| 17 | Write Select WB | |
| 18 | Write Select WA | |
| 19 | Data D1 | |
| 20 | $V_{CC}$ | |

FIGURE 1. Terminal connections.

Device type 01

Write function table (see notes A, B, and C)

| Write inputs | | | Word | | | |
|---|---|---|---|---|---|---|
| WB | WA | GW | Q | 1 | 2 | 3 |
| L | L | L | Q = D | $Q_0$ | $Q_0$ | $Q_0$ |
| L | H | L | $Q_0$ | Q = D | $Q_0$ | $Q_0$ |
| H | L | L | $Q_0$ | $Q_0$ | Q = D | $Q_0$ |
| H | H | L | $Q_0$ | $Q_0$ | $Q_0$ | Q = D |
| X | X | H | $Q_0$ | $Q_0$ | $Q_0$ | $Q_0$ |

Read function table (see notes A and D)

| Read inputs | | | Outputs | | | |
|---|---|---|---|---|---|---|
| RB | RA | GR | Q1 | Q2 | Q3 | Q4 |
| L | L | L | W0B1 | W0B2 | W0B3 | W0B4 |
| L | H | L | W1B1 | W1B2 | W1B3 | W1B4 |
| H | L | L | W2B1 | W2B2 | W2B3 | W2B4 |
| H | H | L | W3B1 | W3B2 | W3B3 | W3B4 |
| X | X | H | Z | Z | Z | Z |

NOTES:
A. H = high level, L = low level, X = irrelevant, Z = high impedance (off)
B. (Q = D) - The four selected internal flip-flop outputs will assume the states applied to the four external data inputs.
C. $Q_0$ = the level of Q before the indicated input conditions were established.
D. W0B1 = The first bit of word 0, etc.

Device type 02

Write function table (see notes A, B, and C)

| Write inputs | | | Word | | | |
|---|---|---|---|---|---|---|
| WB | WA | GW | Q | 1 | 2 | 3 |
| L | L | L | Q = D | $Q_0$ | $Q_0$ | $Q_0$ |
| L | H | L | $Q_0$ | Q = D | $Q_0$ | $Q_0$ |
| H | L | L | $Q_0$ | $Q_0$ | Q = D | $Q_0$ |
| H | H | L | $Q_0$ | $Q_0$ | $Q_0$ | Q = D |
| X | X | H | $Q_0$ | $Q_0$ | $Q_0$ | $Q_0$ |

Read function table (see notes A and D)

| Read inputs | | | Outputs | | | |
|---|---|---|---|---|---|---|
| RB | RA | GR | Q1 | Q2 | Q3 | Q4 |
| L | L | L | W0B1 | W0B2 | W0B3 | W0B4 |
| L | H | L | W1B1 | W1B2 | W1B3 | W1B4 |
| H | L | L | W2B1 | W2B2 | W2B3 | W2B4 |
| H | H | L | W3B1 | W3B2 | W3B3 | W3B4 |
| X | X | H | H | H | H | H |

NOTES:
A. H = high level, L = low level, X = irrelevant
B. (Q = D) - The four selected internal flip-flop outputs will assume the states applied to the four external data inputs.
C. $Q_0$ = the level of Q before the indicated input conditions were established.
D. W0B1 = The first bit of word 0, etc.

FIGURE 2. Truth tables.

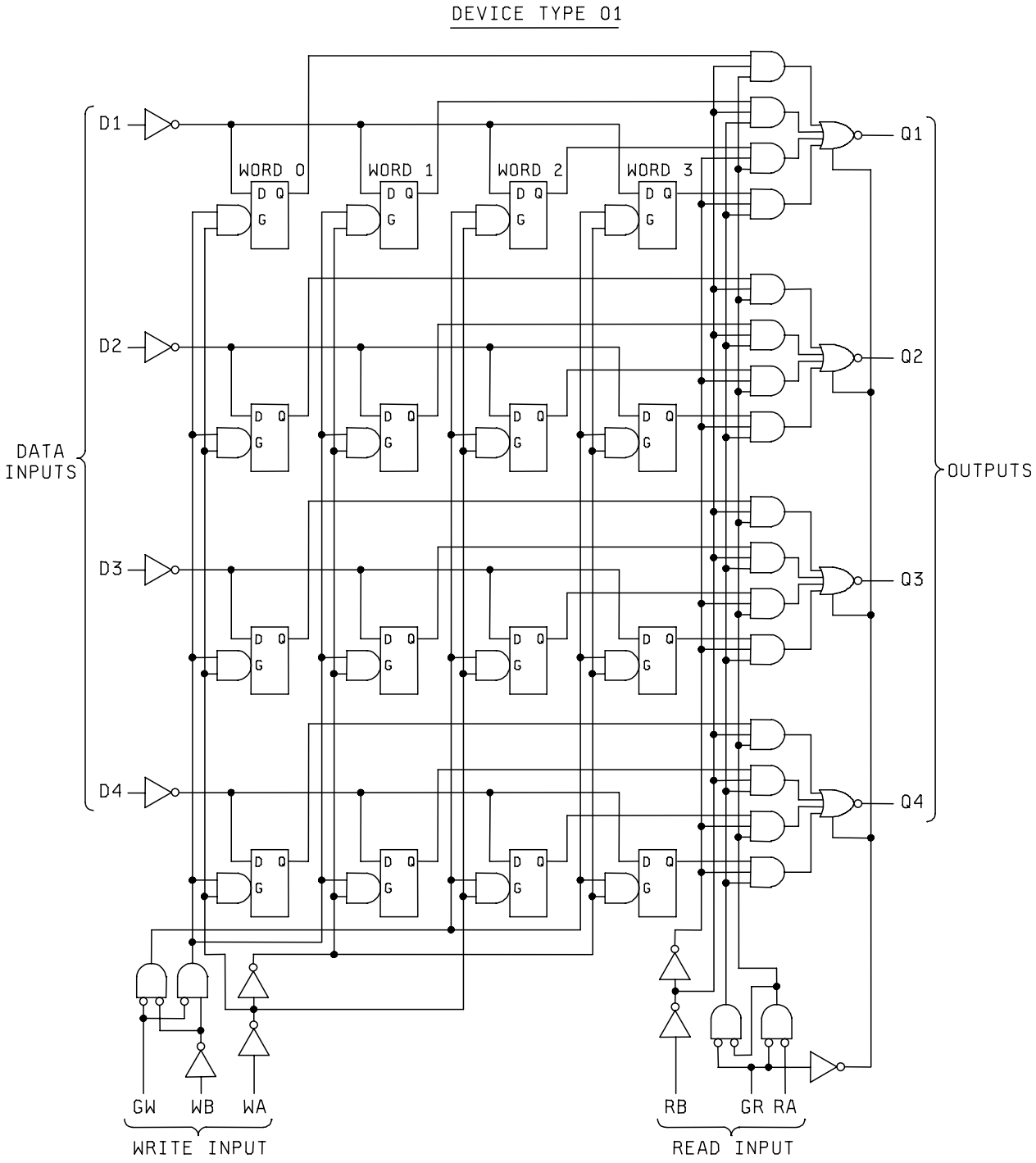



FIGURE 3 Logic diagram.

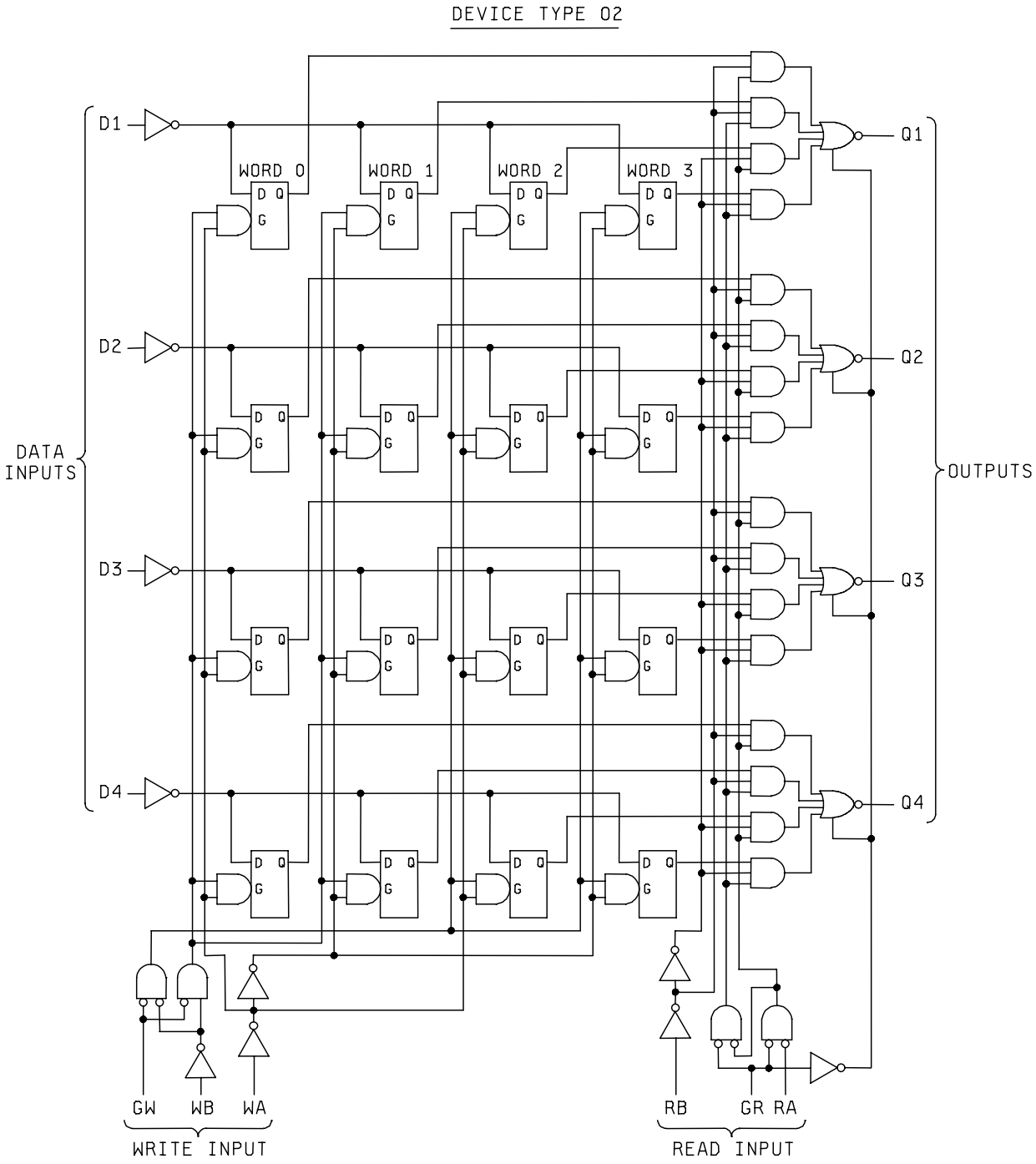
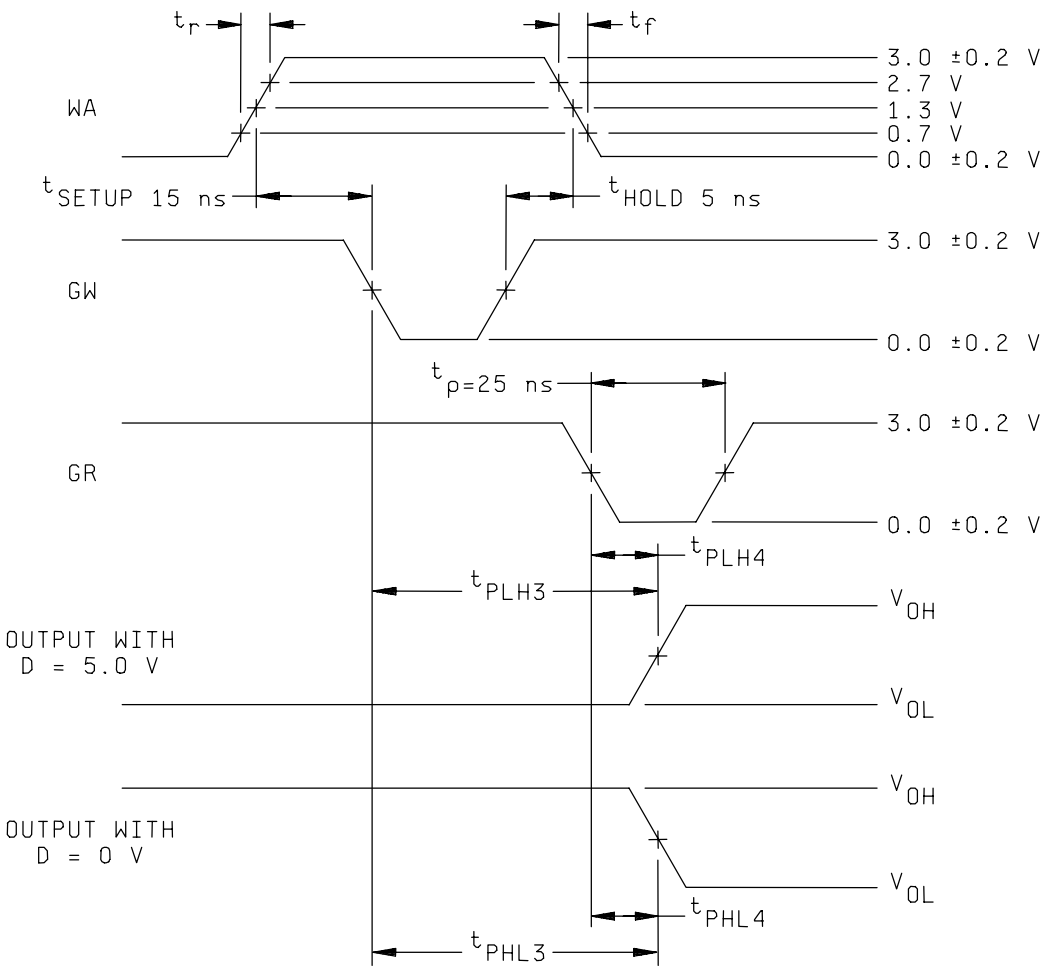



FIGURE 3 Logic diagram - Continued.




NOTES:

1. Input pulse characteristics: PRR ≤ 1.0 MHz, $t_r$ ≤ 15 ns, $t_f$ ≤ 6 ns, duty cycle = 50% ±15%.
2. $C_L$ = 50 pF ±10%. $C_L$ includes probe and jig capacitance.
3. All diodes are 1N3064 and 1N916.
4. Load circuits on a given output are required only where the specific test given in table III indicates "OUT" on that output. Load circuits may otherwise be omitted.

FIGURE 4. Switching test circuit and waveforms for device types 01 and 02.

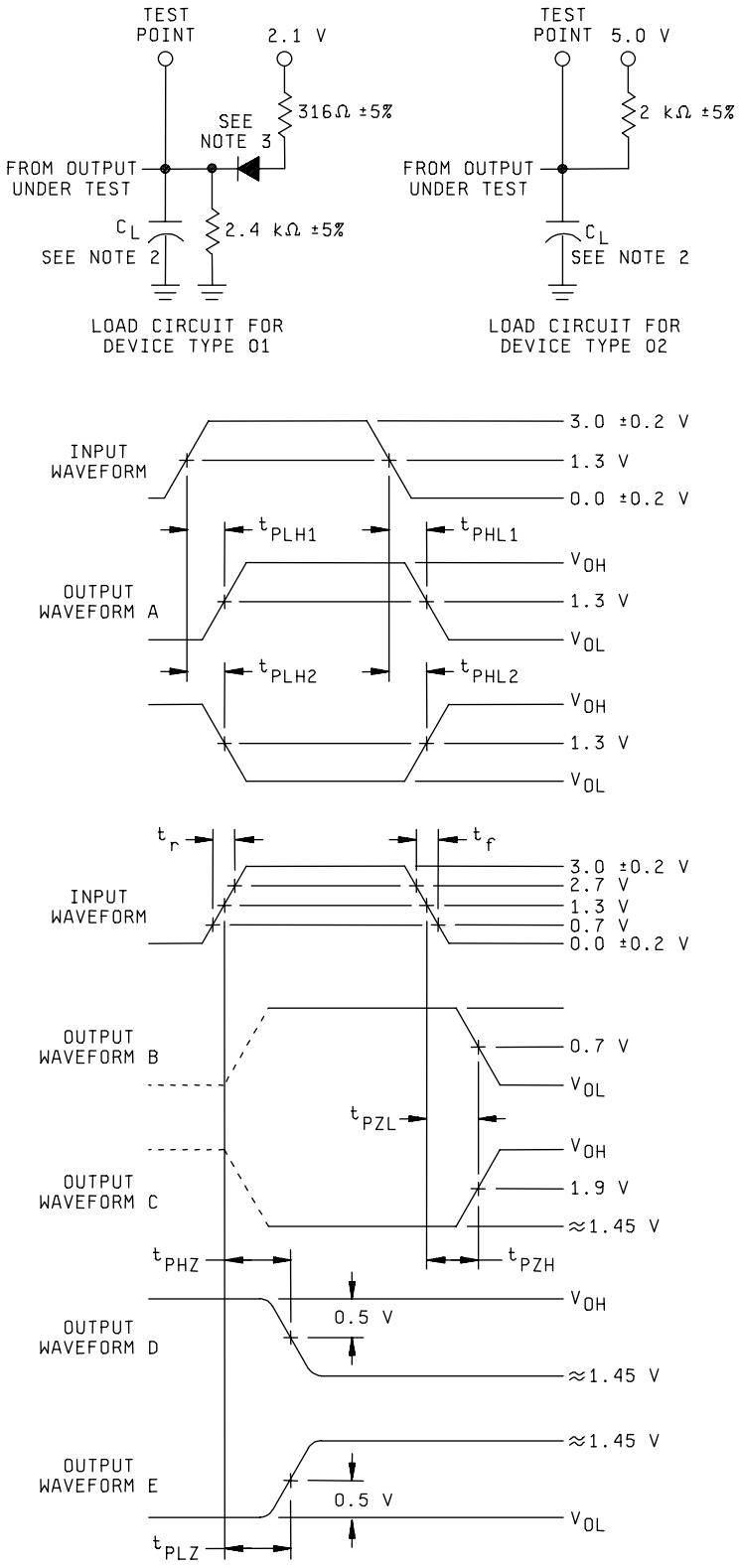



FIGURE 4. Switching test circuit and waveforms for device types 01 and 02 - Continued.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Case 2 | 2 | 3 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | | | | |
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 1 Tc = 25°C | $V_{OL}$ | 3007 | 1 | | | | 0.7 V | 0.7 V | | | GND | | 4 mA | 0.7 V | 0.7 V | 0.7 V | 0.7 V | 0.7 V | 4.5 V | Q1 | | 0.4 | V |
| | | " | 2 | 0.7 V | | | " | " | | | " | 4 mA | | " | " | " | " | | " | Q2 | | " | " |
| | | " | 3 | | 0.7 V | | " | " | | 4 mA | " | | | " | " | " | " | | " | Q3 | | " | " |
| | | " | 4 | | | 0.7 V | " | " | 4 mA | | " | | | " | " | " | " | | " | Q4 | | " | " |
| | $V_{OH}$ | 3006 | 5 | | | | " | " | | | " | | -1 mA | " | " | " | " | 2.0 V | " | Q1 | 2.4 | | " |
| | | " | 6 | 2.0 V | | | " | " | | | " | -1 mA | | " | " | " | " | | " | Q2 | " | | " |
| | | " | 7 | | 2.0 V | | " | " | | -1 mA | " | | | " | " | " | " | | " | Q3 | " | | " |
| | | " | 8 | | | 2.0 V | " | " | -1 mA | | " | | | " | " | " | " | | " | Q4 | " | | " |
| | $V_{IC}$ | | 9 | -18 mA | | | | | | | " | | | | | | | | " | D2 | | -1.5 | " |
| | | | 10 | | -18 mA | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | | 11 | | | -18 mA | | | | | " | | | | | | | | " | D4 | | " | " |
| | | | 12 | | | | -18 mA | | | | " | | | | | | | | " | RB | | " | " |
| | | | 13 | | | | | -18 mA | | | " | | | | | | | | " | RA | | " | " |
| | | | 14 | | | | | | | | " | | | -18 mA | | | | | " | GR | | " | " |
| | | | 15 | | | | | | | | " | | | | -18 mA | | | | " | GW | | " | " |
| | | | 16 | | | | | | | | " | | | | | -18 mA | | | " | WB | | " | " |
| | | | 17 | | | | | | | | " | | | | | | -18 mA | | " | WA | | " | " |
| | | | 18 | | | | | | | | " | | | | | | | -18 mA | " | D1 | | " | " |
| | $I_{IL1}$ | 3009 | 19 | 0.4 V | | | | | | | " | | | | | | | | 5.5 V | D2 | 1/ | 1/ | µA |
| | | " | 20 | | 0.4 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 21 | | | 0.4 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 22 | | | | 0.4 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 23 | | | | | 0.4 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 24 | | | | | | | | " | | | | | 0.4 V | | | " | WB | | " | " |
| | | " | 25 | | | | | | | | " | | | | | | 0.4 V | | " | WA | | " | " |
| | | " | 26 | | | | | | | | " | | | | | | | 0.4 V | " | D1 | | " | " |
| | $I_{IL2}$ | " | 27 | | | | | | | | " | | | 0.4 V | | | | | " | GR | | " | " |
| | $I_{IL3}$ | " | 28 | | | | | | | | " | | | | 0.4 V | | | | " | GW | | " | " |
| | $I_{IH1}$ | 3010 | 29 | 2.7 V | | | | | | | " | | | | | | | | " | D2 | | 20 | " |
| | | " | 30 | | 2.7 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 31 | | | 2.7 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 32 | | | | 2.7 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 33 | | | | | 2.7 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 34 | | | | | | | | " | | | | | 2.7 V | | | " | WB | | " | " |
| | | " | 35 | | | | | | | | " | | | | | | 2.7 V | | " | WA | | " | " |
| | | " | 36 | | | | | | | | " | | | | | | | 2.7 V | " | D1 | | " | " |
| | $I_{IH2}$ | " | 37 | | | | | | | | " | | | 2.7 V | | | | | " | GR | | 60 | " |
| | $I_{IH3}$ | " | 38 | | | | | | | | " | | | | 2.7 V | | | | " | GW | | 40 | " |
| | $I_{IH4}$ | " | 39 | 5.5 V | | | | | | | " | | | | | | | | " | D2 | | 100 | " |
| | | " | 40 | | 5.5 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 41 | | | 5.5 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 42 | | | | 5.5 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 43 | | | | | 5.5 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 44 | | | | | | | | " | | | | | 5.5 V | | | " | WB | | " | " |
| | | " | 45 | | | | | | | | " | | | | | | 5.5 V | | " | WA | | " | " |
| | | " | 46 | | | | | | | | " | | | | | | | 5.5 V | " | D1 | | " | " |
| | $I_{IH5}$ | " | 47 | | | | | | | | " | | | 5.5 V | | | | | " | GR | | 300 | " |
| | $I_{IH6}$ | " | 48 | | | | | | | | " | | | | 5.5 V | | | | " | GW | | 200 | " |

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Case 2 | 2 | 3 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | | | | |
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 1 | $I_{CC}$ | 3005 | 49 | 4.5 V | 4.5 V | 4.5 V | GND | GND | | | GND | | | 4.5 V | 4.5 V | GND | GND | 4.5 V | 5.5 V | $V_{CC}$ | | 50 | mA |
| Tc = 25°C | $I_{OS}$ 2/ | 3011 | 50 | | | | " | " | | | " | | GND | GND | GND | " | " | 5.5 V | " | Q1 | -30 | -130 | " |
| | " | " | 51 | 5.5 V | | | " | " | | | " | GND | | " | " | " | " | " | " | Q2 | " | " | " |
| | " | " | 52 | | 5.5 V | | " | " | | GND | " | | | " | " | " | " | " | " | Q3 | " | " | " |
| | " | " | 53 | | | 5.5 V | " | " | GND | | " | | | " | " | " | " | " | " | Q4 | " | " | " |
| | $I_{OZH}$ | | 54 | | | | 0.7 V | 0.7 V | | | " | | 2.7 V | 2.0 V | 0.7 V | 0.7 V | 0.7 V | 2.0 V | " | Q1 | | 20 | µA |
| | | | 55 | 2.0 V | | | " | " | | | " | 2.7 V | | " | " | " | " | | " | Q2 | | " | " |
| | | | 56 | | 2.0 V | | " | " | | 2.7 V | " | | | " | " | " | " | | " | Q3 | | " | " |
| | | | 57 | | | 2.0 V | " | " | 2.7 V | | " | | | " | " | " | " | | " | Q4 | | " | " |
| | $I_{OZL}$ | | 58 | | | | " | " | | | " | | 0.4 V | " | " | " | " | 2.0 V | " | Q1 | | -20 | " |
| | | | 59 | 2.0 V | | | " | " | | | " | 0.4 V | | " | " | " | " | | " | Q2 | | " | " |
| | | | 60 | | 2.0 V | | " | " | | 0.4 V | " | | | " | " | " | " | | " | Q3 | | " | " |
| | | | 61 | | | 2.0 V | " | " | 0.4 V | | " | | | " | " | " | " | | " | Q4 | | " | " |
| 2 | Same tests, terminal conditions, and limits as subgroup 1, except $T_C$ = +125°C and $V_{IC}$ tests are omitted. | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Same tests, terminal conditions, and limits as subgroup 1, except $T_C$ = -55°C and $V_{IC}$ tests are omitted. | | | | | | | | | | | | | | | | | | | | | | |
| 7 3/ 4/ | Truth | 3014 | 62 | B | A | B | B | B | L | H | GND | L | H | B | B | B | B | A | 5.0 V | 5/ | | | |
| Tc = 25°C | table | " | 63 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | tests | " | 64 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 65 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 66 | A | B | A | B | B | H | L | " | H | L | " | " | B | B | B | " | " | | | |
| | | " | 67 | " | " | " | " | A | L | H | " | L | H | " | " | " | " | " | " | " | | | |
| | | " | 68 | " | " | " | A | B | " | " | " | " | " | " | " | " | " | " | " | " | | | |
| | | " | 69 | " | " | " | " | A | " | " | " | " | " | " | " | " | " | " | " | " | | | |
| | | " | 70 | " | " | " | B | B | H | L | " | H | L | " | A | " | " | " | " | " | | | |
| | | " | 71 | " | " | " | " | " | " | " | " | " | " | " | B | " | " | " | " | " | | | |
| | | " | 72 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 73 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 74 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 75 | " | A | " | B | B | " | H | " | " | H | " | " | B | B | A | " | " | | | |
| | | " | 76 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 77 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 78 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 79 | " | " | " | " | " | " | " | " | " | " | " | A | " | " | " | " | " | | | |
| | | " | 80 | B | B | B | B | B | " | " | " | " | " | " | " | B | B | B | " | " | | | |
| | | " | 81 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 82 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 83 | " | " | " | " | A | " | " | " | " | " | " | " | " | " | " | " | " | | | |
| 8 | Same tests and terminal conditions as for subgroup 7 except $T_C$ = +125°C and $T_C$ = -55°C. | | | | | | | | | | | | | | | | | | | | | | |
| 9 | $t_{PLH1}$ | 3003 | 84 | | | | GND | GND | | | GND | | OUT | GND | GND | GND | GND | IN | 5.0 V | D1 to Q1 | 2 | 50 | ns |
| Tc = 25°C | | Fig. 4 | 85 | IN | | | " | " | | | " | OUT | | " | " | " | " | | " | D2 to Q2 | " | " | " |
| | | " | 86 | | IN | | " | " | | OUT | " | | | " | " | " | " | | " | D3 to Q3 | " | " | " |
| | | " | 87 | | | IN | " | " | OUT | | " | | | " | " | " | " | | " | D4 to Q4 | " | " | " |
| | $t_{PHL1}$ | " | 88 | | | | " | " | | | " | | OUT | " | " | " | " | IN | " | D1 to Q1 | " | 45 | " |
| | | " | 89 | IN | | | " | " | | | " | OUT | | " | " | " | " | | " | D2 to Q2 | " | " | " |
| | | " | 90 | | IN | | " | " | | OUT | " | | | " | " | " | " | | " | D3 to Q3 | " | " | " |
| | | " | 91 | | | IN | " | " | OUT | | " | | | " | " | " | " | | " | D4 to Q4 | " | " | " |
| | $t_{PLH2}$ 7/ | " | 92 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | RA to Q1 | " | " | " |
| | | " | 93 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | RA to Q2 | " | " | " |
| | | " | 94 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | RA to Q3 | " | " | " |
| | | " | 95 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | RA to Q4 | " | " | " |
| | $t_{PHL2}$ 6/ | " | 96 | | | | IN | GND | | | " | | OUT | " | " | 5.0 V | " | 5.0 V | " | RB to Q1 | " | 50 | " |
| | | " | 97 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | RB to Q2 | " | " | " |
| | | " | 98 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | RB to Q3 | " | " | " |
| | | " | 99 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | RB to Q4 | " | " | " |

See footnotes at end of device type 01.

TABLE III. Group A inspection for device type 01.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F Case 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 9 | $t_{PLH3}$ | 3003 | 100 | | | | GND | 5.0 V | | | GND | | OUT | GND | IN | GND | IN | 5.0 V | 5.0 V | GW to Q1 | 2 | 50 | ns |
| $T_C$ = 25°C | 6/ | Fig. 4 | 101 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | GW to Q2 | " | " | " |
| | " | | 102 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | GW to Q3 | " | " | " |
| | " | | 103 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | GW to Q4 | " | " | " |
| | $t_{PHL3}$ | " | 104 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | GW to Q1 | " | 55 | " |
| | 7/ | " | 105 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GW to Q2 | " | " | " |
| | | " | 106 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GW to Q3 | " | " | " |
| | | " | 107 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GW to Q4 | " | " | " |
| | $t_{PHZ}$ | " | 108 | | | | " | GND | | | " | | OUT | IN | GND | " | GND | 5.0 V | " | GR to Q1 | " | " | " |
| | | " | 109 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 110 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 111 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| | $t_{PZH}$ | " | 112 | | | | " | " | | | " | | OUT | " | " | " | " | 5.0 V | " | GR to Q1 | " | 40 | " |
| | | " | 113 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 114 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 115 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| | $t_{PLZ}$ | " | 116 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | GR to Q1 | " | " | " |
| | | " | 117 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 118 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 119 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| | $t_{PZL}$ | " | 120 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | GR to Q1 | " | 45 | " |
| | | " | 121 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 122 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 123 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| 10 | $t_{PLH1}$ | " | 124 | | | | | | | | | | | | | | | | | | " | 65 | " |
| $T_C$ =125°C | $t_{PHL1}$ | " | 125 | | | | | | | | | | | | | | | | | | " | 58 | " |
| | $t_{PLH2}$ | " | 126 | | | | | | | | | | | | | | | | | | " | 58 | " |
| | $t_{PHL2}$ | " | 127 | | | | | | | | | | | | | | | | | | " | 65 | " |
| | $t_{PLH3}$ | " | 128 | | | | | | | | | | | | | | | | | | " | 65 | " |
| | $t_{PHL3}$ | " | 129 | | | | | | | | | | | | | | | | | | " | 72 | " |
| | $t_{PHZ}$ | " | 130 | | | | | | | | | | | | | | | | | | " | 72 | " |
| | $t_{PZH}$ | " | 131 | | | | | | | | | | | | | | | | | | " | 52 | " |
| | $t_{PLZ}$ | " | 132 | | | | | | | | | | | | | | | | | | " | 52 | " |
| | $t_{PZL}$ | " | 133 | | | | | | | | | | | | | | | | | | " | 58 | " |
| 11 | Same tests, terminal conditions and limits as for subgroup 10, except $T_C$ = -55°C. | | | | | | | | | | | | | | | | | | | | | | |

Same tests and terminal conditions as for subgroup 9, except $T_C$ = +125°C and test limits as shown

1/ Min/max limits (µA) for circuits, unless otherwise specified.

| Test | Min/max limits (mA) | | | | |
|---|---|---|---|---|---|
| | A | B | C | E | F |
| $I_{IL1}$ | -120/-360 | -30/-300 | -160/-400 except -120/-360 for test 24 | -120/-360 except -0.5/-360 for test 22 | -135/-370 except -150/-380 for test 23; -135/-380 for tests 24, 25, 26 |
| $I_{IL2}$ | -36 mA/-1.08 mA | -90/-900 | -305/-760 | -.36 mA/-1.08 mA | -.48 mA/-1.20 mA |
| $I_{IL3}$ | -240/-720 | -60/-600 | -305/-760 | -240/-720 | -320/-800 |

2/ $I_{OS}$ limits for circuits B, C, and E are -15/-100 mA.

3/ Connect a 0.5 kΩ to 2 kΩ resistor from terminals, 6, 7, 9, and 10 to $V_{CC}$ for subgroup 7 tests.

4/ A = 3.0 V min., B = 0.0 V or GND, C = pulse 3.0 V / 0.0 V 

5/ Output voltages shall be: H > 1.5 V, L < 1.5 V

6/ Load ground into register under test prior to test.

7/ Load one state into register under test prior to test.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Case 2 | 2 | 3 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | | | | |
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 1 Tc = 25°C | $V_{OL}$ | 3007 | 1 | | | | 0.7 V | 0.7 V | | | GND | | 4 mA | 0.7 V | 0.7 V | 0.7 V | 0.7 V | 0.7 V | 4.5 V | Q1 | | 0.4 | V |
| | | " | 2 | 0.7 V | | | " | " | | | " | 4 mA | | " | " | " | " | | " | Q2 | | " | " |
| | | " | 3 | | 0.7 V | | " | " | | 4 mA | " | | | " | " | " | " | | " | Q3 | | " | " |
| | | " | 4 | | | 0.7 V | " | " | 4 mA | | " | | | " | " | " | " | | " | Q4 | | " | " |
| | $I_{CEX}$ | | 5 | | | | " | " | | | " | | 5.5 V | " | " | " | " | 2.0 V | " | Q1 | | 20 | µA |
| | | | 6 | 2.0 V | | | " | " | | | " | 5.5 V | | " | " | " | " | | " | Q2 | | " | " |
| | | | 7 | | 2.0 V | | " | " | | 5.5 V | " | | | " | " | " | " | | " | Q3 | | " | " |
| | | | 8 | | | 2.0 V | " | " | 5.5 V | | " | | | " | " | " | " | | " | Q4 | | " | " |
| | $V_{IC}$ | | 9 | -18 mA | | | | | | | " | | | | | | | | " | D2 | | -1.5 | V |
| | | | 10 | | -18 mA | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | | 11 | | | -18 mA | | | | | " | | | | | | | | " | D4 | | " | " |
| | | | 12 | | | | -18 mA | | | | " | | | | | | | | " | RB | | " | " |
| | | | 13 | | | | | -18 mA | | | " | | | | | | | | " | RA | | " | " |
| | | | 14 | | | | | | | | " | | | -18 mA | | | | | " | GR | | " | " |
| | | | 15 | | | | | | | | " | | | | -18 mA | | | | " | GW | | " | " |
| | | | 16 | | | | | | | | " | | | | | -18 mA | | | " | WB | | " | " |
| | | | 17 | | | | | | | | " | | | | | | -18 mA | | " | WA | | " | " |
| | | | 18 | | | | | | | | " | | | | | | | -18 mA | " | D1 | | " | " |
| | $I_{IL1}$ | 3009 | 19 | 0.4 V | | | | | | | " | | | | | | | | 5.5 V | D2 | 1/ | 1/ | µA |
| | | " | 20 | | 0.4 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 21 | | | 0.4 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 22 | | | | 0.4 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 23 | | | | | 0.4 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 24 | | | | | | | | " | | | | | 0.4 V | | | " | WB | | " | " |
| | | " | 25 | | | | | | | | " | | | | | | 0.4 V | | " | WA | | " | " |
| | | " | 26 | | | | | | | | " | | | | | | | 0.4 V | " | D1 | | " | " |
| | $I_{IL2}$ | " | 27 | | | | | | | | " | | | 0.4 V | | | | | " | GR | | " | " |
| | $I_{IL3}$ | " | 28 | | | | | | | | " | | | | 0.4 V | | | | " | GW | | " | " |
| | $I_{IH1}$ | 3010 | 29 | 2.7 V | | | | | | | " | | | | | | | | " | D2 | | 20 | " |
| | | " | 30 | | 2.7 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 31 | | | 2.7 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 32 | | | | 2.7 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 33 | | | | | 2.7 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 34 | | | | | | | | " | | | | | 2.7 V | | | " | WB | | " | " |
| | | " | 35 | | | | | | | | " | | | | | | 2.7 V | | " | WA | | " | " |
| | | " | 36 | | | | | | | | " | | | | | | | 2.7 V | " | D1 | | " | " |
| | $I_{IH2}$ | " | 37 | | | | | | | | " | | | 2.7 V | | | | | " | GR | | 40 | " |
| | $I_{IH3}$ | " | 38 | | | | | | | | " | | | | 2.7 V | | | | " | GW | | 40 | " |
| | $I_{IH4}$ | " | 39 | 5.5 V | | | | | | | " | | | | | | | | " | D2 | | 100 | " |
| | | " | 40 | | 5.5 V | | | | | | " | | | | | | | | " | D3 | | " | " |
| | | " | 41 | | | 5.5 V | | | | | " | | | | | | | | " | D4 | | " | " |
| | | " | 42 | | | | 5.5 V | | | | " | | | | | | | | " | RB | | " | " |
| | | " | 43 | | | | | 5.5 V | | | " | | | | | | | | " | RA | | " | " |
| | | " | 44 | | | | | | | | " | | | | | 5.5 V | | | " | WB | | " | " |
| | | " | 45 | | | | | | | | " | | | | | | 5.5 V | | " | WA | | " | " |
| | | " | 46 | | | | | | | | " | | | | | | | 5.5 V | " | D1 | | " | " |
| | $I_{IH5}$ | " | 47 | | | | | | | | " | | | 5.5 V | | | | | " | GR | | 200 | " |
| | $I_{IH6}$ | " | 48 | | | | | | | | " | | | | 5.5 V | | | | " | GW | | 200 | " |

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Case 2 | 2 | 3 | 4 | 5 | 7 | 8 | 9 | 10 | 12 | 13 | 14 | 15 | 17 | 18 | 19 | 20 | | | | |
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 1<br>Tc = 25°C | $I_{CC}$ | 3005 | 49 | 4.5 V | 4.5 V | 4.5 V | GND | GND | | | GND | | | 4.5 V | 4.5 V | GND | GND | 4.5 V | 5.5 V | $V_{CC}$ | | 40 | mA |
| 2 | Same tests, terminal conditions, and limits as subgroup 1, except $T_C$ = +125°C and $V_{IC}$ tests are omitted. | | | | | | | | | | | | | | | | | | | | | | |
| 3 | Same tests, terminal conditions, and limits as subgroup 1, except $T_C$ = -55°C and $V_{IC}$ tests are omitted. | | | | | | | | | | | | | | | | | | | | | | |
| 7 2/ 3/<br>Tc = 25°C | Truth table tests | 3014 | 50 | B | A | B | B | B | L | H | GND | L | H | B | B | B | B | A | 5.0 V | 4/ | | | |
| | | " | 51 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 52 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 53 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 54 | A | B | A | B | B | H | L | " | H | L | " | " | B | B | B | " | " | | | |
| | | " | 55 | " | " | " | " | A | L | H | " | L | H | " | " | " | " | " | " | " | | | |
| | | " | 56 | " | " | " | A | B | " | " | " | " | " | " | " | " | " | " | " | " | | | |
| | | " | 57 | " | " | B | " | A | " | " | " | " | " | " | A | " | " | " | " | " | | | |
| | | " | 58 | " | " | " | B | B | H | L | " | H | L | " | " | A | " | " | " | " | | | |
| | | " | 59 | " | " | " | " | " | " | H | " | " | H | A | B | B | " | " | " | " | | | |
| | | " | 60 | " | " | A | " | A | " | L | " | " | L | B | " | " | A | " | " | " | | | |
| | | " | 61 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 62 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 63 | " | A | " | B | B | " | H | " | " | H | A | " | B | B | A | " | " | | | |
| | | " | 64 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 65 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 66 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 67 | B | B | B | B | B | " | " | " | " | " | B | A | B | B | B | " | " | | | |
| | | " | 68 | " | " | " | " | A | " | " | " | " | " | " | " | " | A | " | " | " | | | |
| | | " | 69 | " | " | " | A | B | " | " | " | " | " | " | " | A | B | " | " | " | | | |
| | | " | 70 | " | " | " | " | A | " | " | " | " | " | " | " | " | " | " | " | " | | | |
| 8 | Same tests and terminal conditions as for subgroup 7 except $T_C$ = +125°C and $T_C$ = -55°C. | | | | | | | | | | | | | | | | | | | | | | |
| 9<br>Tc = 25°C | $t_{PLH1}$ | 3003<br>Fig. 4 | 71 | | | | GND | GND | | | GND | | OUT | GND | GND | GND | GND | IN | 5.0 V | D1 to Q1 | 2 | 50 | ns |
| | | | 72 | IN | | | " | " | | | " | OUT | | " | " | " | " | | " | D2 to Q2 | " | " | " |
| | | | 73 | | IN | | " | " | | OUT | " | | | " | " | " | " | | " | D3 to Q3 | " | " | " |
| | | | 74 | | | IN | " | " | OUT | | " | | | " | " | " | " | | " | D4 to Q4 | " | " | " |
| | $t_{PHL1}$ | " | 75 | | | | " | " | | | " | | OUT | " | " | " | " | IN | " | D1 to Q1 | " | 40 | " |
| | | " | 76 | IN | | | " | " | | | " | OUT | | " | " | " | " | | " | D2 to Q2 | " | " | " |
| | | " | 77 | | IN | | " | " | | OUT | " | | | " | " | " | " | | " | D3 to Q3 | " | " | " |
| | | " | 78 | | | IN | " | " | OUT | | " | | | " | " | " | " | | " | D4 to Q4 | " | " | " |
| | $t_{PLH2}$ 5/ | " | 79 | | | | " | IN | | | " | | OUT | " | " | " | " | 5.0 V | " | RA to Q1 | " | 45 | " |
| | | " | 80 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | RA to Q2 | " | " | " |
| | | " | 81 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | RA to Q3 | " | " | " |
| | | " | 82 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | RA to Q4 | " | " | " |
| | $t_{PHL2}$ 5/ | " | 83 | | | | IN | GND | | | " | | OUT | " | " | 5.0 V | GND | 5.0 V | " | RB to Q1 | " | " | " |
| | | " | 84 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | RB to Q2 | " | " | " |
| | | " | 85 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | RB to Q3 | " | " | " |
| | | " | 86 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | RB to Q4 | " | " | " |

See footnotes at end of device type 02.

TABLE III. Group A inspection for device type 02.

Terminal conditions (pins not designated may be high ≥ 2.0 V; low ≤ 0.7 V; or open).

| Subgroup | Symbol | MIL-STD-883 method | Cases E, F Case 2 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Measured terminal | Limits | | Unit |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Test no. | D2 | D3 | D4 | RB | RA | Q4 | Q3 | GND | Q2 | Q1 | GR | GW | WB | WA | D1 | $V_{CC}$ | | Min | Max | |
| 9 | $t_{PLH3}$ | 3003 | 87 | | | | GND | 5.0 V | | | GND | | OUT | GND | IN | GND | IN | 5.0 V | 5.0 V | GW to Q1 | 2 | 50 | ns |
| $T_C$ = 25°C | 5/ | Fig. 4 | 88 | 5.0 V | | | " | " | | | " | OUT | | " | " | " | " | | " | GW to Q2 | " | " | " |
| | " | | 89 | | 5.0 V | | " | " | | OUT | " | | | " | " | " | " | | " | GW to Q3 | " | " | " |
| | " | | 90 | | | 5.0 V | " | " | OUT | | " | | | " | " | " | " | | " | GW to Q4 | " | " | " |
| | $t_{PHL3}$ | " | 91 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | GW to Q1 | " | 45 | " |
| | 6/ | " | 92 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GW to Q2 | " | " | " |
| | | " | 93 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GW to Q3 | " | " | " |
| | | " | 94 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GW to Q4 | " | " | " |
| | $t_{PLH4}$ | " | 95 | | | | " | GND | | | " | | OUT | IN | GND | " | GND | GND | " | GR to Q1 | " | 40 | " |
| | | " | 96 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 97 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 98 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| | $t_{PHL4}$ | " | 99 | | | | " | " | | | " | | OUT | " | " | " | " | GND | " | GR to Q1 | " | " | " |
| | | " | 100 | GND | | | " | " | | | " | OUT | | " | " | " | " | | " | GR to Q2 | " | " | " |
| | | " | 101 | | GND | | " | " | | OUT | " | | | " | " | " | " | | " | GR to Q3 | " | " | " |
| | | " | 102 | | | GND | " | " | OUT | | " | | | " | " | " | " | | " | GR to Q4 | " | " | " |
| 10 | $t_{PLH1}$ | " | 103 | Same tests and terminal conditions as for subgroup 9, except $T_C$ = +125°C and test limits as shown | | | | | | | | | | | | | | | | | " | 65 | " |
| $T_C$ =125°C | $t_{PHL1}$ | " | 104 | | | | | | | | | | | | | | | | | | " | 52 | " |
| | $t_{PLH2}$ | " | 105 | | | | | | | | | | | | | | | | | | " | 58 | " |
| | $t_{PHL2}$ | " | 106 | | | | | | | | | | | | | | | | | | " | 58 | " |
| | $t_{PLH3}$ | " | 107 | | | | | | | | | | | | | | | | | | " | 65 | " |
| | $t_{PHL3}$ | " | 108 | | | | | | | | | | | | | | | | | | " | 58 | " |
| | $t_{PLH4}$ | " | 109 | | | | | | | | | | | | | | | | | | " | 46 | " |
| | $t_{PHL4}$ | " | 110 | | | | | | | | | | | | | | | | | | " | 46 | " |
| 11 | Same tests, terminal conditions and limits as for subgroup 10, except $T_C$ = -55°C. | | | | | | | | | | | | | | | | | | | | | | |

1/ Min/max limits (µA) for circuits, unless otherwise specified.

| Test | Min/max limits (mA) | | | | |
|---|---|---|---|---|---|
| | A | B | C | E | F |
| $I_{IL1}$ | -120/-360 | -30/-300 | -160/-400 except -120/-360 for test 24 | -120/-360 except -0.5/-360 for tests 22 and 24 | -135/-370 except -150/-380 for test 23 |
| $I_{IL2}$ | -240/-720 | -90/-900 | -305/-760 | -240/-720 | -320/-800 |
| $I_{IL3}$ | -240/-720 | -60/-600 | -305/-760 | -240/-720 | -320/-800 |

2/ Connect a 0.5 kΩ to 2 kΩ resistor from terminals, 6, 7, 9, and 10 to $V_{CC}$ for subgroup 7 tests.

3/ A = 3.0 V min., B = 0.0 V or GND, C = pulse 3.0 V / 0.0 V  3.0 V

4/ Output voltages shall be: H > 1.5 V, L < 1.5 V

5/ Load ground into register under test prior to test.

6/ Load one state into register under test prior to test.

5. PACKAGING

5.1 Packaging requirements. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activity within the Military Department of Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

(This section contains information of a general or explanatory nature which may be helpful, but is not mandatory.)

6.1 Intended use. Microcircuits conforming to this specification are intended for original equipment design applications and logistic support of existing equipment.

6.2 Acquisition requirements. Acquisition documents should specify the following:

a. Title, number, and date of the specification.

b. Complete part number (see 1.2).

c. Requirements for delivery of one copy of the quality conformance inspection data pertinent to the device inspection lot to be supplied with each shipment by the device manufacturer, if applicable.

d. Requirements for certificate of compliance, if applicable.

e. Requirements for notification of change of product or process to contracting activity in addition to notification to the qualifying activity, if applicable.

f. Requirements for failure analysis (including required test condition of method 5003 of MIL-STD-883), corrective action, and reporting of results, if applicable.

g. Requirements for product assurance options.

h. Requirements for special carriers, lead lengths, or lead forming, if applicable. These requirements should not affect the part number. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.

j. Requirements for "JAN" marking.

6.3 Superseding information. The requirements of MIL-M-38510 have been superseded to take advantage of the available Qualified Manufacturer Listing (QML) system provided by MIL-PRF-38535. Previous references to MIL-M-38510 in this document have been replaced by appropriate references to MIL-PRF-38535. All technical requirements now consist of this specification and MIL-PRF-38535. The MIL-M-38510 specification sheet number and PIN have been retained to avoid adversely impacting existing government logistics systems and contractor's parts lists.

6.4 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List QML-38535 whether or not such products have actually been so listed by that date. The attention of the contractors is called to these requirements, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or purchase orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DSCC-VQ, 3990 E. Broad Street, Columbus, Ohio 43123-1199.

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

GND ..... Ground zero voltage potential.
$I_{IN}$ ..... Current flowing into an input terminal.
$V_{IC}$ ..... Input clamp voltage.
$V_{IN}$ ..... Voltage level at an input terminal.
$I_{OZL}$ ..... Output current in the high impedance mode with the output voltage low.
$I_{OZH}$ ..... Output current in the high impedance mode with the output voltage high.
$t_{PHZ}$ ..... Output disable time from high level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined high level to a high impedance (off) state.
$t_{PLZ}$ ..... Output disable time from low level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from the defined low level to a high impedance (off) state.
$t_{PZH}$ ..... Output enable time to high level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined high level.
$t_{PZL}$ ..... Output enable time to low level - The time between the specified reference points on the input and output voltage waveforms with the three state output changing from a high impedance (off) state to the defined low level.

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired for Government logistic support will be acquired to device class B (see 1.2.2), lead material and finish A (see 3.4). Longer length leads and lead forming should not affect the part number.

6.7 Substitutability. The cross-reference information below is presented for the convenience of users. Microcircuits covered by this specification will functionally replace the listed generic-industry type. Generic-industry microcircuit types may not have equivalent operational performance characteristics across military temperature ranges or reliability factors equivalent to MIL-M-38510 device types and may have slight physical variations in relation to case size. The presence of this information should not be deemed as permitting substitution of generic-industry types for MIL-M-38510 types or as a waiver of any of the provisions of MIL-PRF-38535.

| Military device type | Generic-industry type |
|---|---|
| 01 | 54LS670 |
| 02 | 54LS170 |

6.8 Manufacturers' designation. Manufacturers' circuits, which form a part of this specification, are designated with an "X" as shown in table IV herein.

TABLE IV. Manufacturer's designator.

| Device type | Manufacturer | | | | |
|---|---|---|---|---|---|
| | Circuit A | Circuit B | Circuit C | Circuit E | Circuit F |
| | Texas Instruments | Signetics Corp. | National Semiconductor | Fairchild Semiconductor | Motorola Inc. |
| 01 | X | X | X | X | X |
| 02 | X | X | X | X | X |

6.9 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:
Army - CR
Navy - EC
Air Force - 11
DLA - CC

Preparing activity:
DLA - CC

(Project 5962-1966)

Review activities:
Army - MI, SM
Navy - AS, CG, MC, SH, TD
Air Force - 03, 19, 99

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