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| INCH-POUND |
| MIL-M-38510/103H |
| 18 February 2005 |
| SUPERSEDING |
| MIL-M-38510/103G |
| 03 November 2004 |

MILITARY SPECIFICATION

MICROCIRCUITS, LINEAR, VOLTAGE COMPARATORS, MONOLITHIC SILICON

Reactivated after 18 February 2005 and may be used for either new or existing design acquisition.

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

The requirements for acquiring the product herein shall consist of this specification sheet and MIL-PRF-38535.

1. SCOPE

1.1 Scope. This specification covers the detail requirements for monolithic silicon, voltage comparators. Two product assurance classes and a choice of case outlines and lead finish 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 For this product, the requirements of MIL-M-38510 have been superseded by MIL-PRF-38535, (see 6.3).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 or Identifying Number (PIN). The PIN is in accordance with MIL-PRF-38535, and as specified herein.

1.2.1 Device types. The device types are as shown in the following:

| <u>Device type</u> | <u>Circuit</u> |
|--------------------|--|
| 01 | Single differential voltage comparator |
| 02 | Dual channel differential voltage comparator |
| 03 | Single differential voltage comparator / buffer |
| 04 | Precision voltage comparator / buffer |
| 05 | Dual precision voltage comparator / buffer ^{1/} |
| 06 | Dual precision high speed voltage comparator |
| 07 | Dual high precision, high speed voltage comparator |

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

^{1/} Device type 05 may be monolithic, or it may consist of two separate, independent dice.

Comments, suggestions, or questions on this document should be addressed to: Commander, Defense Supply Center Columbus, ATTN: DSCC-VAS, 3990 East Broad St., Columbus, OH 43218-3990, or emailed to Linear@dsc.dla.mil. Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <http://assist.daps.dla.mil>.

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

| <u>Outline letter</u> | <u>Descriptive designator</u> | <u>Terminals</u> | <u>Package style</u> |
|-----------------------|-------------------------------|------------------|--------------------------------|
| A <u>2/</u> | GDFP5-F14 or CDFP6-F14 | 14 | Flat pack |
| C | GDIP1-T14 or CDIP2-T14 | 14 | Dual-in-line |
| E | GDIP1-T16 or CDIP2-T16 | 16 | Dual-in-line |
| F | GDFP2-F16 or CDFP3-F16 | 16 | Flat pack |
| G | MACY1-X8 | 8 | Can |
| H | GDFP1-F10 or CDFP2-F10 | 10 | Flat pack |
| I | MACY1-X10 | 10 | Can |
| P | GDIP1-T8 or CDIP2-T8 | 8 | Dual-in-line |
| X | CDFP4-F16 | 16 | Flat pack |
| Z | GDFP1-G10 | 10 | Flat pack with gull wing leads |
| 2 | CQCC1-N20 | 20 | Square leadless chip carrier |

1.3 Absolute maximum ratings.

| | Device types | | | | |
|--|--------------------------------------|---------|---------|-----------|-------------------|
| | 01 | 02 | 03 | 04 and 05 | 06 and 07 |
| Positive supply voltage | +14.0 V | +14.0 V | +15.0 V | +30.0 V | +18 V |
| Negative supply voltage | -7.0 V | -7.0 V | -15.0 V | -30.0 V | -25 V |
| Total supply voltage | --- | --- | --- | +36.0 V | +36 V |
| Output voltage | --- | --- | +24.0 V | --- | --- |
| Output to negative supply voltage | --- | --- | +30.0 V | +50.0 V | +36.0 V |
| Input voltage range | ±7.0 V | ±7.0 V | ±7.0 V | <u>3/</u> | ±15.0 V <u>4/</u> |
| Differential input voltage | ±5.0 V | ±5.0 V | ±5.0 V | ±30.0 V | ±5.0 V |
| Peak output current | 10 mA | 50 mA | --- | --- | 25 mA |
| Sink current | --- | --- | 100 mA | 50 mA | --- |
| Output short-circuit duration | 10 s | 10 s | 10 s | 10 s | 10 s |
| Strobe voltage | --- | 6.0 V | 6.0 V | --- | --- |
| Maximum strobe current | --- | --- | --- | 10 mA | --- |
| Storage temperature range | -65°C to +150°C for all device types | | | | |
| Junction temperature (T _J) <u>5/</u> | +175°C | +175°C | +175°C | +175°C | +175°C |
| Lead temperature (soldering, 60 seconds) | +300°C | +300°C | +300°C | +300°C | +300°C |

1.4 Recommended operating conditions.

| | |
|---|--|
| Supply voltage range : <u>4/</u> | |
| Device types 01 and 02 | +V _{CC} = +12 V dc, -V _{CC} = -6.0 V dc |
| Device type 03 | +V _{CC} = +12 V dc, -V _{CC} = -3.0 to -12.0 V dc |
| Device types 04, 05, 06, and 07 | ±V _{CC} = ±15.0 V dc |
| Ambient temperature range (T _A) | -55°C to +125°C |

2/ Inactive case outline.

3/ The positive input voltage limit is 30 V above the negative supply. The negative input voltage limit is equal to the negative supply voltage or 30 V below the positive supply, whichever is less negative.

4/ For supply voltages less than ±15.0 V dc, the input voltage rating is equal to the supply voltage.

5/ For short term test (in the specific burn-in and life test configuration when required and up to 168 hours maximum) T_J = +275°C.

1.5 Power and thermal characteristics.

| Case outlines | Maximum allowable power dissipation | Maximum θ_{JC} | Maximum θ_{JA} |
|---------------|--------------------------------------|-----------------------|-----------------------|
| A | 350 mW at $T_A = +125^\circ\text{C}$ | 60°C/W | 140°C/W |
| C, E, and P | 400 mW at $T_A = +125^\circ\text{C}$ | 35°C/W | 120°C/W |
| G | 330 mW at $T_A = +125^\circ\text{C}$ | 40°C/W | 150°C/W |
| I | 350 mW at $T_A = +125^\circ\text{C}$ | 40°C/W | 140°C/W |
| H | 330 mW at $T_A = +125^\circ\text{C}$ | 60°C/W | 150°C/W |
| F | 350 mW at $T_A = +125^\circ\text{C}$ | 60°C/W | 140°C/W |
| X | 200 mW at $T_A = +125^\circ\text{C}$ | 35°C/W | 140°C/W |
| Z | 330 mW at $T_A = +125^\circ\text{C}$ | 21°C/W | 225°C/W still air |
| | | | 142°C/W 500 LFPM |
| 2 | 199 mW at $T_A = +125^\circ\text{C}$ | 55°C/W | 121°C/W |

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3, 4, or 5 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents are those cited in the solicitation or contract.

DEPARTMENT OF DEFENSE SPECIFICATIONS

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

DEPARTMENT OF DEFENSE STANDARDS

MIL-STD-883 - Test Method Standard for Microelectronics.

MIL-STD-1835 - Interface Standard Electronic Component Case Outlines.

(Copies of these documents are available online at <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 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 shall take precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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 Schematic circuits. The schematic circuits shall be maintained by the manufacturer and made available to the qualifying activity and the preparing activity (DSCC-VA) upon request.

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

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

3.5 Electrical performance characteristics. Unless otherwise specified, the electrical performance characteristics are as specified in table I and apply over the full operating ambient temperature range of -55°C to +125°C.

3.6 Rebonding. Rebonding shall be in accordance with MIL-PRF-38535.

3.7 Electrical test requirements. 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.

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

3.9 Microcircuit group assignment. The devices covered by this specification shall be in microcircuit group number 50 (see MIL-PRF-38535, appendix A).

TABLE I. Electrical performance characteristics.

| Test | Symbol | Conditions <u>1/ 2/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified | Temperature | Device type | Limits | | Unit |
|----------------------|----------|---|------------------------------|----------------|--------|------|------|
| | | | | | Min | Max | |
| Input offset voltage | V_{IO} | $V_{OUT} = 1.4 \text{ V},$ $R_S = 200 \Omega$ and 50Ω | $T_A = +25^{\circ}\text{C}$ | 01 | -2 | +2 | mV |
| | | | | 02 | -3.5 | +3.5 | |
| | | $V_{OUT} = 1.0 \text{ V},$ $R_S = 200 \Omega$ and 50Ω | $T_A = +125^{\circ}\text{C}$ | 01 | -3 | +3 | |
| | | | | 02 | -4.5 | +4.5 | |
| | | $V_{OUT} = 1.8 \text{ V},$ $R_S = 200 \Omega$ and 50Ω | $T_A = -55^{\circ}\text{C}$ | 01 | -3 | +3 | |
| | | | | 02 | -4.5 | +4.5 | |
| | | $V_{OUT} = 1.5 \text{ V},$ $R_S = 200 \Omega$ and 50Ω | $T_A = +25^{\circ}\text{C}$ | 03 | -2 | +2 | |
| | | | | | -3 | +3 | |
| | | $V_{IC} = 0 \text{ V}, 13 \text{ V}$ and <u>3/</u> $-14.5 \text{ V},$ $R_S = 50 \Omega,$ | $T_A = +25^{\circ}\text{C}$ | 04,05 | -3 | +3 | |
| | | | | | -4 | +4 | |
| | | $\pm V_{CC} = \pm 2.5 \text{ V},$ $R_S = 50 \Omega, V_{IC} = 0 \text{ V}$ | $T_A = +25^{\circ}\text{C}$ | 04,05 | -3 | +3 | |
| | | | | | -4 | +4 | |
| | | $V_{IC} = 0 \text{ V}, +12 \text{ V},$ and <u>3/</u> $-12 \text{ V},$ $R_S = 50 \Omega$ | $T_A = +25^{\circ}\text{C}$ | 06 | -4 | +4 | |
| | | | | | -7 | +7 | |
| 07 | -1 | | | +1 | | | |
| | -2 | | | +2 | | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified | Temperature | Device type | Limits | | Unit |
|---|--------------------------|---|------------------------------------|----------------|------------------------|------|-------|
| | | | | | Min | Max | |
| Input offset voltage | V _{IO} | +V _{CC} = 5 V, -V _{CC} = 0 V R _S = 50 Ω, V _{IC} = 2.5 V | T _A = +25°C | 06 | -4 | +4 | mV |
| | | | T _A = -55°C, +125°C | | -7 | +7 | |
| | | | T _A = +25°C | 07 | -1 | +1 | |
| | | | T _A = -55°C, +125°C | | -2 | +2 | |
| Raised input offset voltage <u>4/</u> | V _{IO(R)} | V _{IC} = 0 V, 13 V, and <u>3/</u> -14.5 V, R _S = 50 Ω, V _{BAL} = V _{BAL} / STB = +V _{CC} | T _A = +25°C | 04,05 | -3 | +3 | mV |
| | | | -55°C ≤ T _A ≤ +125°C | | -4.5 | +4.5 | |
| Input offset voltage temperature coefficient | ΔV _{IO} / ΔT | R _S = 50 Ω | -55°C ≤ T _A ≤ +125°C | 01,02, 03 | -10 | +10 | μV/°C |
| | | | | 04,05 | -25 | +25 | |
| Input offset current | I _{IO} | V _{OUT} = 1.4 V | T _A = +25°C | 01 | -3 | +3 | μA |
| | | | | 02 | -10 | +10 | |
| | | V _{OUT} = 1.0 V | T _A = +125°C | 01 | -3 | +3 | |
| | | | | 02 | -10 | +10 | |
| | | V _{OUT} = 1.8 V | T _A = -55°C | 01 | -7 | +7 | |
| | | | | 02 | -20 | +20 | |
| | | V _{OUT} = 1.5 V | T _A = +25°C, +125°C | 03 | -3 | +3 | |
| | | | | | T _A = -55°C | -7 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/2/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified | Temperature | Device type | Limits | | Unit |
|---|---------------------------------|--|---|----------------|--------|------|------------------------|
| | | | | | Min | Max | |
| Input offset current | I_{IO} | $V_{IC} = 0\text{ V}, 13\text{ V},$ and <u>3/</u> $-14.5\text{ V},$ $R_S = 50\text{ k}\Omega$ | $+25^{\circ}\text{C} \leq T_A \leq$ $+125^{\circ}\text{C}$ | 04,05 | -10 | +10 | nA |
| | | | $T_A = -55^{\circ}\text{C}$ | | -20 | +20 | |
| | | $V_{IC} = 0\text{ V}, +12\text{ V},$ and <u>3/</u> $-12\text{ V},$ | $T_A = +25^{\circ}\text{C},$ $+125^{\circ}\text{C}$ | 06 | -75 | +75 | |
| | | | | 07 | -40 | +40 | |
| | | | $T_A = -55^{\circ}\text{C}$ | 06 | -100 | +100 | |
| | | | | 07 | -75 | +75 | |
| Raised input offset current <u>4/</u> | $I_{IO(R)}$ | $V_{IC} = 0\text{ V}, R_S = 50\text{ k}\Omega,$ $V_{BAL} = V_{BAL} / STB = +V_{CC}$ | $+25^{\circ}\text{C} \leq T_A \leq$ $+125^{\circ}\text{C}$ | 04,05 | -25 | +25 | nA |
| | | | $T_A = -55^{\circ}\text{C}$ | | -50 | +50 | |
| Input offset current temperature coefficient | $\Delta I_{IO} /$ ΔT | | $T_A = +125^{\circ}\text{C}$ | 01,02, 03 | -25 | +25 | nA/ $^{\circ}\text{C}$ |
| | | $R_S = 50\text{ k}\Omega$ | | | 04,05 | -100 | +100 |
| | | | $T_A = -55^{\circ}\text{C}$ | 01,02, 03 | -75 | +75 | nA/ $^{\circ}\text{C}$ |
| | | $R_S = 50\text{ k}$ | | | 04,05 | -200 | +200 |
| Input bias current | $+I_{IB}$ | | $T_A = +25^{\circ}\text{C},$ $+125^{\circ}\text{C}$ | 01,03 | -0.1 | +20 | μA |
| | | | | 02 | -0.1 | +75 | |
| | | | $T_A = -55^{\circ}\text{C}$ | 01,03 | -0.1 | +45 | |
| | | | | 02 | -0.1 | +150 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified | Temperature | Device type | Limits | | Unit | |
|-----------------------------------|-----------------|---|--|-------------|--------|-------|-------|------|
| | | | | | Min | Max | | |
| Input bias current | +I _B | V _{IC} = 0 V, R _S = 50 kΩ | $+25^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 04,05 | -100 | +0.1 | nA | |
| | | | T _A = -55°C | | -150 | +0.1 | | |
| | | V _{IC} = 13 V and -14.5 V, R _S = 50 kΩ | $+25^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | | -150 | +0.1 | | |
| | | | T _A = -55°C | | -200 | +0.1 | | |
| | | V _{IC} = 0 V | T _A = +25°C, +125°C | | 06,07 | -0.1 | | +500 |
| | | | T _A = -55°C | | | -0.1 | | 1000 |
| | | V _{IC} = +12 V and -12 V | T _A = +25°C, +125°C | | -0.1 | +750 | | |
| | | | T _A = -55°C | | -0.1 | +1000 | | |
| | -I _B | V _{IC} = 0 V, R _S = 50 kΩ | $+25^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 04,05 | -100 | +0.1 | | |
| | | | T _A = -55°C | | -150 | +0.1 | | |
| | | V _{IC} = 13 V and -14.5 V, R _S = 50 kΩ | $+25^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | | -150 | +0.1 | | |
| | | | T _A = -55°C | | -200 | +0.1 | | |
| | | V _{IC} = 0 V | T _A = +25°C, +125°C | | 06,07 | -0.1 | +500 | |
| | | | T _A = -55°C | | | -0.1 | +1000 | |
| V _{IC} = +12 V and -12 V | | T _A = +25°C, +125°C | -0.1 | | +750 | | | |
| | | T _A = -55°C | -0.1 | | +1000 | | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified | Temperature | Device type | Limits | | Unit |
|---|-----------------------------|---|--|--------------|--------|------|------|
| | | | | | Min | Max | |
| Strobe current | I _{STROBE} | V _{STROBE} = 100 mV, V _{ID} = +10 mV | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 02 | -2.5 | -0.1 | mA |
| | | V _{STROBE} = 400 mV, V _{ID} = -5 mV | | 03 | -3.3 | -0.1 | |
| Strobed output level | V _O (strobed) | V _{STROBE} = 0.3 V, <u>5/</u> V _{ID} = +10 mV | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 02 | -1.0 | 0 | V |
| | | V _{STROBE} = 0.9 V, V _{ID} = -5 mV | | 03 | +2.5 | +5.5 | |
| | | V _{STROBE} = 2.5 V, V _{ID} = -5 mV, I _{OL} = 16 mA | | | | +0.4 | |
| Collector output voltage (strobed) | V _{O(STB)} | I _{STB} = -3.0 mA R _S = 50 Ω | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 04,05 | +14 | | V |
| Input voltage common mode rejection | CMR | -V _{CC} = -7.0 V, R _S = 200 Ω, -5 V ≤ V _{IN} ≤ +5 V | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 01,02, 03 | +80 | | dB |
| Common mode rejection ratio | CMRR | V _{IC} = 13 V and -14.5 V, R _S = 50 Ω | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 04,05 | +80 | | dB |
| | | V _{IC} = +12 V and -12 V, R _S = 50 Ω | | 06,07 | 90 | | |
| High level output voltage | V _{OH} | V _{ID} = +5 mV, I _{OH} = 0 mA | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | 01 | +2.5 | +5.0 | V |
| | | V _{ID} = +10 mV, I _{OH} = 0 mA | | 02 | +2.5 | +5.0 | |
| | | V _{ID} = +5 mV, I _{OH} = -5 mA | | 01 | +2.5 | +5.0 | |
| | | V _{ID} = +10 mV, I _{OH} = -5 mA | | 02 | +2.5 | +5.0 | |
| | | V _{ID} = +5 mV, I _{OH} = -400 μA | | 03 | +2.5 | +5.5 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified | Temperature | Device type | Limits | | Unit | | |
|--|--------------------------------------|---|--|------------------------|-------------------------|------|------|------|----|
| | | | | | Min | Max | | | |
| Low level output voltage | V _{OL} | V _{ID} = -5 mV, I _{OL} = 0 mA | -55°C ≤ T _A ≤ +125°C | 01 | -1.0 | 0 | V | | |
| | | V _{ID} = -10 mV, I _{OL} = 0 mA | | 02 | -1.0 | 0 | | | |
| | | V _{ID} = -5 mV, I _{OL} = 100 mA | T _A = +25°C | 03 | | +1.5 | | | |
| | | V _{ID} = -5 mV, I _{OL} = 16 mA | | | T _A = +125°C | | | +0.4 | |
| | | V _{ID} = -5 mV, I _{OL} = 50 mA | | | T _A = -55°C | | | +1.0 | |
| | V _{OL1} V _{OL2} | +V _{CC} = +4.5 V, -V _{CC} = 0 V, V _{IC} = -1.75 V, +0.75 V, V _{ID} = -6.0 mV, I _O = 8 mA | -55°C ≤ T _A ≤ +125°C | 04,05 | | +0.4 | | | |
| | V _{OL3} V _{OL4} | ±V _{CC} = ±15 V, V _{IC} = 13 V, -14 V, V _{ID} = -5.0 mV, I _O = 50 mA | | | | +1.5 | | | |
| | V _{OL1} V _{OL2} | +V _{CC} = +4.5 V, -V _{CC} = 0 V, V _{IC} = +2.25 V, +1.0 V, V _{ID} = 7.0 mV, I _O = 3.2 mA | T _A = +25°C, +125°C | 06,07 | | +0.4 | | | |
| | | | T _A = -55°C | | | +0.6 | | | |
| | V _{OL3} V _{OL4} | V _{IC} = ±12 V, V _{ID} = -7.0 mV, I _O = 25 mA | -55°C ≤ T _A ≤ +125°C | | | +1.5 | | | |
| | Output sink current | I _{OL} | V _{ID} = -5.0 mV, V _{OL} = 0 V | T _A = +25°C | 01 | +2.0 | | | mA |
| | | | V _{ID} = -10 mV, V _{OL} = 0 V | | 02 | +0.5 | | | |
| V _{ID} = -5.0 mV, V _{OL} = 0 V | | | T _A = +125°C | 01 | +0.5 | | | | |
| V _{ID} = -10 mV, V _{OL} = 0 V | | | | 02 | +0.12 | | | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified | Temperature | Device type | Limits | | Unit | |
|-------------------------|------------------|--|------------------------------------|-----------------------------------|---|------------------------|-------|-------|
| | | | | | Min | Max | | |
| Output sink current | I _{OL} | V _{ID} = -5.0 mV, V _{OL} = 0 V | T _A = -55°C | 01 | +1.0 | | mA | |
| | | V _{ID} = -10 mV, V _{OL} = 0 V | | 02 | +0.25 | | | |
| Output leakage current | I _{CEX} | V _{OUT} = 24 V, V _{ID} = +5 mV | T _A = +25°C | 03 | -0.1 | +1.0 | μA | |
| | | | | | T _A = +125°C, -55°C | -0.5 | | +100 |
| | | ±V _{CC} = ±18 V, V _{OUT} = 32 V | T _A = +25°C | 04,05 | -1 | +10 | nA | |
| | | | | | T _A = +125°C | -1 | | +500 |
| | | ±V _{CC} = ±18 V, V _O = 18 V | T _A = +25°C | 06,07 | -1 | +2.0 | μA | |
| | | | | | T _A = +125°C | -1 | | +10.0 |
| Input leakage current | I _{I1} | ±V _{CC} = ±18 V, V _{ID} = +29 V | -55°C ≤ T _A ≤ +125°C | 04,05 | -5 | +500 | nA | |
| | I _{I2} | | | | ±V _{CC} = ±18 V, V _{ID} = -29 V | -5 | | +500 |
| Positive supply current | +I _{CC} | V _{ID} = -5 mV, V _{OUT} = V _{OL} | -55°C ≤ T _A ≤ +125°C | 01 | +0.5 | +9.0 | mA | |
| | | V _{ID} = -10 mV, V _{OUT} = V _{OL} | | 02 | +0.5 | +13.5 | | |
| | | V _{ID} = -5 mV | | 03 | +0.5 | +10 | | |
| | | Limit is for one comparator of device type 05 | | T _A = +25°C, +125°C | 04,05 | | +6.0 | |
| | | | | | | T _A = -55°C | | +7.0 |
| | | | | T _A = +25°C, +125°C | 06,07 | | +10.0 | |
| T _A = -55°C | | | | | | +11.5 | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> -55°C ≤ T _A ≤ +125°C unless otherwise specified | Temperature | Device type | Limits | | Unit | |
|--|-----------------------|--|------------------------------------|--------------------------------|-------------------------|-------|------|--|
| | | | | | Min | Max | | |
| Negative supply current | -I _{CC} | V _{ID} = -5 mV, V _{OUT} = V _{OL} , no load | -55°C ≤ T _A ≤ +125°C | 01 | -7.0 | -0.5 | mA | |
| | | | | 02 | -6.2 | -0.5 | | |
| | | | | 03 | -3.6 | -0.5 | | |
| | | Limit is for one comparator of device type 05 | T _A = +25°C, +125°C | 04,05 | -5.0 | | | |
| | | | | T _A = -55°C | -6.0 | | | |
| | | | T _A = +25°C | 06,07 | -5.0 | | | |
| | | | | | T _A = +125°C | -4.5 | | |
| | | | | | T _A = -55°C | -6.0 | | |
| | | Output short-circuit current | I _{OS} | 10 ms maximum test duration | T _A = +25°C | 04,05 | | |
| T _A = +125°C | | | | | +150 | | | |
| T _A = -55°C | | | | | +250 | | | |
| Adjustment for input offset voltage | V _{IO(ADJ)+} | R _S = 50 Ω | T _A = +25°C | 04,05 | +5.0 | | mV | |
| | V _{IO(ADJ)-} | | | | | -5.0 | | |
| Voltage gain | A _V (±) | ΔV _{OUT} = ±0.5 V, V _{OUT} = 1.4 V | T _A = +25°C | 01 | +1,250 | | V/V | |
| | | | | 02 | +750 | | | |
| | | ΔV _{OUT} = ±0.5 V, V _{OUT} = 1.0 V | T _A = +125°C | 01 | +1,000 | | | |
| | | | | 02 | +500 | | | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions <u>1/ 2/</u> $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ unless otherwise specified | Temperature | Device type | Limits | | Unit |
|---|--------------|---|--|----------------|--------|-----|------|
| | | | | | Min | Max | |
| Voltage gain | $A_V(\pm)$ | $\Delta V_{OUT} = \pm 0.5 \text{ V},$ $V_{OUT} = 1.8 \text{ V}$ | $T_A = -55^{\circ}\text{C}$ | 01 | +1,000 | | V/V |
| | | | | 02 | +500 | | |
| Voltage gain | A_{V+} | $\Delta V_{OUT} = 3.0 \text{ V},$ $V_{OUT} = 1.5 \text{ V}$ | $T_A = +25^{\circ}\text{C}$ | 03 | +30 | | V/mV |
| | | | $T_A = +125^{\circ}\text{C}$ | | +10 | | |
| | | | $T_A = -55^{\circ}\text{C}$ | | +50 | | |
| Voltage gain | A_{V-} | $\Delta V_{OUT} = -1.0 \text{ V},$ $V_{OUT} = 1.5 \text{ V}$ | $T_A = +25^{\circ}\text{C}$ | 03 | +30 | | V/mV |
| | | | $T_A = +125^{\circ}\text{C}$ | | +10 | | |
| | | | $T_A = -55^{\circ}\text{C}$ | | +50 | | |
| Voltage gain (emitter follower output) | $\pm A_{VE}$ | $R_L = 600 \Omega$ | $T_A = +25^{\circ}\text{C}$ | 04,05 | +10 | | V/mV |
| | | | $-55^{\circ}\text{C} \leq T_A \leq +125^{\circ}\text{C}$ | | +8 | | |
| Voltage gain (collector) | A_V | | $T_A = +25^{\circ}\text{C}$ | 06 | +10 | | V/mV |
| | | | | 07 | +20 | | |
| | | | $T_A = +125^{\circ}\text{C},$ -55°C | 06 | +5 | | |
| | | | | 07 | +10 | | |
| Response time, output saturated high level to threshold level | t_{HTHR} | See figure 3, $C_L = 5 \text{ pF},$ 100 mV step, 5 mV overdrive | $T_A = +25^{\circ}\text{C}$ | 01,03 | | 60 | ns |
| | | | | 02 | | 90 | |

See footnotes at end of table.

TABLE I. Electrical performance characteristics – Continued.

| Test | Symbol | Conditions ^{1/ 2/} -55°C ≤ T _A ≤ +125°C unless otherwise specified | Temperature | Device type | Limits | | Unit |
|--|-------------------|--|---|----------------|--------|-----|------|
| | | | | | Min | Max | |
| Response time, output saturated low level to threshold level | t _{LTHR} | See figure 3, C _L = 5 pF, 100 mV step, 5 mV overdrive | T _A = +25°C | 01,02, 03 | | 60 | ns |
| Strobe release time | t _{STRL} | See figure 4, T _A = +25°C, C _L = 5 pF, V _{ID} = +10 mV | T _A = +25°C | 02,03 | | 15 | ns |
| Response time, low-to-high level collector output | t _{RLHC} | V _{OD} (overdrive) = -5 V, C _L = 50 pF, V _{IN} = 100 mV | -55°C ≤ T _A ≤ +25°C | 04,05 | | 300 | ns |
| | | | T _A = +125°C | | | 640 | |
| | | V _{OD} (overdrive) = -5 V, C _L = 50 pF minimum, V _{IN} = 100 mV | T _A = +25°C, -55°C | 06,07 | | 125 | |
| | | | T _A = +125°C | | | 160 | |
| Response time, high-to-low level collector output | t _{RHLC} | V _{OD} (overdrive) = +5 V, C _L = 50 pF, V _{IN} = 100 mV | -55°C ≤ T _A ≤ +25°C | 04,05 | | 300 | ns |
| | | | T _A = +125°C | | | 500 | |
| | | V _{OD} (overdrive) = +5 V, C _L = 50 pF minimum, V _{IN} = 100 mV | T _A = +25°C, +125°C, -55°C | 06,07 | | 160 | |

- 1/ For device types 01, 02, and 03, unless otherwise specified, +V_{CC} = +12 V dc and -V_{CC} = -6 V. Unless otherwise specified, for device type 02, strobe on device not being tested is connected to ground; strobe on device being tested is left open. Unless otherwise specified, for device type 03, strobes are at a high level for all tests.
- 2/ For device types 04, 05, 06, and 07, unless otherwise specified, V_{IC} = 0 V, ±V_{CC} = ±15 V and -55°C ≤ T_A ≤ +125°C. Limits apply to each half of device types 05, 06, and 07 except as noted for +I_{CC} and -I_{CC}.
- 3/ V_{IC} is achieved by algebraically subtracting the common mode voltage from each V_{CC} (power supplies) and algebraically adding it to V_{IN}. V_{IC} can be calculated by using the following formula:

$$V_{IC} = -\left[\frac{(+V_{CC}) + (-V_{CC})}{2}\right] + V_{IN}$$
- 4/ Subscript (R) indicates tests which are performed with input stage current raised by connecting BAL and BAL / STB terminals to +V_{CC}.
- 5/ The output voltage follows the strobe voltage, staying one diode drop (0.7 V) below.

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| Device type | 01 | | | |
|-----------------|------------------|------------------|------------------|------------------|
| Case outlines | C | G | H | 2 |
| Terminal number | Terminal symbol | | | |
| 1 | NC | GND | GND | NC |
| 2 | GND | INPUT+ | INPUT+ | GND |
| 3 | INPUT+ | INPUT- | INPUT- | NC |
| 4 | INPUT- | V _{CC-} | NC | NC |
| 5 | NC | NC | V _{CC-} | INPUT+ |
| 6 | V _{CC-} | NC | OUTPUT | NC |
| 7 | NC | OUTPUT | NC | INPUT- |
| 8 | NC | V _{CC+} | V _{CC+} | NC |
| 9 | OUTPUT | --- | NC | NC |
| 10 | NC | --- | NC | V _{CC-} |
| 11 | V _{CC+} | --- | --- | NC |
| 12 | NC | --- | --- | NC |
| 13 | NC | --- | --- | NC |
| 14 | NC | --- | --- | NC |
| 15 | --- | --- | --- | NC |
| 16 | --- | --- | --- | NC |
| 17 | --- | --- | --- | OUTPUT |
| 18 | --- | --- | --- | NC |
| 19 | --- | --- | --- | NC |
| 20 | --- | --- | --- | V _{CC+} |

NC = No connection

FIGURE 1. Terminal connections.

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| Device type | 02 | | | |
|-----------------|------------------|------------------|------------------|------------------|
| Case outlines | C | H | I | 2 |
| Terminal number | Terminal symbol | | | |
| 1 | NC | INPUT- 1 | GND | NC |
| 2 | INPUT- 1 | INPUT+ 1 | STROBE 1 | NC |
| 3 | INPUT+ 1 | V _{CC-} | INPUT - 1 | INPUT- 1 |
| 4 | V _{CC-} | INPUT+ 2 | INPUT+ 1 | INPUT+ 1 |
| 5 | INPUT+ 2 | INPUT- 2 | V _{CC-} | NC |
| 6 | INPUT- 2 | STROBE 2 | INPUT+ 2 | V _{CC-} |
| 7 | NC | OUTPUT | INPUT- 2 | NC |
| 8 | NC | V _{CC+} | STROBE 2 | INPUT+ 2 |
| 9 | STROBE 2 | GND | OUTPUT | INPUT- 2 |
| 10 | OUTPUT | STROBE 1 | V _{CC+} | NC |
| 11 | V _{CC+} | --- | --- | NC |
| 12 | GND | --- | --- | NC |
| 13 | STROBE 1 | --- | --- | STROBE 2 |
| 14 | NC | --- | --- | OUTPUT |
| 15 | --- | --- | --- | NC |
| 16 | --- | --- | --- | V _{CC+} |
| 17 | --- | --- | --- | NC |
| 18 | --- | --- | --- | GND |
| 19 | --- | --- | --- | STROBE 1 |
| 20 | --- | --- | --- | NC |

NC = No connection

FIGURE 1. Terminal connections – Continued.

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| Device types | 03 | | 04 | | |
|-----------------|-----------------|----------|---------|---------|----------|
| Case outlines | A | G | C | G | H and Z |
| Terminal number | Terminal symbol | | | | |
| 1 | NC | GND | NC | GND | GND |
| 2 | GND | INPUT+ | GND | INPUT+ | INPUT+ 1 |
| 3 | INPUT+ | INPUT- | INPUT+ | INPUT- | INPUT- 1 |
| 4 | INPUT- | VCC- | INPUT- | VCC- | NC |
| 5 | NC | STROBE 1 | NC | BAL | VCC- |
| 6 | VCC- | STROBE 2 | VCC- | BAL/STB | BAL |
| 7 | STROBE 1 | OUTPUT | BAL | OUTPUT | BAL/STB |
| 8 | STROBE 2 | VCC+ | BAL/STB | VCC+ | NC |
| 9 | OUTPUT | --- | OUTPUT | --- | OUTPUT |
| 10 | NC | --- | NC | --- | VCC+ |
| 11 | VCC+ | --- | VCC+ | --- | --- |
| 12 | NC | --- | NC | --- | --- |
| 13 | NC | --- | NC | --- | --- |
| 14 | NC | --- | NC | --- | --- |
| 15 | --- | --- | --- | --- | --- |
| 16 | --- | --- | --- | --- | --- |
| 17 | --- | --- | --- | --- | --- |
| 18 | --- | --- | --- | --- | --- |
| 19 | --- | --- | --- | --- | --- |
| 20 | --- | --- | --- | --- | --- |

NC = No connection
 BAL = Balance
 BAL / STB = Balance / Strobe

FIGURE 1. Terminal connections – Continued.

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| Device types | 04 | | 05 |
|-----------------|-----------------|---------|--------------------|
| Case outlines | P | 2 | E, F, and X |
| Terminal number | Terminal symbol | | |
| 1 | GND | NC | VCC+ A |
| 2 | INPUT+ 1 | GND | GND A |
| 3 | INPUT- 1 | NC | INPUT+ A |
| 4 | VCC- | NC | INPUT- A |
| 5 | BAL | INPUT+ | VCC- |
| 6 | BAL/STB | NC | BAL B |
| 7 | OUTPUT | INPUT- | BAL/STB B |
| 8 | VCC+ | NC | COLLECTOR OUTPUT B |
| 9 | --- | NC | VCC+ B |
| 10 | --- | VCC- | GND B |
| 11 | --- | NC | INPUT+ B |
| 12 | --- | BAL | INPUT- B |
| 13 | --- | NC | BAL A |
| 14 | --- | NC | BAL/STB A |
| 15 | --- | BAL/STB | COLLECTOR OUTPUT A |
| 16 | --- | NC | NC |
| 17 | --- | OUTPUT | --- |
| 18 | --- | NC | --- |
| 19 | --- | NC | --- |
| 20 | --- | VCC+ | --- |

NC = No connection
 BAL = Balance
 BAL / STB = Balance / Strobe

FIGURE 1. Terminal connections – Continued.

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| Device types | 06 and 07 | | |
|-----------------|------------------|------------------|------------------|
| Case outlines | C | H | I |
| Terminal number | Terminal symbol | | |
| 1 | NC | OUTPUT 1 | OUTPUT 1 |
| 2 | NC | GND 1 | GND 1 |
| 3 | GND 1 | INPUT+ 1 | INPUT+ 1 |
| 4 | INPUT+ 1 | INPUT- 1 | INPUT- 1 |
| 5 | INPUT- 1 | V _{CC-} | V _{CC-} |
| 6 | V _{CC-} | OUTPUT 2 | OUTPUT 2 |
| 7 | OUTPUT 2 | GND 2 | GND 2 |
| 8 | GND 2 | INPUT+ 2 | INPUT+ 2 |
| 9 | INPUT+ 2 | INPUT- 2 | INPUT- 2 |
| 10 | INPUT- 2 | V _{CC+} | V _{CC+} |
| 11 | V _{CC+} | --- | --- |
| 12 | OUTPUT 1 | --- | --- |
| 13 | NC | --- | --- |
| 14 | NC | --- | --- |

NC = No connection

FIGURE 1. Terminal connections – Continued.

DEVICE TYPES 01 AND 02

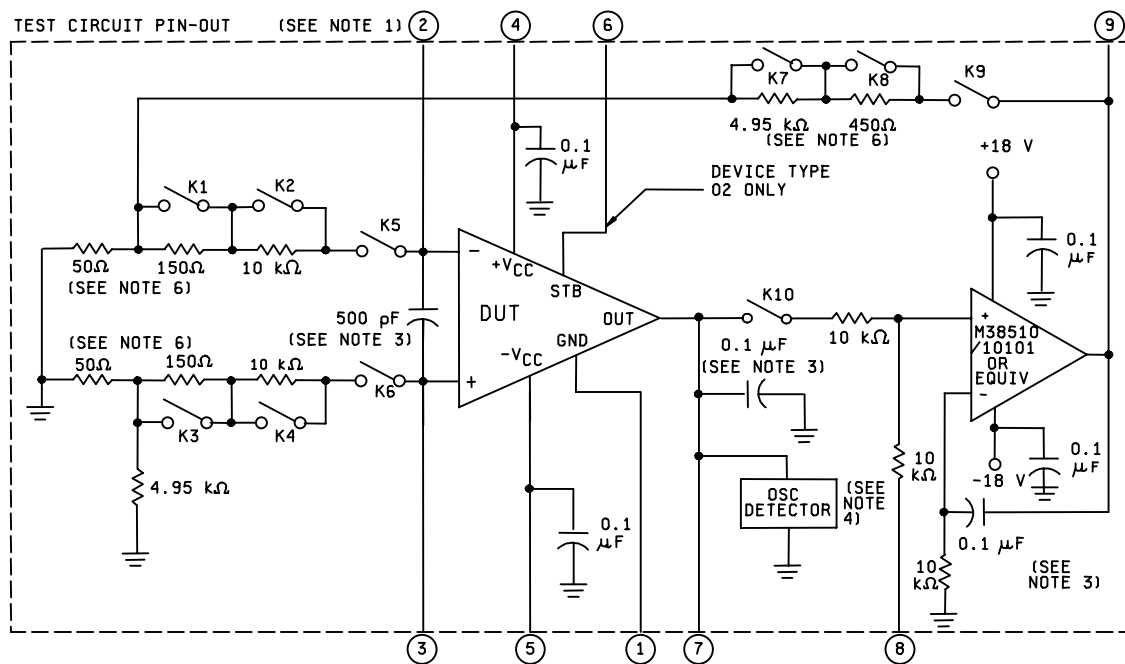


FIGURE 2. Test circuit for static and dynamic tests.

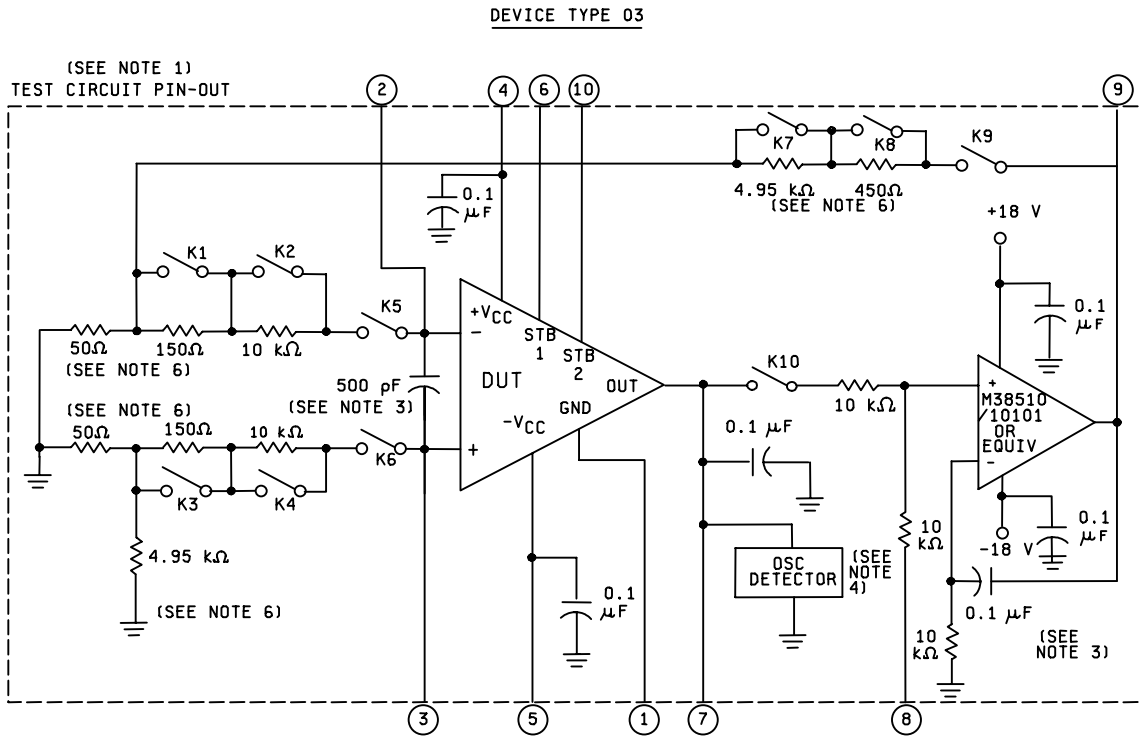


FIGURE 2. Test circuit for static and dynamic tests – continued.

DEVICE TYPES 04 AND 05

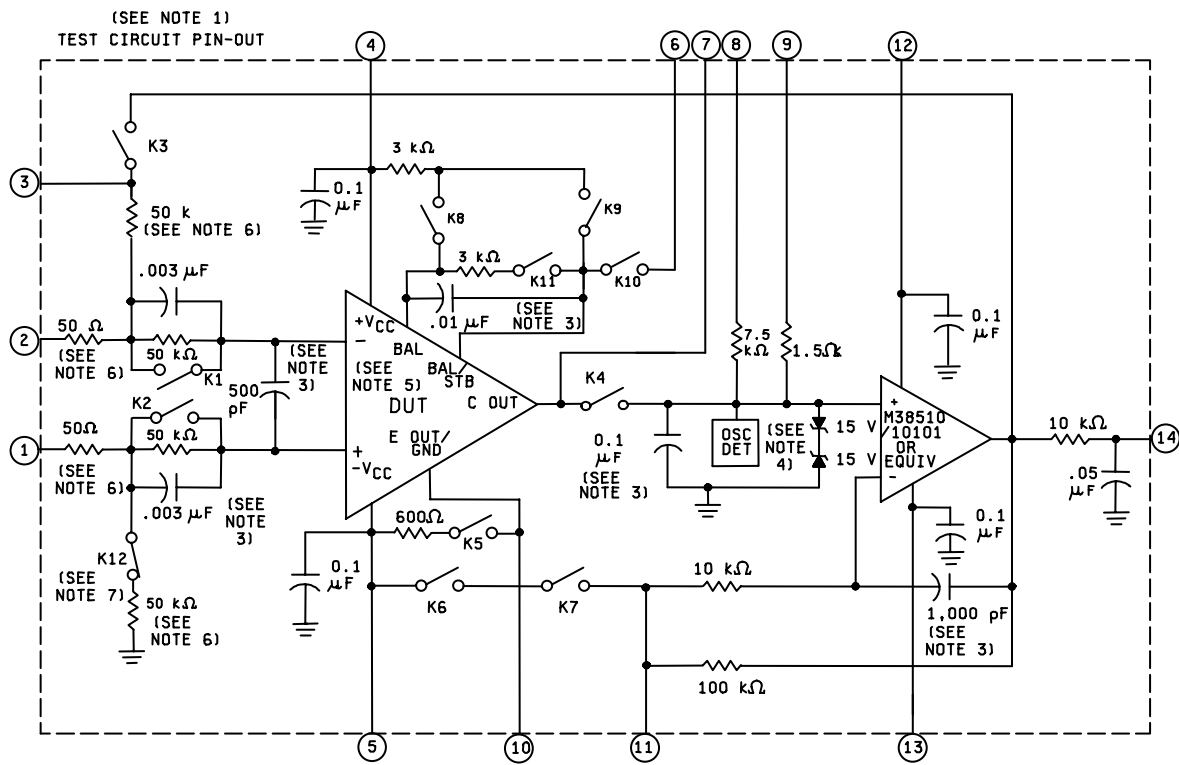


FIGURE 2. Test circuit for static and dynamic tests – continued.

DEVICE TYPES 06 AND 07

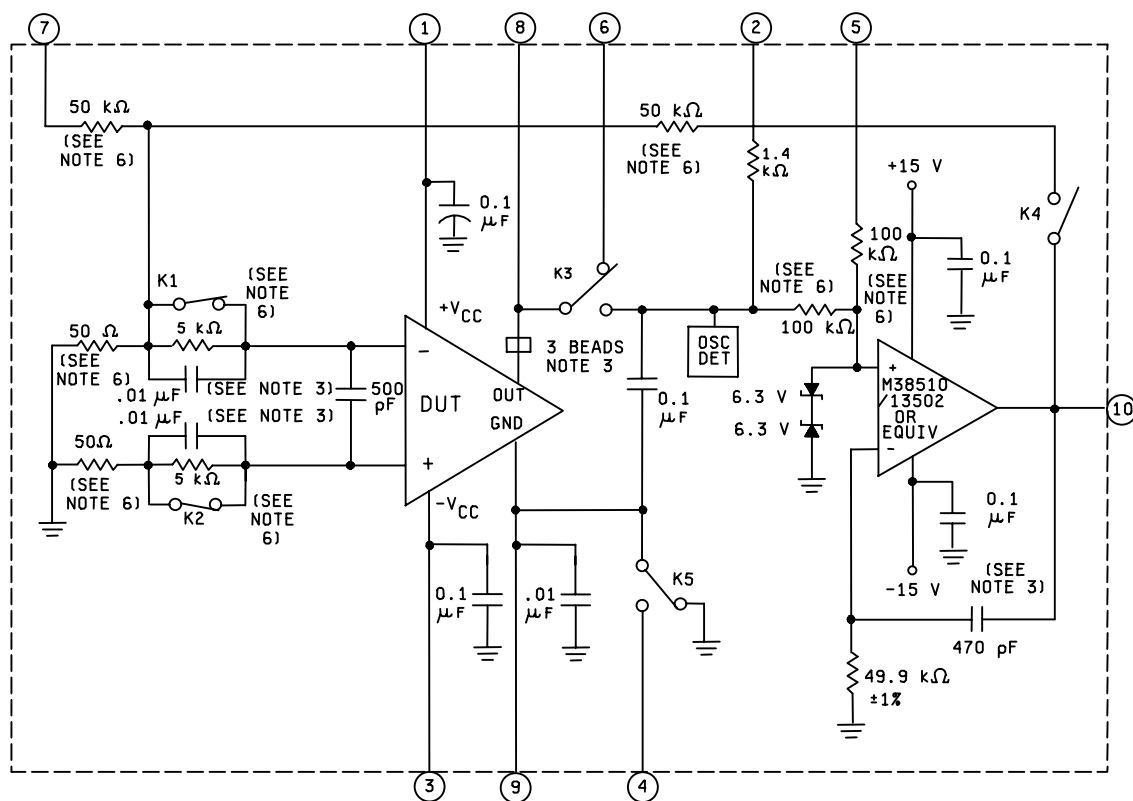


FIGURE 2. Test circuit for static and dynamic tests – continued.

NOTES:

1. Test circuit pin conditions and test temperatures shall be as specified in table III.
2. Precautions shall be taken to prevent damage to the device under test (DUT) during insertion into socket and change of relay switch positions (for example, disable voltage-current supplies, current limit $\pm V_{CC}$, etc.).
3. As required to prevent oscillations. Also, proper wiring procedures shall be followed to prevent oscillations. Loop response and settling time shall be consistent with test rate such that any value has settled to within 5 percent of its final value before value is measured. Suggested values shown may not ensure loop stability for all layouts. Actual compensation used shall be approved by the preparing activity prior to use.
4. Any oscillation greater than 300 mV(p-p) shall be cause for device failure.
5. For dual devices, both halves shall be tested. The output of the idle half shall be driven to the off state by using either a differential input voltage or a strobe input, or the idle half may be biased the same as the tested half if oscillations can be avoided.
6. These resistors are ± 0.1 percent tolerance matched to ± 0.01 percent. All other resistors are ± 1 percent tolerance and capacitors are 10 percent tolerance.
7. All relays are shown in the normal deenergized state.

FIGURE 2. Test circuit for static and dynamic tests – continued.

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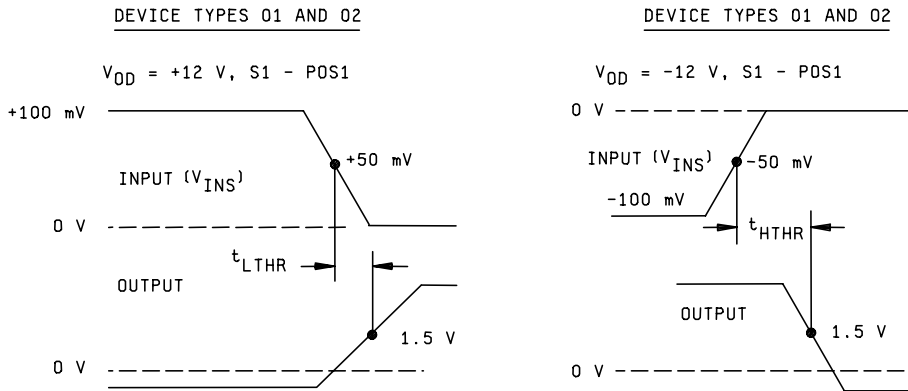
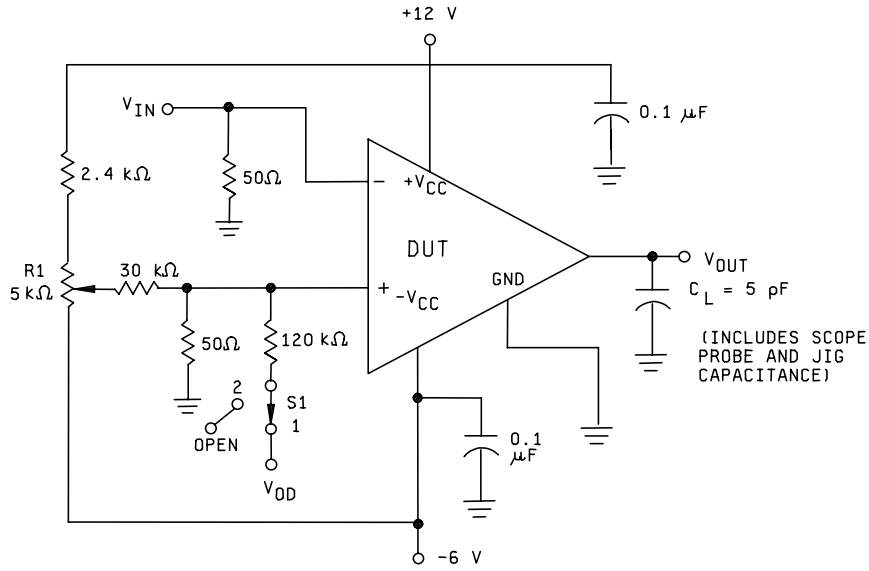
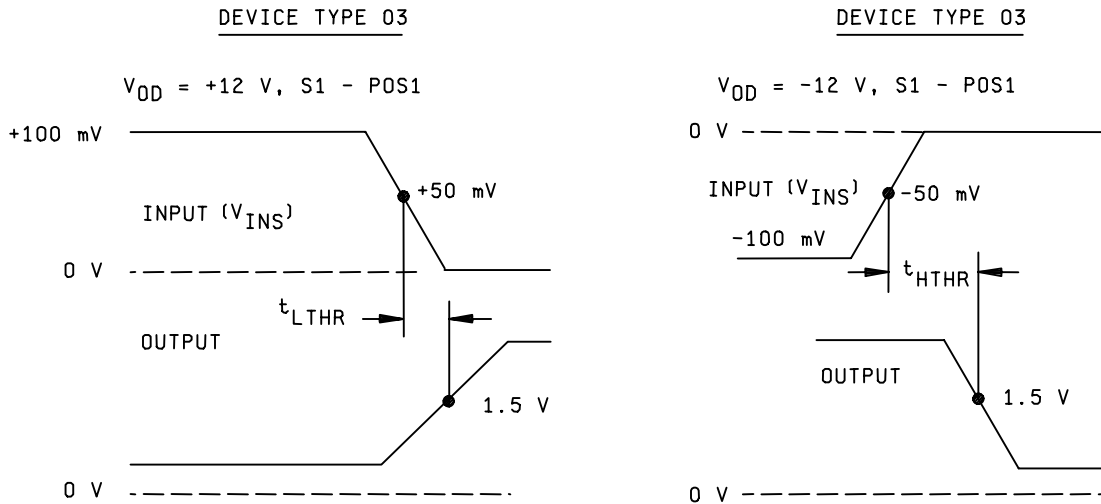


FIGURE 3. Response time test circuit and waveforms for device types 01, 02, and 03.

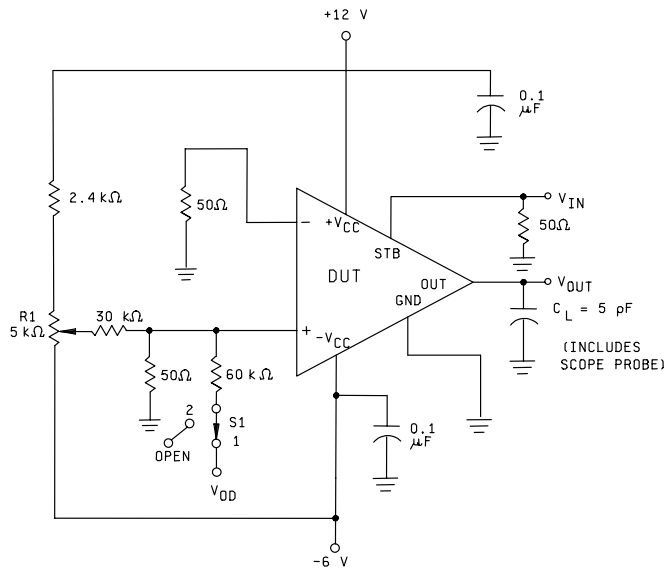


NOTES:

1. $V_{IN} = 100 \text{ ns}$ pulse width, 100 kHz repetition rate, t_r and $t_f \leq 5 \text{ ns}$ (see waveforms).
2. Setup procedure: With S1 open and $V_{IN} = 0$ adjust R1 for $V_{OUT} = 1.5 \text{ V}$. Apply V_{OD} (see note 5) and close S1, then apply V_{IN} . (R1 voltage divider may be replaced with a variable power supply.)
3. All resistor tolerances are ± 1 percent and all capacitor tolerances are ± 10 percent.
4. For device type 02, ground strobe on idle side. For device type 03, strobe is left open.
5. See waveforms for V_{OD} values.
6. When $V_{OD} = 12 \text{ V}$, overdrive applied to device under test (DUT) = 5 mV.

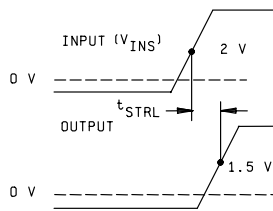
FIGURE 3. Response time test circuit and waveforms for device types 01, 02, and 03 – continued.

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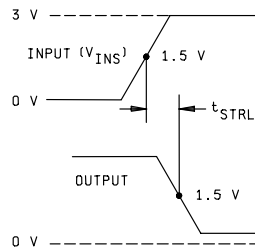
DEVICE TYPE 02

$V_{OD} = +12 \text{ V}$, S1 - POS, 2



DEVICE TYPE 03

$V_{OD} = -12 \text{ V}$, S1 - POS, 2

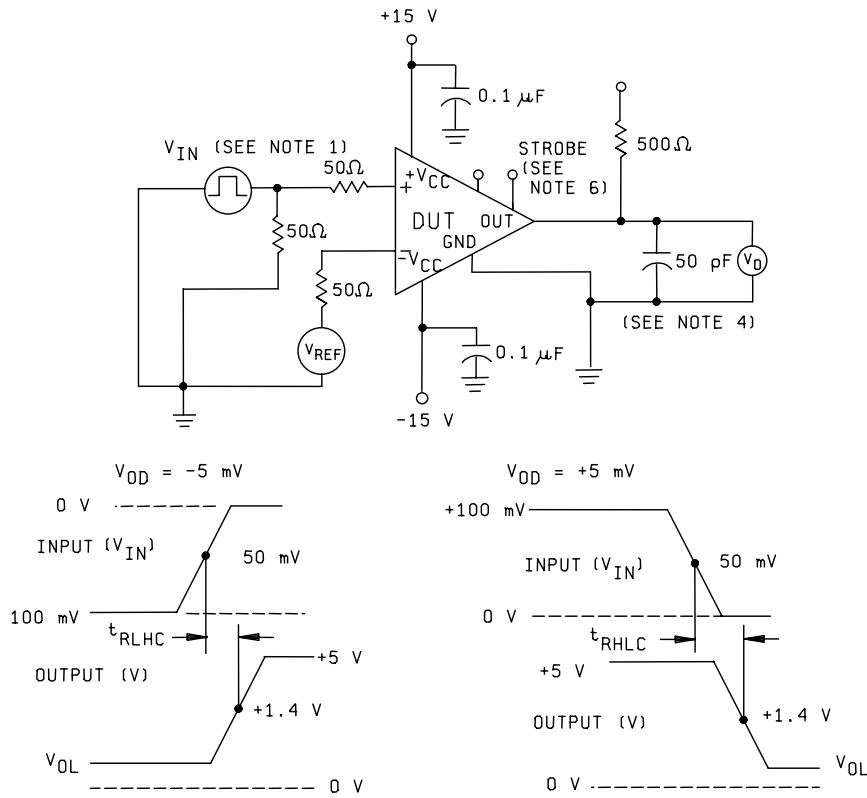


NOTES:

1. $V_{IN} = 100 \text{ ns}$ pulse width, 100 kHz repetition rate, t_r and $t_f \leq 5 \text{ ns}$ (see waveforms).
2. Setup procedure: With S1 open and $V_{IN} = 3 \text{ V}$ (device type 02), and $V_{IN} = 0 \text{ V}$ (device type 03) adjust R1 for $V_{OUT} = 1.5 \text{ V}$. Apply V_{OD} (see note 5) and close S1, then apply V_{IN} . (R1 voltage divider may be replaced with a variable power supply.)
3. All resistor tolerances are ± 1 percent and all capacitor tolerance are ± 10 percent .
4. For device type 02, ground strobe on idle side. For device type 03, unused strobe is left open.
5. See waveform for V_{OD} values.
6. When $V_{OD} = 12 \text{ V}$, overdrive applied to device under test (DUT) = 10 mV .

FIGURE 4. Strobe release time test circuit and waveforms for device types 02 and 03.

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NOTES:

1. $V_{IN} = 10 \mu\text{s}$ pulse width at 50 kHz, t_{TLH} and $t_{THL} \leq 10 \text{ ns}$, and $Z_O = 50 \Omega$.
2. Setup procedure:
 - a. With $V_{IN} = 0 \text{ V}$, step V_{REF} from -3.0 mV to $+3.0 \text{ mV}$ in 0.1 mV steps for subgroup 7, -4.0 mV to $+4.0 \text{ mV}$ for subgroup 8, and stop when output switches from high to low.
 - b. Change V_{REF} from the reference value obtained above by the required V_{OD} (overdrive).
 - c. Apply V_{IN} and measure response time.
3. All resistor tolerances are ± 1 percent and all capacitor tolerances are ± 10 percent.
4. C_L includes scope, probe, and jig capacitance.
5. $T_A = +25^\circ\text{C}$ for subgroup 7. For subgroup 8, the tests shall be performed twice, at $T_A = +125^\circ\text{C}$ and $T_A = -55^\circ\text{C}$.
6. In an environment with excessive noise, a $0.01 \mu\text{F}$ capacitor may be placed between balance and balance/strobe pins.

FIGURE 5. Response time test circuit and waveforms for collector output for device types 04 and 05.

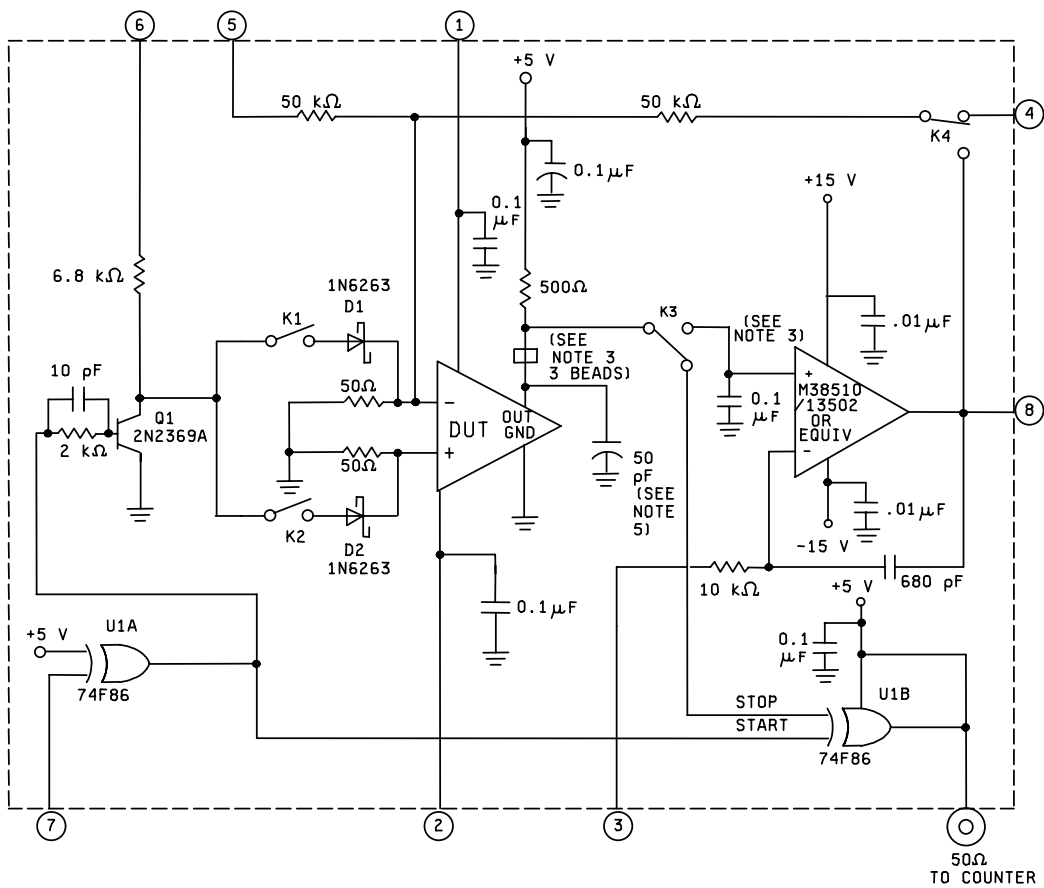


FIGURE 6. Response time test circuit for device types 06 and 07.

NOTES:

1. This circuit is designed especially to be used with a computer-controlled automatic tester, although it can also be implemented as a bench test setup. The test table for subgroups 9, 10, and 11 lists in detail the steps in a typical test sequence, which goes as follows:
 - a. Measure V_{IO} : Device under test (DUT) is in a conventional servo loop (K3 and K4 energized) with output served to TTL logic threshold. (1.4 V on adapter pin 3). Measure $V_{IO} \times 1000$ adapter pin 8.
 - b. Null V_{IO} : Release K3 and K4, apply voltage measured in step 1 to adapter pin 4. This is particularly easy to do on computer-controlled automatic test equipment.
 - c. Apply 5 mV overdrive (OD): The overdrive is developed at the inverting input of the device under test (DUT) via a 1000:1 divider from adapter pin 5.
 - d. Apply initial 100 mV: Close K1, apply 2 mA at adapter pin 6. Since Q1 is off, this current flows through Schottky diode D1 and the 50 Ω source resistor, giving 100 mV. If a current source is not available, 15 V at pin 6 will give about 2 mA current.
 - e. Measure t_{RLHC} : Pull adapter pin 7 low. U1A output goes high, starting the timer via U1B and turning on Q1, which turns off D1. The 100 mV drive disappears abruptly, leaving just the 5 mV overdrive. After the response time, the device under test (DUT) output crosses TTL logic threshold and stops the timer via U1B. On a bench setup, the pulse at 1UB output can be measured with a scope.
 - f. Measure t_{RHLC} : Reset pin 7, change pin 5 from -5 V to +5 V, open K1, close K2, pull pin 7 low, measure pulse width at U1B output.
2. The following delay times are of possible concern in the LM119 (device types 06 and 07) response time test circuit:
 - a. U1A: This device merely inverts and squares up the start signal from the tester. Its gate delay does not affect the tests.
 - b. Q1: This is the major uncompensated delay, since the timer starts when Q1 base goes high, not when Q1 collector goes low. This delay is minimized by using a fast switching transistor with an R-C speedup network driving the base. Measured Q1 delays are well under 10 ns.
 - c. D1 and D2: These Schottky devices have negligible switching times (< 1 ns).
 - d. U1B: The gate delays here are not important as long as the delays from the two inputs are well matched. (Matched delays merely offset the output pulse in time.) To minimize gate delay effects even further, we use one of the "fast" series 74F86 gates; with delays around 5 ns from each input, the mismatch should be no more than 1 or 2 ns.
 - e. Q2: This driver is required only if the time measurement systems has a 50 Ω input. Since it operates as an emitter follower rather than a saturating switch, there are no delays associated with it.
3. As required to prevent oscillations. Also, proper wiring procedures shall be followed to prevent oscillations. Loop response and settling time shall be consistent with test rate such that any value has settled to within 5 percent of its final value before value is measured. Suggested values shown may not ensure loop stability for all layouts. Actual compensation used shall be approved by preparing activity prior to use.
4. All resistor tolerances are ± 1 percent and all capacitor tolerances are ± 10 percent.
5. C_L includes scope, probe, and jig capacitance.

FIGURE 6. Response time test circuit for device types 06 and 07 – continued.

TABLE II. Electrical test requirements.

| MIL-PRF-38535 test requirements | Subgroups (see table III) <u>2/</u> <u>3/</u> | |
|---|---|--------------------------------|
| | Class S devices | Class B devices |
| Interim electrical parameters | 1 | 1 |
| Final electrical test parameters <u>1/</u> | 1,2,3,4 | 1,2,3,4 |
| Group A test requirements | 1,2,3,4,5,6, 7,8,9,10,11 | 1,2,3,4,5,6,7,8,9 |
| Group B electrical test parameters when using the methods 5005 QCI option | 1,2,3, and table IV delta limits | N/A |
| Group C electrical parameters | 1,2,3, and table IV delta limits | 1 and table IV delta limits |
| Group D end point electrical parameters | 1,2,3 | 1 |

1/ PDA applies to subgroup 1.

2/ Subgroup 8 applies to device types 04 and 05 only.

3/ Subgroups 9, 10, and 11 apply to device types 06 and 07.

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.

TABLE III. Group A inspection for device types 01 and 02. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | Relays closed | | | | |
|--|-------------------------|---------------------------|-------------|---|---|---|---------|---------|--------|---|---|---|------------------|--|--|--|--------------------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | | |
| 1 TA = +25°C (figure 2) | V _{IO1} | 4001 | 1 | GND | | | +12.0 V | -6.0 V | | | | | | | | | 1,2,3,4,5,6,8,9,10 |
| | V _{IO2} | " | 2 | " | | | " | " | | | | | | | | | 2,4,5,6,8,9,10 |
| | I _{IO} | " | 3 | " | | | " | " | | | | | | | | | 1,3,5,6,8,9,10 |
| | +I _{IB} | " | 4 | " | | | " | " | | | | | | | | | 1,2,3,5,6,7,9,10 |
| | -I _{IB} | " | 5 | " | | | " | " | | | | | | | | | 1,3,4,5,6,7,9,10 |
| | CMR | 4003 | 6 | +5.0 V | | | +17.0 V | -2.0 V | | | | | | | | | 2,4,5,6,8,9,10 |
| | CMR | 4003 | 7 | -5.0 V | | | +7.0 V | -12.0 V | | | | | | | | | 2,4,5,6,8,9,10 |
| | +I _{CC} | 3005 | 8 | GND | | | 2/ | +12.0 V | -6.0 V | | | | | | | | 1,2,5 |
| | -I _{CC} | 3005 | 9 | " | | | " | " | " | | | | | | | | 1,2,5 |
| | V _{OL} | 3007 | 10 | " | | | " | " | " | | | | | | | | 1,2,5 |
| | I _{OL} | 3009 | 11 | " | | | " | " | " | | | | | | | | 1,2,5 |
| | V _{OH1} | 3006 | 12 | " | | | 2/ | " | " | | | | | | | | 3,4,6 |
| | V _{OH2} | 3006 | 13 | " | | | " | " | " | | | | | | | | 3,4,6 |
| | V _O (STB) 3/ | 3007 | 14 | " | | | " | " | " | | | | | | | | 3,4,6 |
| | I _O (STB) 3/ | 3009 | 15 | " | | | " | " | " | | | | | | | | 3,4,6 |
| | V _{IO1} | 4001 | 16 | " | | | | | | | | | | | | | 1,2,3,4,5,6,8,9,10 |
| | V _{IO2} | 4001 | 17 | " | | | | | | | | | | | | | 2,4,5,6,8,9,10 |
| 2 TA = +125°C (figure 2) | ΔV _{IO} /ΔT 4/ | | 18 | Calculation: ΔV _{IO} / ΔT = [V _{IO} (test 16) - V _{IO} (test 1)] x 10 ³ / 100°C | | | | | | | | | | | | | |
| | I _{IO} | 4001 | 19 | GND | | | +12.0 V | -6.0 V | | | | | | | | | 1,3,5,6,8,9,10 |
| | ΔI _{IO} /ΔT 4/ | | 20 | Calculation: ΔI _{IO} / ΔT = [I _{IO} (test 19) - I _{IO} (test 3)] x 10 ³ / 100°C | | | | | | | | | | | | | |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Pin measured | | | Equation | Limits | | | | | |
|------------------|------------------------|---------------------------|-------------|--------------|---------------------|------|------------------------------------|----------------|------|-------|----------------|-------|-------|
| | | | | No. | Value | Unit | | Device type 01 | | | Device type 02 | | |
| | | | | | | | | Min | Max | Unit | Min | Max | Unit |
| 1 TA = +25°C | V _{IO1} | 4001 | 1 | 9 | E1 | V | $V_{IO} = 10E1$ | -2 | +2 | mV | -3.5 | +3.5 | mV |
| | V _{IO2} | " | 2 | " | E2 | " | $V_{IO} = 10E2$ | -2 | +2 | mV | -3.5 | +3.5 | mV |
| | I _{IO} | " | 3 | " | E3 | " | $I_{IO} = E1 - E3$ | -3 | +3 | µA | -10 | +10 | µA |
| | +I _{IB} | " | 4 | " | E4 | " | $+I_{IB} = E1 - 10E4$ | -0.1 | +20 | µA | -0.1 | +75 | µA |
| | -I _{IB} | " | 5 | " | E5 | " | $-I_{IB} = 10E5 - E1$ | | +20 | µA | -0.1 | +75 | µA |
| | CMR | 4003 | 6 | 9 | E6 | " | $CMR = 20 \log [10^3 / (E6 - E7)]$ | +80 | | dB | +80 | | dB |
| | CMR | 4003 | 7 | 9 | E7 | " | | | | | | | |
| | +I _{CC} | 3005 | 8 | 4 | +I _{CC} | mA | | +0.5 | +9.0 | mA | +0.5 | +13.5 | mA |
| | -I _{CC} | 3005 | 9 | 5 | -I _{CC} | mA | | -7.0 | -0.5 | mA | -6.2 | -0.5 | mA |
| | V _{OL} | 3007 | 10 | 7 | V _{OL} | V | | -1.0 | | V | -1.0 | | V |
| 2 TA = +125°C | I _{OL} | 3009 | 11 | " | I _{OL} | mA | | +2.0 | | mA | +0.5 | | mA |
| | V _{OH1} | 3006 | 12 | " | V _{OH1} | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| | V _{OH2} | 3006 | 13 | " | V _{OH2} | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| | V _{O(STB) 3/} | 3007 | 14 | " | V _{O(STB)} | V | | | | V | -1.0 | | V |
| | I _{O(STB) 3/} | 3009 | 15 | 6 | I _{O(STB)} | mA | | | | | -2.5 | -0.1 | mA |
| | V _{IO1} | 4001 | 16 | 9 | E8 | V | $V_{IO} = 10E8$ | -3 | +3 | mV | -4.5 | +4.5 | mV |
| | V _{IO2} | 4001 | 17 | 9 | E9 | V | $V_{IO} = 10E9$ | -3 | +3 | mV | -4.5 | +4.5 | mV |
| | ΔI _{O/ΔT 4/} | | 18 | | | | | -10 | +10 | µV/°C | -10 | +10 | µV/°C |
| | I _{IO} | 4001 | 19 | 9 | E10 | V | $I_{IO} = E8 - E10$ | -3 | +3 | µA | -10 | +10 | µA |
| | ΔI _{O/ΔT 4/} | | 20 | | | | | -25 | +25 | nA/°C | -25 | +25 | nA/°C |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | Relays closed | | | |
|--|-----------------------------|---------------------------|-------------|---|----|----|---------|---------|---|--------|---|---|------------------|--------|--------------------|----------------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | | |
| 2 TA = +125°C (figure 2) | +IIB | 4001 | 21 | GND | | | +12.0 V | -6.0 V | | | | | -1.0 V | | 1,2,3,5,6,7,9,10 | |
| | -IIB | 4001 | 22 | GND | | | +12.0 V | -6.0 V | | | | | -1.0 V | | 1,3,4,5,6,7,9,10 | |
| | CMR | 4003 | 23 | +5.0 V | | | +17.0 V | -2.0 V | | | | | -6.0 V | | 2,4,5,6,8,9,10 | |
| | CMR | 4003 | 24 | -5.0 V | | | +7.0 V | -12.0 V | | | | | +4.0 V | | 2,4,5,6,8,9,10 | |
| | +ICC | 3005 | 25 | GND | | 2/ | +12.0 V | -6.0 V | | | | | | | 1,2,5 | |
| | -ICC | 3005 | 26 | " | | " | " | " | | | | | | | 1,2,5 | |
| | VOL | 3007 | 27 | " | | " | " | " | | | | | | | 1,2,5 | |
| | IOL | 3009 | 28 | " | | " | " | " | | | | | | | 1,2,5 | |
| | VOH1 | 3006 | 29 | " | 2/ | | " | " | | | | | -5 mA | | 3,4,6 | |
| | VOH2 | 3006 | 30 | " | " | | " | " | | | | | | | 3,4,6 | |
| 3 TA = -55°C (figure 2) | VO(STB) 3/ | 3007 | 31 | " | " | | " | " | | 300 mV | | | | | 3,4,6 | |
| | IO(STB) 3/ | 3009 | 32 | " | " | | " | " | | 100 mV | | | | | 3,4,6 | |
| | VIO1 | 4001 | 33 | " | | | " | " | | | | | -1.8 V | | 1,2,3,4,5,6,8,9,10 | |
| | VIO2 | " | 34 | " | | | " | " | | | | | -1.8 V | | 2,4,5,6,8,9,10 | |
| | $\Delta V_{IO}/\Delta T$ 4/ | " | 35 | Calculation: $\Delta V_{IO} / \Delta T = V_{IO}(\text{test 33}) - V_{IO}(\text{test 1}) \times 10^3 / 80^\circ\text{C}$ | | | | | | | | | | | | |
| | IIO | " | 36 | GND | | | +12.0 V | -6.0 V | | | | | | -1.8 V | | 1,3,5,6,8,9,10 |
| | $\Delta I_{IO}/\Delta T$ 4/ | " | 37 | Calculation: $\Delta I_{IO} / \Delta T = I_{IO}(\text{test 36}) - I_{IO}(\text{test 3}) \times 10^3 / 80^\circ\text{C}$ | | | | | | | | | | | | |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Pin measured | | | Equation | Limits | | | | | |
|--|-------------------|---------------------------|-------------|--------------|---------|------|---|----------------|------|-------|----------------|-------|-------|
| | | | | No. | Value | Unit | | Device type 01 | | | Device type 02 | | |
| | | | | | | | | Min | Max | Unit | Min | Max | Unit |
| 2 TA = +125°C (figure 2) | +IB | 4001 | 21 | 9 | E11 | V | +IB = E ₈ - 10E ₁₁ | -0.1 | +20 | μA | -0.1 | +75 | μA |
| | -IB | 4001 | 22 | " | E12 | " | -IB = 10E ₁₂ - E ₈ | -0.1 | +20 | μA | -0.1 | +75 | μA |
| | CMR | 4003 | 23 | " | E13 | " | CMR = 20 log [10 ³ / (E ₁₃ - E ₁₄)] | +80 | | dB | +80 | | dB |
| | CMR | 4003 | 24 | " | E14 | " | | | | | | | |
| | +ICC | 3005 | 25 | 4 | +ICC | mA | | +0.5 | +9.0 | mA | +0.5 | +13.5 | mA |
| | -ICC | 3005 | 26 | 5 | -ICC | mA | | -7.0 | -0.5 | mA | -6.2 | -0.5 | mA |
| | VOL | 3007 | 27 | 7 | VOL | V | | -1.0 | | V | -1.0 | | V |
| | IOL | 3009 | 28 | " | IOL | mA | | +0.5 | | mA | +0.12 | | mA |
| | VOH1 | 3006 | 29 | " | VOH1 | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| | VOH2 | 3006 | 30 | " | VOH2 | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| VO(STB) <u>3/</u> | 3007 | 31 | " | VO(STB) | V | | | | | -1.0 | | V | |
| 3 TA = -55°C (figure 2) | IO(STB) <u>3/</u> | 3009 | 32 | 6 | IO(STB) | mA | | | | | -2.5 | -0.1 | mA |
| | VIO1 | 4001 | 33 | 9 | E15 | V | VIO = 10E ₁₅ | -3 | +3 | mV | -4.5 | +4.5 | mV |
| | VIO2 | " | 34 | 9 | E16 | V | VIO = 10E ₁₆ | -3 | +3 | mV | -4.5 | +4.5 | mV |
| | ΔVIO/ΔT <u>4/</u> | " | 35 | | | | | -10 | +10 | μV/°C | -10 | +10 | μV/°C |
| | IIO | " | 36 | 9 | E17 | V | IIO = E ₁₅ - E ₁₇ | -7 | +7 | μA | -20 | +20 | μA |
| | ΔIIO/ΔT <u>4/</u> | " | 37 | | | | | -75 | +75 | nA/°C | -75 | +75 | nA/°C |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | Relays closed | | |
|--|------------|---------------------------|-------------|---------------------|----|----|---------|---------|---|--------|---|-------|------------------|--|--------------------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| 3 TA = -55°C | +IB | 4001 | 38 | GND | | | +12.0 V | -6.0 V | | | | | -1.8 V | | 1,2,3,5,6,7,9,10 |
| | -IB | 4001 | 39 | GND | | | +12.0 V | -6.0 V | | | | | -1.8 V | | 1,3,4,6,7,9,10 |
| | CMR | 4003 | 40 | +5.0 V | | | +17.0 V | -2.0 V | | | | | -6.8 V | | 2,4,5,6,8,9,10 |
| | CMR | 4003 | 41 | -5.0 V | | | +7.0 V | -12.0 V | | | | | +3.2 V | | 2,4,5,6,8,9,10 |
| | +ICC | 3005 | 42 | GND | | 2/ | +12.0 V | -6.0 V | | | | | | | 1,2,5 |
| (figure 2) | -ICC | 3005 | 43 | " | | " | " | " | | | | | | | 1,2,5 |
| | VOL | 3007 | 44 | " | | " | " | " | | | | | | | 1,2,5 |
| | IOL | 3009 | 45 | " | | " | " | " | | | | | | | 1,2,5 |
| | VOH1 | 3006 | 46 | " | 2/ | | " | " | | | | -5 mA | | | 3,4,6 |
| | VOH2 | 3006 | 47 | " | " | | " | " | | | | | | | 3,4,6 |
| 4 TA = +25°C (see figure 2) | VO(STB) 2/ | 3007 | 48 | " | " | | " | " | | 300 mV | | | | | 3,4,6 |
| | IO(STB) 2/ | 3009 | 49 | " | " | | " | " | | 100 mV | | | | | 3,4,6 |
| | AV+ | 4004 | 50 | " | | | " | " | | | | | -1.9 V | | 1,2,3,4,5,6,8,9,10 |
| | AV- | " | 51 | " | | | " | " | | | | | -0.9 V | | 1,2,3,4,5,6,8,9,10 |
| | AV+ | " | 52 | " | | | " | " | | | | | -1.5 V | | 1,2,3,4,5,6,8,9,10 |
| 5 TA = +125°C (see figure 2) | AV- | " | 53 | " | | | " | " | | | | | -0.5 V | | 1,2,3,4,5,6,8,9,10 |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Pin measured | | | Equation | Limits | | | | | |
|--------------------------------|------------|---------------------------|-------------|--------------|---------|------|--|----------------|------|------|----------------|-------|------|
| | | | | No. | Value | Unit | | Device type 01 | | | Device type 02 | | |
| | | | | | | | | Min | Max | Unit | Min | Max | Unit |
| 3 TA = -55°C | +IB | 4001 | 38 | 9 | E18 | V | +IB = E15 - 10E18 | -0.1 | +45 | µA | -0.1 | +150 | µA |
| | -IB | 4001 | 39 | " | E19 | " | -IB = 10E19 - E15 | -0.1 | +45 | µA | -0.1 | +150 | µA |
| | CMR | 4003 | 40 | " | E20 | " | CMR = 20 log [10 ³ / (E20 - E21)] | +80 | | dB | +80 | | dB |
| | CMR | 4003 | 41 | " | E21 | " | | | | | | | |
| (figure 2) | +ICC | 3005 | 42 | 4 | +ICC | mA | | +0.5 | +9.0 | mA | +0.5 | +13.5 | mA |
| | -ICC | 3005 | 43 | 5 | -ICC | mA | | -7.0 | -0.5 | mA | -6.2 | -0.5 | mA |
| | VOL | 3007 | 44 | 7 | VOL | V | | -1.0 | | V | -1.0 | | V |
| | IOL | 3009 | 45 | " | IOL | mA | | +1.0 | | mA | +0.25 | | mA |
| | VOH1 | 3006 | 46 | " | VOH1 | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| | VOH2 | 3006 | 47 | " | VOH2 | V | | +2.5 | +5.0 | V | +2.5 | +5.0 | V |
| | VO(STB) 2/ | 3007 | 48 | " | VO(STB) | V | | | | | -1.0 | | V |
| 4 TA = +25°C (figure 2) | IO(STB) 2/ | 3009 | 49 | 6 | IO(STB) | mA | | | | | -2.5 | -0.1 | mA |
| | AV+ | 4004 | 50 | 9 | E22 | V | AV+ = 50 / (E1 - E22) | +1,250 | | V/V | +750 | | V/V |
| | AV- | " | 51 | 9 | E23 | " | AV- = 50 / (E1 - E23) | +1,250 | | " | +750 | | " |
| | AV+ | " | 52 | 9 | E24 | " | AV+ = 50 / (E8 - E24) | +1,000 | | " | +500 | | " |
| 5 TA = +125°C (figure 2) | AV- | " | 53 | 9 | E25 | " | AV- = 50 / (E8 - E25) | +1,000 | | " | +500 | | " |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD method | Test no. | Adapter PIN numbers | | | | | | | | | Relays closed | | |
|-------------------------------|----------|-------------------|-------------|---|---|---|---------|--------|---|---|---|---|------------------|--|--------------------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | | | |
| 6 TA = -55°C (figure 2) | AV+ | 4004 | 54 | GND | | | +12.0 V | -6.0 V | | | | | | | 1,2,3,4,5,6,8,9,10 |
| | AV- | " | 55 | GND | | | +12.0 V | -6.0 V | | | | | | | 1,2,3,4,5,6,8,9,10 |
| 7 TA = +25°C | tLTHR | | 56 | These tests shall be performed using test conditions and procedures listed on figure 3. | | | | | | | | | | | |
| | tHTHR | | 57 | These tests shall be performed using test conditions and procedures listed on figure 4. | | | | | | | | | | | |
| | tSTRL 3/ | | 58 | These tests shall be performed using test conditions and procedures listed on figure 4. | | | | | | | | | | | |

See footnotes at end of device types 01 and 02.

TABLE III. Group A inspection for device types 01 and 02 – continued. 1/

| Subgroup | Symbol | MIL-STD no. method | Test no. | Pin measured | | | Equation | Limits | | | | | | |
|-------------------------------|----------|--------------------------|-------------|--------------|-------|------|--------------------------|----------------|-----|------|----------------|-----|------|----|
| | | | | No. | Value | Unit | | Device type 01 | | | Device type 02 | | | |
| | | | | | | | | Min | Max | Unit | Min | Max | Unit | |
| 6 TA = -55°C (figure 2) | AV+ | 4004 | 54 | 9 | E26 | V | $AV+ = 50 / (E15 - E26)$ | +1,000 | | V/V | +500 | | V/V | |
| | AV- | " | 55 | " | E27 | " | $AV- = 50 / (E15 - E27)$ | +1,000 | | " | +500 | | " | |
| 7 TA = +25°C | lTTHR | " | 56 | | | | | | 60 | ns | | | 60 | ns |
| | tHTHR | " | 57 | | | | | | 60 | ns | | | 90 | ns |
| | ISTRl 3/ | " | 58 | | | | | | | | | | 15 | ns |

1/ For devices marked with the "Q" certification mark, the parameters listed herein may be guaranteed if not tested to the limits specified herein in accordance with the manufacturer's QM plan.

2/ For device type 01, use -5 mV; for device type 02, use -10 mV.

3/ Device type 02 only.

4/ Test numbers 18, 20, 35, and 37, which require read and record measurements plus a calculation, may be omitted except when subgroups 2 and 3 are being performed for group A sampling inspections and group C end points.

Δ Represents delta.

TABLE III. Group A inspection for device type 03. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | | | | | | | |
|------------------------------------|-------------------------|---------------------------|-------------|---|---|---|---------|---------|--------|---|---|---|----|--|--|--|--------|---------|--|--|--|--|--------|--------|--------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | | | | | |
| 1 TA = +25°C (figure 4) | V _{IO1} | 4001 | 1 | GND | | | +12.0 V | -6.0 V | | | | | | | | | -1.5 V | | | | | | | | |
| | V _{IO2} | " | 2 | " | | | " | " | | | | | | | | | " | | | | | | | | |
| | I _{IO} | " | 3 | " | | | " | " | | | | | | | | | " | | | | | | | | |
| | +I _{IB} | " | 4 | " | | | " | " | | | | | | | | | " | | | | | | | | |
| | -I _{IB} | " | 5 | " | | | " | " | | | | | | | | | " | | | | | | | | |
| | CMRR | 4003 | 6 | +5.0 V | | | +17.0 V | -2.0 V | | | | | | | | | | -6.5 V | | | | | | | |
| | CMRR | 4003 | 7 | -5.0 V | | | +7.0 V | -12.0 V | | | | | | | | | | +3.5 V | | | | | | | |
| | +I _{CC} | 3005 | 8 | GND | | | -5 mV | +12.0 V | -6.0 V | | | | | | | | | | | | | | | | |
| | -I _{CC} | 3005 | 9 | " | | | " | " | | | | | | | | | | | | | | | | | |
| | V _{OL} | 3007 | 10 | " | | | " | " | | | | | | | | | | +100 mA | | | | | | | |
| | V _{OH} | 3006 | 11 | " | | | -5 mV | " | | | | | | | | | | -0.4 mA | | | | | | | |
| | I _C EX | | 12 | " | | | -5 mV | " | | | | | | | | | | +24 V | | | | | | | |
| | V _O (STL)1 | | 13 | " | | | | | | | | | | | | | | | | | | | +0.9 V | | |
| | V _O (STL)2 | | 14 | " | | | | | | | | | | | | | | | | | | | | | |
| | V _O (STH)1 | | 15 | " | | | | | | | | | | | | | | | | | | | | +2.5 V | |
| | V _O (STH)2 | | 16 | " | | | | | | | | | | | | | | | | | | | | | +16 mA |
| | I _{STB1} | | 17 | " | | | | | | | | | | | | | | | | | | | | | +16 mA |
| | I _{STB2} | | 18 | " | | | | | | | | | | | | | | | | | | | | | +0.4 V |
| V _{IO1} | 4001 | 19 | " | | | | | | | | | | | | | | | | | | | | | -1.5 V | |
| V _{IO2} | " | 20 | " | | | | | | | | | | | | | | | | | | | | | -1.5 V | |
| 2 TA = +125°C (figure 4) | ΔV _{IO} /ΔT 2/ | " | 21 | Calculation: ΔV _{IO} / ΔT = [V _{IO} (test 19) - V _{IO} (test 1)] x 10 ³ / 100°C | | | | | | | | | | | | | | | | | | | | | |
| | I _{IO} | 4001 | 22 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | | | | -1.5 V | |
| | ΔI _{IO} /ΔT 2/ | " | 23 | Calculation: ΔI _{IO} / ΔT = [I _{IO} (test 22) - I _{IO} (test 3)] x 10 ³ / 100°C | | | | | | | | | | | | | | | | | | | | | |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | | |
|--------------------------------|----------|---------------------------|-------------|---------------------|---|---|---------|---------|--------|---|---|---|----|--|--|--|--|--|--|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | |
| 1 TA = +25°C | +IIB | 4001 | 24 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | |
| | -IIB | " | 25 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | |
| | CMRR | 4003 | 26 | +5.0 V | | | +17.0 V | -2.0 V | | | | | | | | | | | | |
| | CMRR | 4003 | 27 | -5.0 V | | | +7.0 V | -12.0 V | | | | | | | | | | | | |
| | +ICC | 3005 | 28 | GND | | | -5 mV | +12.0 V | -6.0 V | | | | | | | | | | | |
| | -ICC | 3005 | 29 | " | | | " | " | " | | | | | | | | | | | |
| | VOL | 3007 | 30 | " | | | " | " | " | | | | | | | | | | | |
| | VOH | 3006 | 31 | " | | | -5 mV | " | " | | | | | | | | | | | |
| 2 TA = +125°C (figure 2) | ICEX | | 32 | " | | | -5 mV | " | " | | | | | | | | | | | |
| | VO(STL)1 | | 33 | " | | | | | | | | | | | | | | | | |
| | VO(STL)2 | | 34 | " | | | | | | | | | | | | | | | | |
| | VO(STH)1 | | 35 | " | | | | | | | | | | | | | | | | |
| | VO(STH)2 | | 36 | " | | | | | | | | | | | | | | | | |
| | ISTB1 | | 37 | " | | | | | | | | | | | | | | | | |
| | ISTB2 | | 38 | " | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Relays energized | Pin measured | | | Equation | Limits | | |
|------------------|--------------------------------|---------------------------|-------------|---------------------|--------------|----------|-------|--|--------|------|------|
| | | | | | No. | Value | Unit | | Min | Max | Unit |
| 2 TA = +125°C | +IB | 4001 | 24 | 1,2,3,5,6,7,9,10 | 9 | E11 | V | +IB = E8 - 10E11 | +20 | | μA |
| | -IB | " | 25 | 1,3,4,5,6,7,9,10 | " | E12 | " | -IB = 10E12 - E8 | +20 | | μA |
| | CMRR | 4003 | 26 | 2,4,5,6,8,9,10 | " | E13 | " | CMR = 20 log [10 ³ / (E13 - E14)] | +80 | | dB |
| | CMRR | 4003 | 27 | 2,4,5,6,8,9,10 | " | E14 | " | | | | |
| | +ICC | 3005 | 28 | 1,2,5 | 4 | +ICC | mA | | +0.5 | +10 | mA |
| | -ICC | 3005 | 29 | 1,2,5 | 5 | -ICC | mA | | -3.6 | -0.5 | mA |
| | VOL | 3007 | 30 | 1,2,5 | 7 | VOL | V | | | +0.4 | V |
| | VOH | 3006 | 31 | 3,4,6 | " | VOH | V | | +2.5 | +5.5 | V |
| | ICEX | | 32 | 3,4,6 | " | ICEX | μA | | -0.5 | +100 | μA |
| | VO(STL)1 | | 33 | 1,2,5 | " | VO(STL)1 | V | | +2.5 | +5.5 | V |
| | VO(STL)2 | | 34 | 1,2,5 | " | VO(STL)2 | " | | +2.5 | +5.5 | " |
| | VO(STH)1 | | 35 | 1,2,5 | " | VO(STH)1 | " | | | +0.4 | " |
| | VO(STH)2 | | 36 | 1,2,5 | " | VO(STH)2 | " | | | +0.4 | " |
| | 2 TA = +125°C (figure 2) | ISTB1 | | 37 | 1,2,5 | 6 | ISTB1 | mA | | -3.3 | -0.1 |
| ISTB2 | | | 38 | 1,2,5 | 10 | ISTB2 | mA | | -3.3 | -0.1 | mA |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | | | |
|-------------------------------|-------------------------------|---------------------------|-------------|---|-------|-------|---------|---------|--------|--------|---|---|----|--|--|---------|--|--|--|--|--------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | | | | |
| 3 TA = -55°C (figure 2) | VIO1 | 4001 | 39 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | VIO2 | " | 40 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | $\Delta V_{IO} / \Delta T$ 2/ | " | 41 | Calculation: $\Delta V_{IO} / \Delta T = [V_{IO}(\text{test 39}) - V_{IO}(\text{test 1})] \times 10^3 / 80^\circ\text{C}$ | | | | | | | | | | | | | | | | | |
| | IIO | " | 42 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | $\Delta I_{IO} / \Delta T$ 2/ | " | 43 | Calculation: $\Delta I_{IO} / \Delta T = [I_{IO}(\text{test 42}) - I_{IO}(\text{test 3})] \times 10^3 / 80^\circ\text{C}$ | | | | | | | | | | | | | | | | | |
| | +IIB | " | 44 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | -IIB | " | 45 | GND | | | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | CMRR | 4003 | 46 | +5.0 V | | | +17.0 V | -2.0 V | | | | | | | | | | | | | |
| | CMRR | 4003 | 47 | -5.0 V | | | +7.0 V | -12.0 V | | | | | | | | | | | | | |
| | +ICC | 3005 | 48 | GND | | -5 mV | +12.0 V | -6.0 V | | | | | | | | | | | | | |
| | -ICC | 3005 | 49 | " | | " | " | " | | | | | | | | | | | | | |
| | VOL | 3007 | 50 | " | | " | " | " | | | | | | | | +50 mA | | | | | |
| | VOH | 3006 | 51 | " | -5 mV | | " | " | | | | | | | | -0.4 mA | | | | | |
| | ICEX | | 52 | " | -5 mV | | " | " | | | | | | | | +24 V | | | | | |
| | VO(STL)1 | | 53 | " | | -5 mV | " | " | | +0.9 V | | | | | | | | | | | +0.9 V |
| | VO(STL)2 | | 54 | " | | " | " | " | | " | | | | | | | | | | | |
| | VO(STH)1 | | 55 | " | | " | " | " | | +2.5 V | | | | | | +16 mA | | | | | |
| | VO(STH)2 | | 56 | " | | " | " | " | | " | | | | | | +16 mA | | | | | +2.5 V |
| ISTB1 | | 57 | " | | " | " | " | | +0.4 V | | | | | | | | | | | | |
| ISTB2 | | 58 | " | | " | " | " | | " | | | | | | | | | | | | +0.4 V |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Relays energized | Pin measured | | | Equation | Limits | | |
|-----------------------------------|-------------------------------------|---------------------------|-------------|---------------------|-------------------|----------------------|---------|---------------------------------------|--------|------|------------------|
| | | | | | No. | Value | Unit | | Min | Max | Unit |
| 3 TA = -55°C (figure 2) | V _{IO1} | 4001 | 39 | 1,2,3,4,5,6,8,9,10 | 9 | E15 | V | $V_{IO} = 10E15$ | -3 | +3 | mV |
| | V _{IO2} | " | 40 | 2,4,5,6,8,9,10 | 9 | E16 | V | $V_{IO} = 10E16$ | -3 | +3 | mV |
| | $\Delta V_{IO}/\Delta T \text{ 2/}$ | " | 41 | | | | | | -10 | +10 | $\mu V/^\circ C$ |
| | I _{IO} | " | 42 | 1,3,5,6,8,9,10 | 9 | E17 | V | $I_{IO} = E15 - E17$ | -7 | +7 | μA |
| | $\Delta I_{IO}/\Delta T \text{ 2/}$ | " | 43 | | | | | | -75 | +75 | $nA/^\circ C$ |
| | +I _{IB} | " | 44 | 1,2,3,5,6,7,9,10 | 9 | E18 | V | $+I_{IB} = E15 - 10E18$ | | +45 | μA |
| | -I _{IB} | " | 45 | 1,3,4,5,6,7,9,10 | " | E19 | " | $-I_{IB} = 10E19 - E15$ | | +45 | μA |
| | CMRR | 4003 | 46 | 2,4,5,6,8,9,10 | " | E20 | " | $CMRR = 20 \log [10^3 / (E20 - E21)]$ | +80 | | dB |
| | CMRR | 4003 | 47 | 2,4,5,6,8,9,10 | " | E21 | " | | | | |
| | +I _{CC} | 3005 | 48 | 1,2,5 | 4 | +I _{CC} | mA | | +0.5 | +10 | mA |
| | -I _{CC} | 3005 | 49 | 1,2,5 | 5 | -I _{CC} | mA | | -3.6 | -0.5 | mA |
| | V _{OL} | 3007 | 50 | 1,2,5 | 7 | V _{OL} | V | | | +1.0 | V |
| | V _{OH} | 3006 | 51 | 3,4,6 | " | V _{OH} | V | | +2.5 | +5.5 | V |
| | I _{CEX} | | 52 | 3,4,6 | " | I _{CEX} | μA | | -0.5 | +100 | μA |
| | V _{O(STL)1} | | 53 | 1,2,5 | " | V _{O(STL)1} | V | | +2.5 | +5.5 | V |
| | V _{O(STL)2} | | 54 | 1,2,5 | " | V _{O(STL)2} | " | | +2.5 | +5.5 | " |
| | V _{O(STH)1} | | 55 | 1,2,5 | " | V _{O(STH)1} | " | | | +0.4 | " |
| | V _{O(STH)2} | | 56 | 1,2,5 | " | V _{O(STH)2} | " | | | +0.4 | " |
| I _{STB1} | | 57 | 1,2,5 | 6 | I _{STB1} | mA | | -3.3 | -0.1 | mA | |
| I _{STB2} | | 58 | 1,2,5 | 10 | I _{STB2} | mA | | -3.3 | -0.1 | mA | |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | |
|------------|--------------------|-------------------|-------------|---|---|---|---------|--------|---|---|---|---|--------|--|--|--|--|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | | | | | |
| 4 | AV+ | 4004 | 59 | GND | | | +12.0 V | -6.0 V | | | | | -4.5 V | | | | | |
| | AV- | 4004 | 60 | " | | | " | " | | | | | -0.5 V | | | | | |
| 5 | AV+ | 4004 | 61 | " | | | " | " | | | | | -4.5 V | | | | | |
| | AV- | 4004 | 62 | " | | | " | " | | | | | -0.5 V | | | | | |
| 6 | AV+ | 4004 | 63 | " | | | " | " | | | | | -4.5 V | | | | | |
| | AV- | 4004 | 64 | " | | | " | " | | | | | -0.5 V | | | | | |
| 7 | t _L THR | | 65 | These tests shall be performed using test conditions and procedures listed on figure 3. | | | | | | | | | | | | | | |
| | t _H THR | | 66 | | | | | | | | | | | | | | | |
| TA = +25°C | t _{STRL1} | | 67 | These tests shall be performed using test conditions and procedures listed on figure 4. | | | | | | | | | | | | | | |
| | t _{STRL2} | | 68 | | | | | | | | | | | | | | | |

See footnotes at end of device type 03.

TABLE III. Group A inspection for device type 03 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Relays energized | Pin measured | | | Equation | Limits | | |
|--------------------------------|--------|---------------------------|-------------|---------------------|--------------|-------|------|---------------------------|--------|-----|------|
| | | | | | No. | Value | Unit | | Min | Max | Unit |
| 4 TA = +25°C (figure 2) | AV+ | 4004 | 59 | 1,2,3,4,5,6,8,9,10 | 9 | E22 | V | $AV+ = 300 / (E1 - E22)$ | +30 | | V/V |
| | AV- | " | 60 | 1,2,3,4,5,6,8,9,10 | " | E23 | " | $AV- = 100 / (E23 - E1)$ | +30 | | " |
| 5 TA = +125°C (figure 2) | AV+ | " | 61 | 1,2,3,4,5,6,8,9,10 | " | E24 | " | $AV+ = 300 / (E8 - E24)$ | +10 | | " |
| | AV- | " | 62 | 1,2,3,4,5,6,8,9,10 | " | E25 | " | $AV- = 100 / (E25 - E8)$ | +10 | | " |
| 6 TA = -55°C (figure 2) | AV+ | " | 63 | 1,2,3,4,5,6,8,9,10 | " | E26 | " | $AV+ = 300 / (E15 - E26)$ | +50 | | " |
| | AV- | " | 64 | 1,2,3,4,5,6,8,9,10 | " | E27 | " | $AV- = 100 / (E27 - E15)$ | +50 | | " |
| 7 TA = +25°C | 1LTHR | | 65 | | | | | | | 60 | ns |
| | 1HTHR | | 66 | | | | | | | 60 | " |
| | 1STR1 | | 67 | | | | | | | 15 | " |
| | 1STR2 | | 68 | | | | | | | 15 | " |

1/ For devices marked with the "Q" certification mark, the parameters listed herein may be guaranteed if not tested to the limits specified herein in accordance with the manufacturer's OM plan.

2/ Test numbers 21, 23, 41, and 43, which require read and record measurements plus a calculation, may be omitted except when subgroups 2 and 3 are being performed for group A sampling inspections and group C end points.

Δ Represents delta.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | Symbol | MIL-STD-883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | | |
|-------------------------------|------------------------|--------------------|----------|---------------------|----|------------------|--------------|-------|------|----------------------|-----------------------------------|----------------------------------|-------|------|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit | |
| 1 TA = +25°C (figure 2) | V _{IO} | 4001 | 1 | -20.0 V | | 1,2,3,4,5 | 14 | E1 | V | V _{IO} = E1 | -3 | +3 | mV | |
| | | " | 2 | " | | 1,2,3,4,5 | " | E2 | " | V _{IO} = E2 | " | " | " | |
| | | " | 3 | " | | 1,2,3,4,5 | " | E3 | " | " | V _{IO} = E3 | " | " | " |
| | | " | 4 | " | | 1,2,3,4,5 | " | E4 | " | " | V _{IO} = E4 | " | " | " |
| | V _{IO} (R) | " | 5 | " | | 1,2,3,4,5,8,9,10 | " | E5 | " | " | V _{IO} (R) = E5 | " | " | " |
| | | " | 6 | " | | 1,2,3,4,5,8,9,10 | " | E6 | " | " | V _{IO} (R) = E6 | " | " | " |
| | | " | 7 | " | | 1,2,3,4,5,8,9,10 | " | E7 | " | " | V _{IO} (R) = E7 | " | " | " |
| | | " | 8 | " | | 3,4,5 | " | E8 | " | " | I _{IO} = 20 (E1 - E8) | -10.0 | +10.0 | nA |
| | I _{IO} | " | 9 | " | | 3,4,5 | " | E9 | " | " | I _{IO} = 20 (E2 - E9) | " | " | " |
| | | " | 10 | " | | 3,4,5 | " | E10 | " | " | I _{IO} = 20 (E3 - E10) | " | " | " |
| | | " | 11 | " | | 3,4,5,8,9,10 | " | E11 | " | " | I _{IO} = 20 (E5 - E11) | -25.0 | +25.0 | " |
| | | +I _{IB} | " | 12 | " | | 1,3,4,5 | " | E12 | " | " | +I _{IB} = 20 (E1 - E12) | -100 | +0.1 |
| | " | | 13 | " | | 1,3,4,5 | " | E13 | " | " | +I _{IB} = 20 (E2 - E13) | -150 | " | " |
| | -I _{IB} | " | 14 | " | | 1,3,4,5 | " | E14 | " | " | +I _{IB} = 20 (E3 - E14) | -150 | " | " |
| | | " | 15 | " | | 2,3,4,5 | " | E15 | " | " | -I _{IB} = 20 (E15 - E1) | -100 | " | " |
| | | " | 16 | " | | 2,3,4,5 | " | E16 | " | " | -I _{IB} = 20 (E16 - E2) | -150 | " | " |
| | | " | 17 | " | | 2,3,4,5 | " | E17 | " | " | -I _{IB} = 20 (E17 - E3) | -150 | " | " |
| | V _O (STB) | " | 18 | | | 1,2,4,5,10 | 7 | E18 | " | " | V _O (STB) = E18 | +14.0 | | V |
| | V _{IO} (ADJ)+ | " | 19 | -20.0 V | | 1,2,3,4,5,8,11 | 14 | E19 | " | " | V _{IO} (ADJ)+ = E1 - E19 | +5.0 | | mV |
| | V _{IO} (ADJ)- | " | 20 | -20.0 V | | 1,2,3,4,5,9,11 | 14 | E20 | " | " | V _{IO} (ADJ)- = E1 - E20 | | -5.0 | mV |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | |
|--|---------|---------------------------|-------------|--|---------|---------|---------|---------|---|---|---|---------|-----|----|----|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | |
| 1 $T_A = +25^\circ\text{C}$ (figure 2) | CMRR | 4003 | 21 | Calculation = $20 \log [27.5 \times 10^3 / (E_3 - E_2)]$ | | | | | | | | | | | | |
| | VOL1 2/ | 3007 | 22 | +0.5 V | +0.5 V | +6.5 V | +4.5 V | GND | | | | 8 mA | GND | | | |
| | VOL2 2/ | " | 23 | +3.0 V | +3.0 V | +9.0 V | +4.5 V | GND | | | | 8 mA | " | | | |
| | VOL3 2/ | " | 24 | +13.0 V | +13.0 V | +18.0 V | +15.0 | -15.0 V | | | | 50 mA | " | | | |
| | VOL4 2/ | " | 25 | -14.0 V | -14.0 V | -9.0 V | +15.0 | -15.0 V | | | | 50 mA | " | | | |
| | ICEX | 3009 | 26 | GND | GND | -5 V | +18.0 V | -18.0 V | | | | +32.0 V | " | | | |
| | I11 | 4001 | 27 | +12.0 V | -17.0 V | | " | " | | | | | " | | | |
| | I12 | 4001 | 28 | -17.0 V | +12.0 V | | " | " | | | | | " | | | |
| | +ICC | 3005 | 29 | GND | GND | +10.0 V | +15.0 V | -15.0 V | | | | | " | | | |
| | -ICC | 3005 | 30 | " | GND | +10.0 V | " | " | | | | | " | | | |
| | IOS 2/ | 3011 | 31 | " | +0.1 V | | " | " | | | | 5.0 V | " | | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | |
|-------------------------------|------------------|---------------------------|-------------|------------------------|----|---------------------|--------------|-------|------|------------|--------|------|------|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit |
| 1 TA = +25°C (figure 2) | CMRR | 4003 | 21 | | | | | | | | +80 | | dB |
| | VOL1 $\bar{2}$ / | 3007 | 22 | | | 1,2,12 | 7 | E22 | V | VOL1 = E22 | | +0.4 | V |
| | VOL2 $\bar{2}$ / | " | 23 | | | 1,2,12 | " | E23 | " | VOL2 = E23 | | +0.4 | " |
| | VOL3 $\bar{2}$ / | " | 24 | | | 1,2,12 | " | E24 | " | VOL3 = E24 | | +1.5 | " |
| | VOL4 $\bar{2}$ / | " | 25 | | | 1,2,12 | " | E25 | " | VOL4 = E25 | | +1.5 | " |
| | ICEX | 3009 | 26 | | | 1,2,12 | 7 | I26 | nA | ICEX = I26 | | +10 | nA |
| | I 1 | 4001 | 27 | | | 1,2,12 | 1 | I27 | " | I 1 = I27 | | -5 | " |
| | I 2 | 4001 | 28 | | | 1,2,12 | 2 | I28 | " | I 2 = I28 | | -5 | " |
| | +ICC | 3005 | 29 | | | 1,2 | 4 | I29 | mA | +ICC = I29 | | +6.0 | mA |
| | -ICC | 3005 | 30 | | | 1,2 | 5 | I30 | " | -ICC = I30 | | -5.0 | " |
| | IOS $\bar{3}$ / | 3011 | 31 | | | 1,2 | 7 | I31 | " | IOS = I31 | | +200 | " |

See footnotes at end of device types 04 and 05.

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TABLE III. Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | |
|--------------------------------|---------------------|---------------------------|-------------|---------------------|--|---|---------|---------|---|---------|---------|---------|---------|---------|----|--|---------|---------|---------|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
| 2 TA = +125°C (figure 2) | V _{IO} | 4001 | 32 | GND | GND | +15.0 V | -15.0 V | | | | | +15.0 V | | | | | GND | +20.0 V | |
| | | | 33 | " | " | +29.5 V | -0.5 V | | | | | | +29.5 V | | | | | +14.5 V | " |
| | | | 34 | " | " | +2.0 V | -28.0 V | | | | | | +2.0 V | | | | | -13.0 V | " |
| | | | 35 | " | " | +2.5 V | -2.5 V | | | | | | +2.5 V | | | | | GND | " |
| | | | 36 | " | " | +15.0 V | -15.0 V | | | | +15.0 V | | | +15.0 V | | | | GND | " |
| | V _{IO} (R) | 37 | " | " | +29.5 V | -0.5 V | | | | +29.5 V | | | +29.5 V | | | | +14.5 V | " | |
| | | 38 | " | " | +2.0 V | -28.0 V | | | | +2.0 V | | | +2.0 V | | | | -13.0 V | " | |
| | | 39 | " | " | Calculation = $[V_{IO} (E32) - V_{IO}(E1)] / 100^{\circ}\text{C}$ 4/ | | | | | | | | | | | | | | |
| | I _{IO} | | | 40 | GND | GND | +15.0 V | -15.0 V | | | | | +15.0 V | | | | | GND | +20.0 V |
| | | | | 41 | " | " | +29.5 V | -0.5 V | | | | | | +29.5 V | | | | | +14.5 V |
| 42 | | | | " | " | +2.0 V | -28.0 V | | | | | | +2.0 V | | | | | -13.0 V | " |
| 43 | | | | " | " | +15.0 V | -15.0 V | | | | +15.0 V | | | +15.0 V | | | | GND | " |
| 44 | | | | " | " | Calculation = $[I_{IO}(\text{test } 40) - I_{IO}(\text{test } 8)] / 100^{\circ}\text{C}$ 4/ | | | | | | | | | | | | | |
| ΔI _{IO} /ΔT | +I _B | | 45 | GND | GND | +15.0 V | -15.0 V | | | | | +15.0 V | | | | | GND | +20.0 V | |
| | | | 46 | " | " | +29.5 V | -0.5 V | | | | | | +29.5 V | | | | | +14.5 V | " |
| | | | 47 | " | " | +2.0 V | -28.0 V | | | | | | +2.0 V | | | | | -13.0 V | " |
| | | | 48 | " | " | +15.0 V | -15.0 V | | | | +15.0 V | | | +15.0 V | | | | GND | " |
| | | | 49 | " | " | +29.5 V | -0.5 V | | | | +29.5 V | | | +29.5 V | | | | +14.5 V | " |
| | | | 50 | " | " | +2.0 V | -28.0 V | | | | +2.0 V | | | +2.0 V | | | | -13.0 V | " |

See footnotes at end of device types 04 and 05.

TABLE III - Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | |
|------------------------------------|-------------------------|---------------------------|-------------|------------------------|----|---------------------|--------------|-------|------|-------------------------------------|--------|-------|-------|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit |
| 2 TA = +125°C (figure 2) | V _{IO} | 4001 | 32 | -20.0 V | | 1,2,3,4,5 | 14 | E32 | V | V _{IO} = E32 | -4 | +4 | mV |
| | | " | 33 | " | | 1,2,3,4,5 | " | E33 | " | V _{IO} = E33 | " | " | " |
| | | " | 34 | " | | 1,2,3,4,5 | " | E34 | " | V _{IO} = E34 | " | " | " |
| | | " | 35 | " | | 1,2,3,4,5 | " | E35 | " | V _{IO} = E35 | " | " | " |
| | V _{IO(R)} | " | 36 | " | | 1,2,3,4,5,8,9,10 | " | E36 | " | V _{IO(R)} = E36 | -4.5 | +4.5 | " |
| | | " | 37 | " | | 1,2,3,4,5,8,9,10 | " | E37 | " | V _{IO(R)} = E37 | " | " | " |
| | | " | 38 | " | | 1,2,3,4,5,8,9,10 | " | E38 | " | V _{IO(R)} = E38 | " | " | " |
| | | " | 39 | " | | | | | | | | -25.0 | +25.0 |
| I _{IO} | ΔI _{IO} /ΔT 4/ | " | 40 | -20.0 V | | 3,4,5 | 14 | E40 | V | I _{IO} = 20 (E40 - E32) | -10.0 | +10.0 | nA |
| | | " | 41 | " | | 3,4,5 | " | E41 | " | I _{IO} = 20 (E41 - E33) | " | " | " |
| | | " | 42 | " | | 3,4,5 | " | E42 | " | I _{IO} = 20 (E42 - E34) | " | " | " |
| | | " | 43 | " | | 3,4,5,8,9,10 | " | E43 | " | I _{IO(R)} = 20 (E43 - E35) | -25.0 | +25.0 | " |
| +I _{IB} | ΔI _{IO} /ΔT 4/ | " | 44 | | | | | | | | -100 | +100 | pA/°C |
| | | " | 45 | -20.0V | | 1,3,4,5 | 14 | E45 | V | +I _{IB} = 20 (E32 - E45) | -100 | +0.1 | nA |
| | | " | 46 | " | | 1,3,4,5 | " | E46 | " | +I _{IB} = 20 (E33 - E46) | -150 | " | " |
| | | " | 47 | " | | 1,3,4,5 | " | E47 | " | +I _{IB} = 20 (E34 - E47) | -150 | " | " |
| | | " | 48 | " | | 2,3,4,5 | " | E48 | " | -I _{IB} = 20 (E48 - E32) | -100 | " | " |
| | | " | 49 | " | | 2,3,4,5 | | E49 | " | -I _{IB} = 20 (E49 - E33) | -150 | " | " |
| -I _{IB} | | " | 50 | " | | 2,3,4,5 | | E50 | " | -I _{IB} = 20 (E50 - E34) | -150 | " | " |

See footnotes at end of device types 04 and 05.

TABLE III. Group A Inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD no. | Test no. | Adapter PIN numbers | | | | | | | | | | | | | |
|----------|---------|----------------|-------------|--|---------|---------|---------|---------|-------|---|---------|---------|-----|----|----|--|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| 2 | VO(STB) | 4001 | 51 | GND | +15.0 V | | +15.0 V | -15.0 V | -3 mA | | +15.0 V | | | | | | |
| | CMRR | 4003 | 52 | Calculation = $20 \log [27.5 \times 10^3 / (E34 - E33)]$ | | | | | | | | | | | | | |
| | VOL1 2/ | 3007 | 53 | +0.5 V | +0.5 V | +6.5 V | +4.5 V | GND | | | GND | 8 mA | GND | | | | |
| | VOL2 2/ | " | 54 | +3.0 V | +3.0 V | +9.0 V | +4.5 V | GND | | | GND | 8 mA | " | | | | |
| | VOL3 2/ | " | 55 | +13.0 V | +13.0 V | +18.0 V | +15.0 V | -15.0 V | | | -15.0 V | 50 mA | " | | | | |
| | VOL4 2/ | " | 56 | -14.0 V | -14.0 V | -9.0 V | +15.0 V | -15.0 V | | | -15.0 V | 50 mA | " | | | | |
| | ICEX | 3009 | 57 | GND | GND | -5 V | +18.0 V | -18.0 V | | | -18.0 V | +32.0 V | " | | | | |
| | I1 | 4001 | 58 | +12.0 V | -17.0 V | | " | " | | | " | " | " | | | | |
| | I2 | 4001 | 59 | -17.0 V | +12.0 V | | " | " | | | " | " | " | | | | |
| | +ICC | 3005 | 60 | GND | GND | +10.0 V | +15.0 V | -15.0 V | | | -15.0 V | | " | | | | |
| | -ICC | 3005 | 61 | " | GND | +10.0 V | " | " | | | " | | " | | | | |
| | IOS 2/ | 3011 | 62 | " | +0.1 V | | " | " | | | " | +5.0 V | " | | | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | |
|------------------------------------|---------|---------------------------|-------------|------------------------|----|---------------------|--------------|-------|------|---------------|--------|------|------|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit |
| 2 TA = +125°C (figure 2) | VO(STB) | 4001 | 51 | | | 1,2,4,5,10 | 7 | E51 | V | VO(STB) = E51 | +14 | | V |
| | CMRR | 4003 | 52 | | | | | | | | +80 | | dB |
| | VOL1 2/ | 3007 | 53 | | | 1,2,12 | 7 | E53 | V | VOL1 = E53 | | +0.4 | V |
| | VOL2 2/ | " | 54 | | | 1,2,12 | " | E54 | " | VOL2 = E54 | | +0.4 | " |
| | VOL3 2/ | " | 55 | | | 1,2,12 | " | E55 | " | VOL3 = E55 | | +1.5 | " |
| | VOL4 2/ | " | 56 | | | 1,2,12 | " | E56 | " | VOL4 = E56 | | +1.5 | " |
| | ICEX | 3009 | 57 | | | 1,2 | 7 | I57 | nA | ICEX = I57 | -1 | +500 | nA |
| | I11 | 4001 | 58 | | | 1,2,12 | 1 | I58 | " | I11 = I58 | -5 | " | " |
| | I12 | 4001 | 59 | | | 1,2,12 | 2 | I59 | " | I12 = I59 | -5 | " | " |
| | +ICC | 3005 | 60 | | | 1,2 | 4 | I60 | mA | +ICC = I60 | | +6.0 | mA |
| | -ICC | 3005 | 61 | | | 1,2 | 5 | I61 | " | -ICC = I61 | -5.0 | | " |
| | IOS 3/ | 3011 | 62 | | | 1,2 | 7 | I62 | " | IOS = I62 | | +150 | " |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | |
|---|---------------------|---------------------------|-------------|---------------------|-----|--|---------|---------|---------|---------|---------|---------|---------|----|----|---------|---------|---------|---|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
| 3 T _A = -55°C (figure 2) | V _{IO} | 4001 | 63 | GND | GND | | +15.0 V | -15.0 V | | | | +15.0 V | | | | | GND | +20.0 V | |
| | | | 64 | " | " | | +29.5 V | -0.5 V | | | | | +29.5 V | | | | | +14.5 V | " |
| | | | 65 | " | " | | +2.0 V | -28.0 V | | | | | +2.0 V | | | | | -13.0 V | " |
| | | | | 66 | " | " | | +2.5 V | -2.5 V | | | | +2.5 V | | | | GND | " | |
| | | V _{IO} (R) | | 67 | " | " | | +15.0 V | -15.0 V | | +15.0 V | | +15.0 V | | | | GND | " | |
| | | | 68 | " | " | | +29.5 V | -0.5 V | | +29.5 V | | +29.5 V | | | | | +14.5 V | " | |
| | | | 69 | " | " | | +2.0 V | -28.0 V | | +2.0 V | | +2.0 V | | | | | -13.0 V | " | |
| | | $\Delta V_{IO}/\Delta T$ | | 70 | " | Calculation = $ V_{IO}(E63) - V_{IO}(E1) / 80^\circ C$ 4/ | | | | | | | | | | | | | |
| | | I _{IO} | | 71 | GND | GND | | +15.0 V | -15.0 V | | | | +15.0 V | | | | GND | +20.0 V | |
| | 72 | | " | " | | +29.5 V | -0.5 V | | | | +29.5 V | | | | | +14.5 V | " | | |
| | 73 | | " | " | | +2.0 V | -28.0 V | | | | +2.0 V | | | | | -13.0 V | " | | |
| | I _{IO} (R) | | 74 | " | " | | +15.0 V | -15.0 V | | +15.0 V | | +15.0 V | | | | GND | " | | |
| | | $\Delta I_{IO}/\Delta T$ | | 75 | " | Calculation = $ I_{IO}(\text{test } 71) - I_{IO}(\text{test } 8) / 80^\circ C$ 4/ | | | | | | | | | | | | | |
| | +I _{IB} | | 76 | GND | GND | | +15.0 V | -15.0 V | | | | +15.0 V | | | | GND | +20.0 V | | |
| | | 77 | " | " | | +29.5 V | -0.5 V | | | | +29.5 V | | | | | +14.5 V | " | | |
| | | 78 | " | " | | +2.0 V | -28.0 V | | | | +2.0 V | | | | | -13.0 V | " | | |
| | -I _{IB} | | 79 | " | " | | +15.0 V | -15.0 V | | +15.0 V | | +15.0 V | | | | GND | " | | |
| | | 80 | " | " | | +29.5 V | -0.5 V | | +29.5 V | | +29.5 V | | | | | +14.5 V | " | | |
| | | 81 | " | " | | +2.0 V | -28.0 V | | +2.0 V | | +2.0 V | | | | | -13.0 V | " | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | Symbol | MIL-STD-883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | | |
|--|--|--------------------|----------|---------------------|--------------|------------------|--------------|-----------------------------------|------------------------------------|-----------------------------------|----------------------------------|-------|-------|-------|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit | |
| 3 T _A = -55°C (figure 2) | V _{IO} | 4001 | 63 | -20.0 V | | 1,2,3,4,5 | 14 | E63 | V | V _{IO} = E63 | -4 | +4 | mV | |
| | | " | 64 | " | | 1,2,3,4,5 | " | E64 | " | V _{IO} = E64 | " | " | " | |
| | | " | 65 | " | | 1,2,3,4,5 | " | E65 | " | V _{IO} = E65 | " | " | " | |
| | | " | 66 | " | | 1,2,3,4,5 | " | E66 | " | V _{IO} = E66 | " | " | " | |
| | V _{IO(R)} | " | 67 | " | | 1,2,3,4,5,8,9,10 | " | E67 | " | V _{IO(R)} = E67 | -4.5 | +4.5 | " | |
| | | " | 68 | " | | 1,2,3,4,5,8,9,10 | " | E68 | " | V _{IO(R)} = E68 | " | " | " | |
| | | " | 69 | " | | 1,2,3,4,5,8,9,10 | " | E69 | " | V _{IO(R)} = E69 | " | " | " | |
| | ΔV _{IO} /ΔT $\frac{\mu V}{^{\circ}C}$ | " | 70 | | | | | | | | | -25.0 | +25.0 | μV/°C |
| | | I _{IO} | " | 71 | -20.0 V | | 3,4,5 | 14 | E71 | V | I _{IO} = 20 (E71 – E63) | -20.0 | +20.0 | nA |
| | | | " | 72 | " | | 3,4,5 | " | E72 | " | I _{IO} = 20 (E72 – E64) | " | " | " |
| " | | | 73 | " | | 3,4,5 | " | E73 | " | I _{IO} = 20 (E73 – E66) | " | " | " | |
| ΔI _{IO} /ΔT $\frac{\mu A}{^{\circ}C}$ | " | 74 | " | | 3,4,5,8,9,10 | " | E74 | " | I _{IO(R)} = 20(E74 – E67) | -50.0 | +50.0 | " | | |
| | " | 75 | | | | | | | | | -200 | +200 | pA/°C | |
| +I _{IB} | +I _{IB} | " | 76 | -20.0V | | 1,3,4,5 | 14 | E76 | V | +I _{IB} = 20 (E63 – E76) | -150 | +0.1 | nA | |
| | | " | 77 | " | | 1,3,4,5 | " | E77 | " | +I _{IB} = 20 (E64 – E77) | -200 | " | " | |
| | | " | 78 | " | | 1,3,4,5 | " | E78 | " | +I _{IB} = 20 (E65 – E78) | -200 | " | " | |
| | -I _{IB} | " | 79 | " | | 2,3,4,5 | " | E79 | " | -I _{IB} = 20 (E79 – E63) | -150 | " | " | |
| | | " | 80 | " | | 2,3,4,5 | " | E80 | " | -I _{IB} = 20 (E80 – E64) | -200 | " | " | |
| " | 81 | " | | 2,3,4,5 | " | E81 | " | -I _{IB} = 20 (E81 – E66) | -200 | " | " | " | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | |
|-----------------------------------|---------|---------------------------|-------------|--|---------|---------|---------|---------|-------|---|---|---------|-----|----|----|--|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | |
| 3 TA = -55°C (figure 2) | VO(STB) | 4001 | 82 | GND | +15.0 V | | +15.0 V | -15.0 V | -2 mA | | | +15.0 V | | | | | |
| | CMRR | 4003 | 83 | Calculation = $20 \log [27.5 \times 10^3 / (E_{65} - E_{64})]$ | | | | | | | | | | | | | |
| | VOL1 2/ | 3007 | 84 | +0.5 V | +0.5 V | +6.5 V | +4.5 V | GND | | | | 8 mA | GND | | | | |
| | VOL2 2/ | " | 85 | +3.0 V | +3.0 V | +9.0 V | +4.5 V | GND | | | | 8 mA | " | | | | |
| | VOL3 2/ | " | 86 | +13.0 V | +13.0 V | +18.0 V | +15.0 V | -15.0 V | | | | 50 mA | " | | | | |
| | VOL4 2/ | " | 87 | -14.0 V | -14.0 V | -9.0 V | +15.0 V | -15.0 V | | | | 50 mA | " | | | | |
| | II1 | 4001 | 88 | +12.0 V | -17.0 V | | +18.0 V | -18.0 V | | | | | " | | | | |
| | II2 | 4001 | 89 | -17.0 V | +12.0 V | | +18.0 V | -18.0 V | | | | | " | | | | |
| | +ICC | 3005 | 90 | GND | GND | +10.0 V | +15.0 V | -15.0 V | | | | | " | | | | |
| | -ICC | 3005 | 91 | " | GND | +10.0 V | " | " | | | | | " | | | | |
| | IOS 3/ | 3011 | 92 | " | +0.1 V | | " | " | | | | +5.0 V | " | | | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | | |
|---|-----------------------------|---------------------------|-------------|------------------------|----|---------------------|--------------|-------|------|-----------------------|--------|------|------|----|
| | | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit | |
| 3 T _A = -55°C (figure 2) | VO(STB) | 4001 | 82 | | | 1,2,4,5,10 | 7 | E82 | V | VO(STB) = E82 | +14 | | V | |
| | CMRR | 4003 | 83 | | | | | | | | +80 | | dB | |
| | VOL1 $\bar{2}$ / | 3007 | 84 | | | 1,2,12 | 7 | E84 | V | VOL1 = E84 | | +0.4 | V | |
| | VOL2 $\bar{2}$ / | " | 85 | | | 1,2,12 | " | E85 | " | VOL2 = E85 | | +0.4 | " | |
| | VOL3 $\bar{2}$ / | " | 86 | | | 1,2,12 | " | E86 | " | VOL3 = E86 | | +1.5 | " | |
| | VOL4 $\bar{2}$ / | " | 87 | | | 1,2,12 | " | E87 | " | VOL4 = E87 | | +1.5 | " | |
| | I _{I1} | 4001 | 88 | | | 1,2,12 | 1 | I88 | nA | I _{I1} = I88 | | -5 | +500 | nA |
| | I _{I2} | 4001 | 89 | | | 1,2,12 | 2 | I89 | nA | I _{I2} = I89 | | -5 | +500 | nA |
| | +ICC | 3005 | 90 | | | 1,2 | 4 | I90 | mA | +ICC = I90 | | | +7.0 | mA |
| | -ICC | 3005 | 91 | | | 1,2 | 5 | I91 | " | -ICC = I91 | | -6.0 | | " |
| | I _{OS} $\bar{3}$ / | 3011 | 92 | | | 1,2 | 7 | I92 | " | I _{OS} = I92 | | | +250 | " |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 - continued. 1/

| Subgroup | Symbol | MIL-STD -883 method | Test no. | Adapter PIN numbers | | | | | | | | | | | | | | | |
|--------------------------------|--|---------------------------|-------------|---|-----|---|---------|---------|---------|---|---|---|----|---------|----|---|---|---------|--|
| | | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
| 4 TA = +25°C (figure 2) | AVE(REF) | 4004 | 93 | GND | GND | | +15.0 V | -15.0 V | +15.0 V | | | | | GND | | | | +20.0 V | |
| | AVE+ | " | 94 | " | " | " | " | " | " | " | " | " | " | +10.0 V | " | " | " | " | |
| | AVE- | " | 95 | " | " | " | " | " | " | " | " | " | " | -10.0 V | " | " | " | " | |
| 5 TA = +125°C (figure 2) | AVE(REF) | " | 96 | " | " | " | " | " | " | " | " | " | " | GND | " | " | " | " | |
| | AVE+ | " | 97 | " | " | " | " | " | " | " | " | " | " | +10.0 V | " | " | " | " | |
| | AVE- | " | 98 | " | " | " | " | " | " | " | " | " | " | -10.0 V | " | " | " | " | |
| 6 | (Tests 99 – 101) Same tests, terminal conditions, equations, and limits as subgroup 5 except TA = -55°C. | | | | | | | | | | | | | | | | | | |
| 7 TA = +25°C | IRHLC | | 102 | These tests shall be performed using test conditions and procedures listed on figure 5. | | | | | | | | | | | | | | | |
| | IRLHC | | 103 | | | | | | | | | | | | | | | | |
| 8 TA = +125°C | IRHLC | | 104 | These tests shall be performed using test conditions and procedures listed on figure 5. | | | | | | | | | | | | | | | |
| | IRLHC | | 105 | | | | | | | | | | | | | | | | |
| 8 TA = -55°C | IRHLC | | 106 | These tests shall be performed using test conditions and procedures listed on figure 5. | | | | | | | | | | | | | | | |
| | IRLHC | | 107 | | | | | | | | | | | | | | | | |

See footnotes at end of device types 04 and 05.

TABLE III. Group A inspection for device types 04 and 05 – continued. 1/

| Subgroup | MIL-STD -883 method | Test no. | Adapter pin numbers | | Relays energized | Pin measured | | | Equation | Limits | | |
|--------------------------------|---|-------------|------------------------|----|---------------------|--------------|-------|------|-------------------------|--------|------|------|
| | | | 13 | 14 | | No. | Value | Unit | | Min | Max | Unit |
| 4 TA = +25°C (figure 2) | AVE(REF) | 93 | -20.0 V | | 1,2,3,5,7 | 14 | E93 | V | | | | |
| | AVE+ | 94 | " | | 1,2,3,5,7 | " | E94 | " | $AVE+ = 10/(E94 - E93)$ | +10.0 | V/mV | |
| | AVE- | 95 | " | | 1,2,3,5,7 | " | E95 | " | $AVE- = 10/(E93 - E96)$ | +10.0 | " | |
| 5 TA = +125°C (figure 2) | AVE(REF) | 96 | " | | 1,2,3,5,7 | " | E96 | " | | | | |
| | AVE+ | 97 | " | | 1,2,3,5,7 | " | E97 | " | $AVE+ = 10/(E97 - E96)$ | +8.0 | " | |
| | AVE- | 98 | " | | 1,2,3,5,7 | " | E98 | " | $AVE- = 10/(E96 - E98)$ | +8.0 | " | |
| 6 | (Tests 99 – 101) Same tests, terminal conditions, equations, and limits as subgroup 5 except TA = -55°C | | | | | | | | | | | |
| 7 TA = +25°C | tRHLC | 102 | | | | | | | | | 300 | ns |
| | tRLHC | 103 | | | | | | | | | 300 | " |
| 8 TA = +125°C | tRHLC | 104 | | | | | | | | | 500 | " |
| | tRLHC | 105 | | | | | | | | | 640 | " |
| 8 TA = -55°C | tRHLC | 106 | | | | | | | | | 300 | " |
| | tRLHC | 107 | | | | | | | | | 300 | " |

1/ For devices marked with the "Q" certification mark, the parameters listed herein may be guaranteed if not tested to the limits specified herein in accordance with the manufacturer's QM plan.

2/ VOL1 and VOL2 use VID = -6 mV; VOL3, VOL4 use VID = -5 mV.

3/ Maximum test duration shall be 10 ms.

4/ Test numbers 39, 44, 70, and 75, which require read and record measurements plus a calculation, may be omitted except when subgroups 2 and 3 are being performed for group A sampling inspections and group C and D end points.

Δ Represents delta.

TABLE III. Group A inspection for device types 06 and 07 . 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | | Equation | Limit 06 | | | Limit 07 | | |
|-------------------------------|--------|--|---------------------|--------|--------|--------|--------|-----|-----------|------------------|-------------|-------|------|----------------------|----------|-------|------|----------|-------|------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | Unit | | Min | Max | Unit | Min | Max | Unit |
| 1 TA = +25°C (figure 2) | VIO | 1 | 15V | 15V | -15V | 0V | -1.4V | | | 3,4,5 | 10 | E1 | V | VIO = E1 | -4.0 | +4.0 | mV | -1 | +1 | mV |
| | | 2 | 27V | 27V | -3V | 12V | -13.4V | | | " | " | " | " | VIO = E2 | " | " | " | " | " | " |
| | 3 | 3V | 3V | -27V | -12V | 10.6V | | | " | " | " | " | " | VIO = E3 | " | " | " | " | " | " |
| | 4 | 2.5V | 2.5V | -2.5V | -2.5V | 1.1V | | | " | " | " | " | " | VIO = E4 | " | " | " | " | " | " |
| | 5 | 15V | 15V | -15V | 0V | -1.4V | | | 1,2,3,4,5 | " | " | " | " | IIO = 20 (E5 - E1) | -75 | +75 | nA | -40 | +40 | nA |
| | 6 | 27V | 27V | -3V | 12V | -13.4V | | | " | " | " | " | " | IIO = 20 (E6 - E2) | " | " | " | " | " | " |
| | 7 | 3V | 3V | -27V | -12V | 10.6V | | | " | " | " | " | " | IIO = 20 (E7 - E3) | " | " | " | " | " | " |
| | 8 | 15V | 15V | -15V | 0V | -1.4V | | | 2,3,4,5 | " | " | " | " | +IIB = 20 (E1 - E8) | -0.1 | +500 | " | -0.1 | +500 | " |
| | 9 | 27V | 27V | -3V | 12V | -13.4V | | | " | " | " | " | " | +IIB = 20 (E2 - E9) | " | +750 | " | " | +750 | " |
| | 10 | 3V | 3V | -27V | -12V | 10.6V | | | " | " | " | " | " | +IIB = 20 (E3 - E10) | " | +750 | " | " | +750 | " |
| | 11 | 15V | 15V | -15V | 0V | -1.4V | | | 1,3,4,5 | " | " | " | " | -IIB = 20 (E11 - E1) | " | +500 | " | " | +500 | " |
| | 12 | 27V | 27V | -3V | 12V | -13.4V | | | " | " | " | " | " | -IIB = 20 (E12 - E2) | " | +750 | " | " | +750 | " |
| | 13 | 3V | 3V | -27V | -12V | 10.6V | | | " | " | " | " | " | -IIB = 20 (E13 - E3) | " | +750 | " | " | +750 | " |
| 14 | CMRR | Calculation = $20 \log [24 \times 10^3 / E3 - E2]$ | | | | | | | | | | 90 | | dB | 90 | | dB | | | |
| 15 | VOL1 | 3.5V | | -1V | -1V | | 7V | | 3.2mA | 5 | 8 to 9 | E14 | V | VOL1 = E14 | | +0.4 | V | | +0.4 | V |
| 16 | VOL2 | 2.25V | | -2.25V | -2.25V | | | | 3.2mA | " | " | E15 | " | VOL2 = E15 | | +0.4 | " | | +0.4 | " |
| 17 | VOL3 | 27V | | -3V | 12V | | | | 25mA | " | " | E16 | " | VOL3 = E16 | | +1.5 | " | | +1.5 | " |
| 18 | VOL4 | 3V | | -27V | -12V | | | | 25mA | " | " | E17 | " | VOL4 = E17 | | +1.5 | " | | +1.5 | " |
| 19 | ICEX | 18V | | -18V | | | | 18V | | | 6 | I1 | μA | ICEX = I1 | -1.0 | +2.0 | μA | -1.0 | +2.0 | μA |
| 20 | +ICC | 15V | | -15V | | | | 7V | | | 1 | I2 | mA | +ICC = I2 | | +10.0 | mA | | +10.0 | mA |
| 21 | -ICC | 15V | | -15V | | | | " | | | 3 | I3 | mA | -ICC = I3 | -5.0 | | mA | -5.0 | | mA |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | | Relays energized | Measurement | | | Equation | Limit 06 | | | Limit 07 | | |
|--------------------------------|-----------------|----------|---|--------|--------|--------|--------|----|---|-----------|------------------|-------------|------|-----------------------------------|-----------------------|----------|------|------|----------|------|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | Pin | | Value | Unit | Min | | Max | Unit | Min | Max | Unit | |
| 2 TA = +125°C (figure 2) | V _{IO} | 22 | 15V | 15V | -15V | 0V | -1.4V | | | | 3,4,5 | 10 | E18 | V | V _{IO} = E18 | -7.0 | +7.0 | mV | -2.0 | +2.0 | mV |
| | | 23 | 27V | 27V | -3V | 12V | -13.4V | | | | " | " | E19 | " | V _{IO} = E19 | " | " | " | " | " | " |
| | | 24 | 3V | 3V | -27V | -12V | 10.6V | | | | " | " | E20 | " | V _{IO} = E20 | " | " | " | " | " | " |
| | | 25 | 2.5V | 2.5V | -2.5V | -2.5V | 1.1V | | | | " | " | E21 | " | V _{IO} = E21 | " | " | " | " | " | " |
| | 26 | 15V | 15V | -15V | 0V | -1.4V | | | | 1,2,3,4,5 | " | E22 | " | I _{IO} = 20 (E22 - E18) | -75 | +75 | nA | -40 | +40 | nA | |
| | 27 | 27V | 27V | -3V | 12V | -13.4V | | | | " | " | E23 | " | I _{IO} = 20 (E23 - E19) | " | " | " | " | " | " | |
| | 28 | 3V | 3V | -27V | -12V | 10.6V | | | | " | " | E24 | " | I _{IO} = 20 (E24 - E20) | " | " | " | " | " | " | |
| | 29 | 15V | 15V | -15V | 0V | -1.4V | | | | 2,3,4,5 | " | E25 | " | +I _{IB} = 20 (E18 - E25) | -0.1 | +500 | " | -0.1 | +500 | " | |
| | 30 | 27V | 27V | -3V | 12V | -13.4V | | | | " | " | E26 | " | +I _{IB} = 20 (E19 - E26) | " | +750 | " | " | +750 | " | |
| | 31 | 3V | 3V | -27V | -12V | 10.6V | | | | " | " | E27 | " | +I _{IB} = 20 (E20 - E27) | " | +750 | " | " | +750 | " | |
| | 32 | 15V | 15V | -15V | 0V | -1.4V | | | | 1,3,4,5 | " | E28 | " | -I _{IB} = 20 (E28 - E18) | " | +500 | " | " | +500 | " | |
| | 33 | 27V | 27V | -3V | 12V | -13.4V | | | | " | " | E29 | " | -I _{IB} = 20 (E29 - E19) | " | +750 | " | " | +750 | " | |
| | 34 | 3V | 3V | -27V | -12V | 10.6V | | | | " | " | E30 | " | -I _{IB} = 20 (E30 - E20) | " | +750 | " | " | +750 | " | |
| | 35 | CMRR | Calculation = 20 log [24 x 10 ³ / E24 - E23] | | | | | | | | | | 90 | | | dB | 90 | | | dB | |
| 36 | VOL1 | 3.5V | | -1V | -1V | | 3.2mA | 7V | | 5 | 8 to 9 | E31 | V | VOL1 = E31 | | +0.4 | V | | +0.4 | V | |
| 37 | VOL2 | 2.25V | | -2.25V | -2.25V | 3.2mA | | | | " | " | E32 | " | VOL2 = E32 | | +0.4 | " | | +0.4 | " | |
| 38 | VOL3 | 27V | | -3V | 12V | 25mA | | | | " | " | E33 | " | VOL3 = E33 | | +1.5 | " | | +1.5 | " | |
| 39 | VOL4 | 3V | | -27V | -12V | 25mA | | | | " | " | E34 | " | VOL4 = E34 | | +1.5 | " | | +1.5 | " | |
| 40 | ICEX | 18V | | -18V | | 18V | -7V | | | 6 | l4 | l4 | μA | ICEX = l4 | -1.0 | +10.0 | μA | -1.0 | +10.0 | μA | |
| 41 | +ICC | 15V | | -15V | | | 7V | | | | 1 | l5 | mA | +ICC = l5 | | +10.0 | mA | | +10.0 | mA | |
| 42 | -ICC | 15V | | -15V | | | | | | | 3 | l6 | mA | -ICC = l6 | -4.5 | | mA | -4.5 | | mA | |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | Equation | Limit 06 | | | Limit 07 | | | | |
|-------------------------------|------------------|--|---------------------|---------|---------|---------|---------|-----|---------|------------------|-------------|-------|------------|-----------------------------------|-----------------------------------|-------|----------|------|-------|-------|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | | Unit | Min | Max | Unit | Min | Max | Unit | |
| 3 TA = -55°C (figure 3) | V _{IO} | 43 | 15 V | 15 V | -15 V | 0 V | -1.4 V | | 7 V | 3,4,5 | 10 | E35 | V | V _{IO} = E35 | -7.0 | +7.0 | mV | -2.0 | +2.0 | mV | |
| | | 44 | 27 V | 27 V | -3 V | 12 V | -13.4 V | | | " | " | E36 | " | V _{IO} = E36 | " | " | " | " | " | " | |
| | | 45 | 3 V | 3 V | -27 V | -12 V | 10.6 V | | | " | " | " | E37 | " | V _{IO} = E37 | " | " | " | " | " | " |
| | | 46 | 2.5 V | 2.5 V | -2.5 V | -2.5 V | 1.1 V | | | " | " | " | E38 | " | V _{IO} = E38 | " | " | " | " | " | " |
| | | 47 | 15 V | 15 V | -15 V | 0 V | -1.4 V | | | 1,2,3,4,5 | " | " | E39 | " | I _{IO} = 20 (E39 - E36) | -100 | +100 | nA | -75 | +75 | nA |
| | I _{IO} | 48 | 27 V | 27 V | -3 V | 12 V | -13.4 V | | | " | " | " | E40 | " | I _{IO} = 20 (E40 - E36) | " | " | " | " | " | " |
| | | 49 | 3 V | 3 V | -27 V | -12 V | 10.6 V | | | " | " | " | E41 | " | I _{IO} = 20 (E41 - E37) | " | " | " | " | " | " |
| | +I _{IB} | 50 | 15 V | 15 V | -15 V | 0 V | -1.4 V | | | 2,3,4,5 | " | " | E42 | " | +I _{IB} = 20 (E35 - E42) | -0.1 | +1000 | " | -0.1 | +1000 | " |
| | | 51 | 27 V | 27 V | -3 V | 12 V | -13.4 V | | | " | " | " | E43 | " | +I _{IB} = 20 (E36 - E43) | " | " | " | " | " | " |
| | | 52 | 3 V | 3 V | -27 V | -12 V | 10.6 V | | | " | " | " | E44 | " | +I _{IB} = 20 (E37 - E44) | " | " | " | " | " | " |
| -I _{IB} | 53 | 15 V | 15 V | -15 V | 0 V | -1.4 V | | | 1,3,4,5 | " | " | E45 | " | -I _{IB} = 20 (E45 - E35) | " | " | " | " | " | " | |
| | 54 | 27 V | 27 V | -3 V | 12 V | -13.4 V | | | " | " | " | E46 | " | -I _{IB} = 20 (E46 - E36) | " | " | " | " | " | " | |
| | 55 | 3 V | 3 V | -27 V | -12 V | 10.6 V | | | " | " | " | E47 | " | -I _{IB} = 20 (E47 - E37) | " | " | " | " | " | " | |
| CMRR | 56 | Calculation = $20 \log [24 \times 10^3 / E37 - E36]$ | | | | | | | | | | 90 | | dB | 90 | | dB | | | | |
| VOL1 | 57 | 3.5 V | | -1 V | -1 V | | 3.2 mA | 7 V | 5 | 8 to 9 | E48 | V | VOL1 = E48 | | +0.6 | V | | +0.6 | V | | |
| | 58 | 2.25 V | | -2.25 V | -2.25 V | | 3.2 mA | | " | " | E49 | " | VOL2 = E49 | | +0.6 | " | | +0.6 | " | | |
| | 59 | 27 V | | -3 V | 12 V | 25 mA | | | " | " | E50 | " | VOL3 = E50 | | +1.5 | " | | +1.5 | " | | |
| | 60 | 3 V | | -27 V | -12 V | 25 mA | | | " | " | E51 | " | VOL4 = E51 | | +1.5 | " | | +1.5 | " | | |
| | +ICC | 61 | 15 V | | -15 V | | | | | | 1 | I7 | mA | +ICC = I7 | | +11.5 | mA | | +11.5 | mA | |
| | -ICC | 62 | 15 V | | -15 V | | | | | | 3 | I8 | mA | -ICC = I8 | | | mA | | | mA | |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | | Equation | Limit 06 | | | Limit 07 | | | | |
|---|--------|----------|---------------------|------|-------|-------|---------|---|---|------------------|-------------|-------|------|----------|----------|----------------------|------|----------|------|------|--|------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | Unit | | Min | Max | Unit | Min | Max | Unit | | |
| 4 $T_A = +25^{\circ}\text{C}$ (figure 2) | AV | 63 | 15 V | 15 V | -15 V | -15 V | -1.5 V | | | | 3,4 | 10 | EA | V | | | | | | | | |
| | | | 15 V | 15 V | -15 V | -15 V | -11.5 V | | | | | " | " | E52 | " | AV = 10 / (EA - E52) | +10 | | V/mV | +20 | | V/mV |
| 5 $T_A = +125^{\circ}\text{C}$ (figure 2) | AV | 64 | 15 V | 15 V | -15 V | -15 V | -1.5 V | | | | 3,4 | " | EB | " | | | | | | | | |
| | | | 15 V | 15 V | -15 V | -15 V | -11.5 V | | | | | " | " | E53 | " | AV = 10 / (EB - E53) | +5 | | V/mV | +10 | | V/mV |
| 6 $T_A = -55^{\circ}\text{C}$ (figure 2) | AV | 65 | 15 V | 15 V | -15 V | -15 V | -1.5 V | | | | 3,4 | " | EC | " | | | | | | | | |
| | | | 15 V | 15 V | -15 V | -15 V | -11.5 V | | | | | " | " | E54 | " | AV = 10 / (EC - E54) | +5 | | V/mV | +10 | | V/mV |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | | Limits | | |
|-------------------------------|---------------------|----------|---------------------|-------|-------|----|------|------|-----|------------------|--------------------|-------|------|--------|-----|------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | Unit | Min | Max | Unit |
| 9 TA = +25°C (figure 6) | V/I/O | | 15 V | -15 V | 1.4 V | | 0 V | 0 V | 5 V | 3.4 | 8 | E0 | V | | | |
| | Release k31, k4 | | " | " | " | " | " | " | " | | | | | | | |
| | Null V/I/O | | " | " | " | E0 | " | " | " | | | | | | | |
| | Apply 5 mV OD | | " | " | " | " | -5 V | " | " | | | | | | | |
| | Close k1 | | " | " | " | " | " | " | " | 1 | | | | | | |
| | Apply 100 mV | | " | " | " | " | " | 2 mA | 5 V | 1 | | | | | | |
| | IRLHC | 66 | " | " | " | " | " | 2 mA | 0 V | 1 | Counterpulse width | t1 | ns | 125 | ns | |
| | Reset | | " | " | " | " | " | 0 V | 5 V | 1 | | | | | | |
| | Change 5 mV OD | | " | " | " | " | 5 V | " | " | 1 | | | | | | |
| | Open k1 Close k2 | | " | " | " | " | " | " | " | 2 | | | | | | |
| | Apply 100 mV | | " | " | " | " | " | 2 mA | " | 2 | | | | | | |
| | IRHLC | 67 | " | " | " | " | " | 2 mA | 0 V | 2 | Counterpulse width | t2 | ns | 160 | ns | |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | | Limits | | |
|---------------------------------|---------------------|----------|---------------------|-------|-------|----|------|------|-----|------------------|--------------------|-------|------|--------|-----|------|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | Unit | Min | Max | Unit |
| 10 TA = +125°C (figure 6) | V/O | | 15 V | -15 V | 1.4 V | E0 | 0 V | 0 V | 5 V | 3.4 | 8 | E0 | V | | | |
| | Release k3, k4 | | " | " | " | " | " | " | " | | | | | | | |
| | Null V/O | | " | " | " | E0 | " | " | " | | | | | | | |
| | Apply 5 mV OD | | " | 15 V | " | " | -5 V | " | " | | | | | | | |
| | Close k1 | | " | " | " | " | " | " | " | 1 | | | | | | |
| | Apply 100 mV | | " | " | " | " | " | 2 mA | " | 1 | | | | | | |
| | IRLHC | 68 | " | -15 V | " | " | " | 2 mA | 0 V | 1 | Counterpulse width | t3 | ns | 160 | | ns |
| | Reset | | " | " | " | " | " | 0 V | 5 V | 1 | | | | | | |
| | Change 5 mV OD | | " | " | " | " | 5 V | " | " | 1 | | | | | | |
| | Open k1 Close k2 | | " | " | " | " | " | " | " | 2 | | | | | | |
| | Apply 100 mV | | " | " | " | " | " | 2 mA | " | 2 | | | | | | |
| | IRHLC | 69 | " | " | " | " | " | 2 mA | 0 V | 2 | Counterpulse width | t4 | ns | 160 | | ns |

TABLE III. Group A inspection for device types 06 and 07 – continued. 1/

| Subgroup | Symbol | Test No. | Adapter PIN numbers | | | | | | | Relays energized | Measurement | | | Equation | | Limits | |
|--------------------------------|----------------------|----------|---------------------|-------|-------|----|------|------|------|------------------|---------------------|---------------------|------|------------|------------|--------|----|
| | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | | Pin | Value | Unit | Min | Max | Unit | |
| 11 TA = -55°C (figure 6) | V _{IO} | | 15 V | -15 V | 1.4 V | | 0 V | 0 V | 5 V | 5 V | 3,4 | 8 | E0 | V | | | |
| | Release k3, k4 | | " | " | " | " | " | " | " | " | | | | | | | |
| | Null V _{IO} | | " | " | " | E0 | " | " | " | " | | | | | | | |
| | Apply 5 mV OD | | " | " | " | " | -5 V | " | " | " | | | | | | | |
| | Close k1 | | " | " | " | " | " | " | " | " | 1 | | | | | | |
| | Apply 100 mV | 70 | " | " | " | " | " | " | 2 mA | " | 1 | | | | | | |
| | IRLHC | | " | " | " | " | " | " | 2 mA | 0 V | 1 | Counter pulse width | t5 | ns | t5 = tRLHC | 125 | ns |
| | Reset | | " | " | " | " | " | " | 0 V | 5 V | 1 | | | | | | |
| | Change 5 mV OD | | " | " | " | " | 5 V | " | " | " | 1 | | | | | | |
| | Open k1 Close k2 | | " | " | " | " | " | " | " | " | 2 | | | | | | |
| | Apply 100 mV | | " | " | " | " | " | " | 2 mA | " | 2 | | | | | | |
| IRHLC | 71 | " | " | " | " | " | " | 2 mA | 0 V | 2 | Counter pulse width | t6 | ns | t6 = tRHLC | 160 | ns | |

1/ For devices marked with the "Q" certification mark, the parameters listed herein may be guaranteed if not tested to the limits specified herein in accordance with the manufacturer's QM plan.

TABLE IV. Group C end-point electrical parameters. (TA = +25°C) 1/ 2/ 3/

| Test | Device types 01 and 03 +VCC = +12 V, -VCC = -6 V | | | Device type 02 +VCC = +12 V, -VCC = -6 V | | | Device types 04 and 05 +VCC = +15 V, -VCC = -15 V | | | Device type 06 ±VCC = ±15 V | | | Device type 07 ±VCC = ±15 V | | |
|---------------------|---|-------|---------|---|---------|---------|--|---------|----------|--------------------------------|--------|--------|--------------------------------|---------|---------|
| | Limits | Delta | Delta | Limits | Delta | Delta | Limits | Delta | Delta | Limits | Delta | Delta | Limits | Delta | Delta |
| | Min | Max | | Min | Max | | Min | Max | | Min | Max | | Min | Max | |
| V _{IO} | -2 mV | +2 mV | ±0.5 mV | -3.5 mV | +3.5 mV | ±0.5 mV | -3 mV | +3 mV | ±0.5 mV | -4 mA | +4 mA | ±1 mV | -1 mV | +1 mV | ±0.5 mV |
| +I _B | 0 μA | 20 μA | ±2 μA | 0 μA | 75 μA | ±7.5 μA | -100 nA | ±0.1 nA | ±12.5 nA | -0.1 nA | 500 nA | ±50 nA | -0.1 nA | +500 nA | ±50 nA |
| -I _B | 0 μA | 20 μA | ±2 μA | 0 μA | 75 μA | ±7.5 μA | -100 nA | ±0.1 nA | ±12.5 nA | -0.1 nA | 500 nA | ±50 nA | -0.1 nA | +500 nA | ±50 nA |
| I _{CEX} 4/ | --- | --- | --- | --- | --- | --- | -1 | 10 nA | ±5 nA | --- | --- | --- | --- | --- | --- |

1/ For device types 01, 02, and 03, V_{IO} deltas and limits apply to tests 1 and 2 in table III. For device types 04 and 05, V_{IO} deltas and limits apply to tests 1, 2, and 3 in table III. For device types 06 and 07, V_{IO} deltas and limits apply to tests 1, 2, and 3 in table III.

2/ For device types 01, 02, and 03, +I_B deltas and limits apply to test 4 in table III. For device types 04 and 05, +I_B deltas and limits apply to tests 12, 13, and 14 in table III. For device types 06 and 07, +I_B deltas and limits apply to tests 8, 9, and 10 in table III.

3/ For device types 01, 02, and 03, -I_B deltas and limits apply to test 5 in table III. For device types 04 and 05, -I_B deltas and limits apply to tests 15, 16, and 17 in table III. For device types 06 and 07, -I_B deltas and limits apply to tests 11, 12, and 13 in table III.

4/ I_{CEX} deltas and limits apply to test 26 in table III.

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.

4.4.2 Group B inspection. Group B inspection shall be in accordance with table II of 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 voltage values given, except the input offset voltage (or differential voltage) are referenced to the external zero reference level of the supply voltage. Currents given are conventional current and positive when flowing into the referenced terminal.

4.5.2 Burn-in and life test cooldown procedure. When devices are measured at +25°C following application of the steady state life or burn-in condition, they shall be cooled to within 10°C of their power stable condition at room temperature prior to removal of the bias.

5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When packaging of material 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 or 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 that 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. PIN and compliance identifier, if applicable (see 1.2).
- c. Requirements for delivery of one copy of the 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 acquiring activity in addition to notification of the qualifying activity, if applicable.
- f. Requirements for failure analysis (including required test condition of MIL-STD-883, method 5003), 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. Unless otherwise specified, these requirements will not apply to direct purchase by or direct shipment to the Government.
- i. Requirements for "JAN" marking.
- j. Packaging requirements (see 5.1).

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 43128-3990.

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

6.5.1 Logic threshold voltage. The approximate voltage at the output of the comparator at which the loading logic circuitry changes its digital state.

6.5.2 Voltage gain. The ratio of the change in output voltage to the change in voltage between the input terminals producing it with the dc output level in the vicinity of the logic threshold voltage (A_V).

6.5.3 Response time. The interval between the application of an input step function and the time when the output crosses the logic threshold voltage. The input step drives the comparator from some initial, saturated input voltage to an input level just barely in excess of that required to bring the output from saturation to the logic threshold voltage. This excess is referred to as the voltage overdrive.

6.5.4 Positive output level. The dc output voltage in the positive direction with the input voltage equal to or greater than a minimum specified amount.

6.5.5 Negative output level. The dc output voltage in the negative direction with the input voltage equal to or greater than a minimum specified amount.

6.5.6 Output sink current. The maximum negative current that can be delivered by the comparator (I_{OL}).

6.5.7 Peak output current. The maximum current that may flow into the output load without causing damage to the comparator.

6.5.8 Differential input voltage. The difference between the two voltages applied to the input terminals of an amplifier. The difference is considered positive when the noninverting input is positive with respect to the inverting input and negative when the inverting input is positive with respect to the noninverting input (V_{ID}).

6.5.9 Strobe current. The current into the strobe terminal of an amplifier (I_{STB}).

6.5.10 Output leakage current. The current into the output of an amplifier with the output at high level (I_O).

6.5.11 Ground leakage current. The current into the ground terminal of an amplifier with the output at high level (I_G).

6.5.12 Input leakage current. The current into the input terminal of an amplifier with the output at a specified voltage (I_I).

6.6 Logistic support. Lead materials and finishes (see 3.4) are interchangeable. Unless otherwise specified, microcircuits acquired to Government logistic support should be acquired to device class B (see 1.2.2), and 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.

| <u>Military device type</u> | <u>Generic-industry type</u> |
|-----------------------------|------------------------------|
| 01 | 710 |
| 02 | 711 |
| 03 | LM106 |
| 04 | LM111 |
| 05 | LH2111 |
| 06 | LM119 |
| 07 | LT119A |

6.8 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

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| Custodians: Army – CR Navy – EC Air Force – 11 NASA – NA DLA – CC | Preparing activity: DLA - CC Project 5962-2102 |
| Review activities: Army – MI, SM Navy - AS, CG, MC, SH, TD Air Force – 03, 19, 99 | |

NOTE: The activities listed above were interested in this document as of this date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using the ASSIST Online database at <http://assist.daps.dla.mil>.