

The documentation and process conversion measures necessary to comply with this revision shall be completed by 27 January 2016.

INCH-POUND

MIL-PRF-19500/583C  
 27 October 2015  
 SUPERSEDING  
 MIL-PRF-19500/583B  
 22 July 2010

PERFORMANCE SPECIFICATION SHEET

\* TRANSISTOR, NPN, SILICON AMPLIFIER,  
 TYPES 2N5681 AND 2N5682, JAN, JANTX, AND JANTXV

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

The requirements for acquiring the product described herein shall consist of this specification sheet and [MIL-PRF-19500](#).

1. SCOPE

\* 1.1 Scope. This specification covers the performance requirements for NPN , silicon, amplifier transistor. Three levels of product assurance (JAN, JANTX, and JANTXV) are provided for each device.

\* 1.2 Package outlines. The device package outlines are as follows: TO-39 in accordance with [figure 1](#) for all encapsulated device types.

1.3 Maximum ratings. Unless otherwise specified,  $T_A = +25^\circ\text{C}$ .

| Type   | $P_T$<br>$T_A = +25^\circ\text{C}$<br>(1) | $P_T$<br>$T_C = +25^\circ\text{C}$<br>(2) | $R_{\theta JC}$ | $V_{CBO}$   | $V_{CEO}$   | $V_{EBO}$   | $I_C$       | $I_B$       | $T_{op}$ and $T_{STG}$ |
|--------|---|---|-----------------|-------------|-------------|-------------|-------------|-------------|------------------------|
|        | <u>W</u>                                  | <u>W</u>                                  | <u>°C</u>       | <u>V dc</u> | <u>V dc</u> | <u>V dc</u> | <u>A dc</u> | <u>A dc</u> | <u>°C</u>              |
| 2N5681 | 1.0                                       | 10  | 17.5            | 100         | 100         | 4.0         | 1.0         | 0.5         | -65 to +200            |
| 2N5682 | 1.0                                       | 10  | 17.5            | 120         | 120         | 4.0         | 1.0         | 0.5         |                        |

(1) Derate linearly 5.7 mW/°C for  $T_A > +25^\circ\text{C}$ .

(2) Derate linearly 57 mW/°C for  $T_C > +25^\circ\text{C}$ .

\* Comments, suggestions, or questions on this document should be addressed to DLA Land and Maritime, ATTN: VAC, P.O. Box 3990, Columbus, OH 43218-3990, or emailed to [Semiconductor@dla.mil](mailto:Semiconductor@dla.mil). Since contact information can change, you may want to verify the currency of this address information using the ASSIST Online database at <https://assist.dla.mil>.



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1.4 Primary electrical characteristics at T<sub>A</sub> = +25°C.

|            |   |   |   |   |  |  |   |
|------------|---|---|---|---|--|--|---|
| Limits     | h <sub>FE</sub> at V <sub>CE</sub> = 2.0 V dc 1/  |   |   | /h <sub>fe</sub> /<br>f = 10 MHz<br>V <sub>CE</sub> = 10 V dc<br>I <sub>C</sub> = 100 mA dc | C <sub>obo</sub><br>f = 1.0 MHz<br>V <sub>CB</sub> = 20 V dc<br>I <sub>E</sub> = 0 | V <sub>CE(sat)</sub> 1 (1)<br>I <sub>C</sub> = 250 mA<br>dc<br>I <sub>B</sub> = 25 mA dc | V <sub>BE(sat)</sub> 1 1/<br>I <sub>C</sub> = 250 mA<br>dc<br>I <sub>B</sub> = 25 mA dc |
|            | h <sub>FE1</sub><br>I <sub>C</sub> = 250 mA<br>dc | h <sub>FE2</sub><br>I <sub>C</sub> = 500 mA<br>dc | h <sub>FE3</sub><br>I <sub>C</sub> = 1.0 A dc |   |  |  |   |
| Min<br>Max | 40<br>150   | 20  | 5   | 3.0   | pF<br>50   | V dc<br>0.6  | V dc<br>1.1   |

(1) Pulsed see 4.5.1.

- \* 1.5 Part or Identifying Number (PIN). The PIN is in accordance with [MIL-PRF-19500](#), and as specified herein. See 6.5 for PIN construction example and 6.6 for a list of available PINs.
- \* 1.5.1 JAN certification mark and quality level for encapsulated devices. The quality level designators for encapsulated devices that are applicable for this specification sheet from the lowest to the highest level are as follows: "JAN", "JANTX", and "JANTXV".
- \* 1.5.2 First number and first letter symbols. The transistors of this specification sheet use the first number and letter symbols "2N".
- \* 1.5.2.1 Second number symbols. The second number symbols for the transistors covered by this specification sheet are as follows: "5681" and "5682".
- \* 1.5.3 Lead finish. The lead finishes applicable to this specification sheet are listed on [QPDSIS-19500](#).

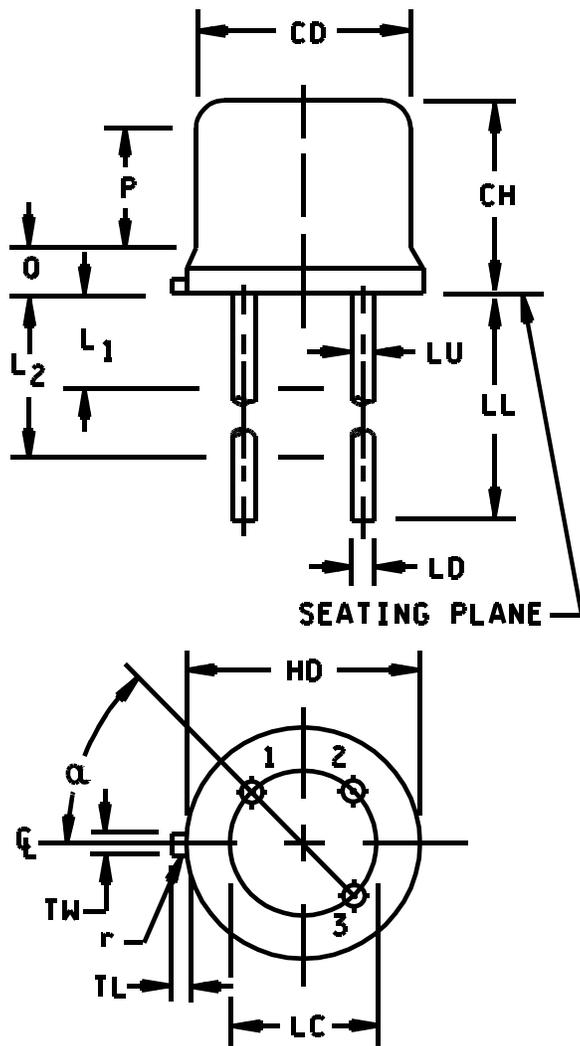


FIGURE 1. Physical dimensions for (TO-39).

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| Symbol<br>(see<br>note 3) | Dimensions |      |             |       | Notes  |
|---------------------------|------------|------|-------------|-------|--------|
|                           | Inches     |      | Millimeters |       |        |
|                           | Min        | Max  | Min         | Max   |        |
| CD                        | .305       | .335 | 7.75        | 8.51  |        |
| CH                        | .240       | .260 | 6.10        | 6.60  |        |
| HD                        | .335       | .370 | 8.51        | 9.39  |        |
| LC                        | .200 BSC   |      | 5.08 BSC    |       | 10     |
| LD                        | .016       | .021 | 0.41        | 0.53  | 10, 11 |
| LL                        | .500       | .750 | 12.70       | 19.05 | 11, 12 |
| LU                        | .016       | .019 | 0.41        | 0.48  | 11, 12 |
| L <sub>1</sub>            |            | .050 |             | 1.27  | 11, 12 |
| L <sub>2</sub>            | .250       |      | 6.35        |       | 11, 12 |
| P                         | .100       |      | 2.54        |       | 9      |
| Q                         |            | .050 |             | 1.27  | 8      |
| R                         |            | .010 |             | 0.25  | 13     |
| TL                        | .029       | .045 | 0.74        | 1.14  | 7      |
| TW                        | .028       | .034 | 0.72        | 0.86  | 6      |
| $\alpha$                  | 45° BSC    |      |             |       | 10     |
| Term 1                    | Emitter    |      |             |       |        |
| Term 2                    | Base       |      |             |       |        |
| Term 3                    | Collector  |      |             |       |        |

FIGURE 1. Physical dimensions for (TO-39) continued.

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Refer to applicable symbol list.
4. In accordance with ASME Y14.5M, diameters are equivalent to  $\phi$ x symbology.
5. Lead number 1 is the emitter, lead number 2 is the base, lead number 4 is omitted from this outline. The collector is number 3 and is electrically connected to the case.
6. Beyond r (radius) max, TW shall be held for a minimum length of .011 inch (0.28 mm).
7. TL measured from maximum HD.
8. Outline in this zone is not controlled.
9. CD shall not vary more than .010 inch (0.25 mm) in zone P. This zone is controlled for automatic handling
10. Leads at gauge plane .054 +.001 -.000 inch (1.37 +0.03 - 0.00 mm) below seating plane shall be within .007 inch (0.18 mm) radius of true position (TP) at maximum material condition (MMC) relative to tab at MMC.
11. LU applies between L<sub>1</sub> and L<sub>2</sub>. LD applies between L<sub>2</sub> and LL minimum. Diameter is uncontrolled in L<sub>1</sub> and beyond LL minimum.
12. All three leads.
13. r (radius) applies to both inside corners of tab.

FIGURE 1. Physical dimensions for (TO-39) continued.

## 2. APPLICABLE DOCUMENTS

- \* 2.1 General. The documents listed in this section are specified in sections 3 and 4 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 and 4 of this specification, whether or not they are listed.

### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document 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-19500](#) - Semiconductor Devices, General Specification for.

#### DEPARTMENT OF DEFENSE STANDARDS

[MIL-STD-750](#) - Test Methods for Semiconductor Devices.

- \* (Copies of these documents are available online at <http://quicksearch.dla.mil/>).

2.3 Order of precedence. Unless otherwise noted herein or in the contract, in the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 General. The individual item requirements shall be as specified in [MIL-PRF-19500](#) and as modified herein.

3.2 Qualification. Devices furnished under this specification shall be products that are manufactured by a manufacturer authorized by the qualifying activity for listing on the applicable qualified manufacturer's list (QML) before contract award (see [4.2](#) and [6.3](#)).

3.3 Abbreviations, symbols, and definitions. Abbreviations, symbols, and definitions used herein shall be as specified in [MIL-PRF-19500](#).

3.4 Interface requirements and physical dimensions. The interface requirements and physical dimensions shall be as specified in [MIL-PRF-19500](#) and on [figure 1](#) (TO-39) herein.

3.4.1 Lead finish. Lead finish shall be solderable as defined in [MIL-PRF-19500](#), [MIL-STD-750](#), and herein. Where a choice of lead finish is desired, it shall be specified in the acquisition document (see [6.2](#)).

3.5 Marking. Marking shall be in accordance with [MIL-PRF-19500](#).

3.6 Electrical performance characteristics. Unless otherwise specified herein, the electrical performance characteristics are as specified in [1.3](#), [1.4](#), and [table I](#) herein.

3.7 Electrical test requirements. The electrical test requirements shall be the subgroups specified in [table I](#) herein.

3.8 Workmanship. Semiconductor devices shall be processed in such a manner as to be uniform in quality and shall be free from other defects that will affect life, serviceability, or appearance.

## 4. VERIFICATION

4.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Qualification inspection (see 4.2).
- b. Screening (see 4.3)
- c. Conformance inspection (see 4.4 and tables I and II).

4.2 Qualification inspection. Qualification inspection shall be in accordance with MIL-PRF-19500 and as specified herein.

4.2.1 Group E inspection. Group E inspection shall be performed for qualification or re-qualification only. In case qualification was awarded to a prior revision of the specification sheet that did not request the performance of table III tests, the tests specified in table III herein that were not performed in the prior revision shall be performed on the first inspection lot of this revision to maintain qualification.

4.3 Screening (JANTX and JANTXV levels only). Screening shall be in accordance with table E-IV of MIL-PRF-19500, and as specified herein. The following measurements shall be made in accordance with table I herein. Devices that exceed the limits of table I herein shall not be acceptable.

| Screen (see table E-IV of MIL-PRF-19500) | Measurement  |
|--|--|
|  | JANTX and JANTXV level   |
| (1)                                      | Method 3131 (see 4.3.2)  |
| 11                                       | $I_{CBO}$ , $h_{FE2}$  |
| 12                                       | See 4.3.1  |
| 13                                       | Subgroup 2 of table I herein;<br>$\Delta I_{CBO} = 100$ percent of initial value, or 10 nA dc whichever is greater;<br>$\Delta h_{FE2} = \pm 15$ percent of initial value. |

(1) Shall be performed anytime before screen 10.

4.3.1 Power burn-in conditions. Power burn-in conditions are as follows:  $V_{CB} \geq 20$  V dc;  $P_T = 1.0$  W at  $T_A = 30^\circ\text{C} \pm 5^\circ\text{C}$ . NOTE: No heat sink or forced air cooling on the devices shall be permitted.

4.3.2 Thermal impedance. The thermal impedance measurements shall be performed in accordance with method 3131 of MIL-STD-750 using the guidelines in that method for determining  $I_M$ ,  $I_H$ ,  $t_H$ ,  $t_{SW}$ , (and  $V_H$  where appropriate). Measurement delay time ( $t_{MD}$ ) = 70  $\mu\text{s}$  max. See table III, group E, subgroup 4 herein.

4.4 Conformance inspection. Conformance inspection shall be in accordance with [MIL-PRF-19500](#), and as specified herein. Alternate flow is allowed for quality conformance inspection in accordance with [MIL-PRF-19500](#).

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with [table I](#) herein.

- \* 4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified. Separate samples may be used for each step. In the event of a group B failure, the manufacturer may pull a new sample at double the sample size from either the failed assembly lot or from another assembly lot from the same wafer lot. If the new “assembly lot” option is exercised, the failed assembly lot shall be scrapped. Delta measurements shall be in accordance with [table II](#) herein.

| <u>Step</u> | <u>Method</u> | <u>Condition</u>  |
|-------------|---------------|---|
| 1           | 1027          | Steady-state life: 340 hours, $V_{CB} \geq 20$ V dc, $T_J = 150^\circ\text{C}$ minimum. External heating of the device under test to achieve $T_J = 150^\circ\text{C}$ minimum is allowed provided that a minimum of 75 percent of rated power is dissipated. No heat sink or forced-air cooling on the devices shall be permitted. $n = 45$ devices, $c = 0$ . |
| * 2         | 1048          | Blocking life, $T_A = +150^\circ\text{C}$ , $V_{CB} = 80$ percent of rated voltage, 48 hours minimum. $n = 45$ devices, $c = 0$ .   |
| 3           | 1032          | High-temperature life (non-operating), $T_A = +200^\circ\text{C}$ . $n = 22$ , $c = 0$ .  |

4.4.2.1 Group B sample selection. Samples selected for group B inspection shall meet all of the following requirements:

- a. For JAN, JANTX, and JANTXV samples shall be selected randomly from a minimum of three wafers (or from each wafer in the lot) from each wafer lot.
- b. Shall be chosen from an inspection lot that has been submitted to and passed group A, subgroup 2, conformance inspection. When the final lead finish is solder or any plating prone to oxidation at high temperature, the samples for life test (group B for JAN, JANTX, and JANTXV) may be pulled prior to the application of final lead finish.

- \* 4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in table E-VII of [MIL-PRF-19500](#). Delta measurements shall be in accordance with [table II](#) herein; delta requirements only apply to subgroup C6.

4.4.3.1 Group C inspection, table E-VII (JAN, JANTX, and JANTXV) of [MIL-PRF-19500](#).

| <u>Subgroup</u> | <u>Method</u> | <u>Condition</u>   |
|-----------------|---------------|--|
| C2              | 2036          | Test condition E.  |
| C5              | 3131          | Thermal resistance, see <a href="#">4.3.2</a> , $R_{\theta JC} = 17.5^\circ\text{C/W}$ . |
| C6              |               | Not applicable.  |

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4.4.3.2 Group C sample selection. Samples for subgroups in group C shall be chosen at random from any lot containing the intended package type and lead finish procured to the same specification which is submitted to and passes group A tests for conformance inspection. Testing of a subgroup using a single device type enclosed in the intended package type shall be considered as complying with the requirements for that subgroup.

\* 4.4.4 Group E inspection. Group E inspection for qualification only shall be conducted in accordance with the conditions specified for subgroup testing in table E-IX of [MIL-PRF-19500](#) and [table III](#) herein. Delta measurements shall be in accordance with [table II](#) herein.

4.5 Methods of inspection. Methods of inspection shall be as specified in the appropriate tables and as follows.

4.5.1 Pulse measurements. Conditions for pulse measurement shall be as specified in section 4 of [MIL-STD-750](#).

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TABLE I. Group A inspection.

\*

| Inspection <u>1/</u>  | MIL-STD-750 |  | Symbol               | Limits     |     | Unit  |
|---|-------------|--|----------------------|------------|-----|-------|
|   | Method      | Conditions   |                      | Min        | Max |       |
| <u>Subgroup 1 2/</u>  |             |  |                      |            |     |       |
| Visual and mechanical <u>3/</u> examination   | 2071        | n = 45 devices, c = 0  |                      |            |     |       |
| Solderability <u>3/</u>   | 2026        | n = 15 leads, c = 0  |                      |            |     |       |
| Resistance to solvents <u>3/ 4/</u>   | 1022        | n = 15 devices, c = 0  |                      |            |     |       |
| * Salt atmosphere (corrosion), (Laser marked devices only. Not required for non-corrosive base metals.) | 1041        | n = 6 devices, c = 0   |                      |            |     |       |
| Temp cycling <u>3/</u>  | 1051        | Test condition C, 25 cycles.<br>n = 22 devices, c = 0  |                      |            |     |       |
| Hermetic seal   | 1071        | n = 22 devices, c = 0  |                      |            |     |       |
| Fine leak<br>Gross leak   |             |  |                      |            |     |       |
| Electrical measurements   |             | Group A, subgroup 2  |                      |            |     |       |
| Bond strength <u>3/</u>   | 2037        | Pre-condition T <sub>A</sub> = +250°C at t = 24 hrs or T <sub>A</sub> = +300°C at t = 2 hrs, n = 11 wires, c = 0 |                      |            |     |       |
| * Decap internal visual (design verification)   | 2075        | n = 4 devices, c = 0   |                      |            |     |       |
| <u>Subgroup 2</u>   |             |  |                      |            |     |       |
| Breakdown voltage collector to emitter<br>2N5681<br>2N5682  | 3011        | Bias condition D, pulsed (see 4.5.1)<br>I <sub>C</sub> = 10 mA dc  | V <sub>(BR)CEO</sub> | 100<br>120 |     | V dc  |
| Collector emitter cutoff current<br>2N5681<br>2N5682  | 3041        | Bias condition A, V <sub>BE</sub> = 1.5 V dc<br><br>V <sub>CE</sub> = 100 V dc<br>V <sub>CE</sub> = 120 V dc     | I <sub>CEX1</sub>    |            | 100 | nA dc |
| Collector emitter cutoff current<br>2N5681<br>2N5682  | 3041        | Bias condition D<br><br>V <sub>CE</sub> = 70 V dc<br>V <sub>CE</sub> = 80 V dc                                   | I <sub>CEO</sub>     |            | 10  | μA dc |
| Collector to baser cutoff current<br>2N5681<br>2N5682   | 3036        | Bias condition D<br><br>V <sub>CE</sub> = 100 V dc<br>V <sub>CE</sub> = 120 V dc                                 | I <sub>CBO</sub>     |            | 100 | nA dc |
| Emitter to base cutoff current  | 3061        | Bias condition D, V <sub>EB</sub> = 4.0 V dc   | I <sub>EBO</sub>     |            | 1.0 | μA dc |

See footnotes at end of table.

\* TABLE I. Group A inspection - Continued.

| Inspection 1/   | MIL-STD-750 |   | Symbol         | Limits |     | Unit  |
|---|-------------|---|----------------|--------|-----|-------|
|   | Method      | Conditions  |                | Min    | Max |       |
| <u>Subgroup 2 Continued</u>                             |             |   |                |        |     |       |
| Forward current transfer ratio                          | 3076        | Pulsed (see 4.5.1), $I_C = 250$ mA dc<br>$V_{CE} = 2.0$ V dc                        | $h_{FE1}$      | 40     | 150 |       |
| Forward current transfer ratio                          | 3076        | Pulsed (see 4.5.1), $I_C = 500$ mA dc<br>$V_{CE} = 2.0$ V dc                        | $h_{FE2}$      | 20     |     |       |
| Forward current transfer ratio                          | 3076        | Pulsed (see 4.5.1), $I_C = 1.0$ A dc<br>$V_{CE} = 2.0$ V dc                         | $h_{FE3}$      | 5      |     |       |
| Collector to emitter voltage (saturated)                | 3071        | Pulsed (see 4.5.1), $I_C = 250$ mA dc<br>$I_B = 25$ mA dc                           | $V_{CE(sat)1}$ |        | 0.6 | V dc  |
| Collector to emitter voltage (saturated)                | 3071        | Pulsed (see 4.5.1), $I_C = 500$ mA dc<br>$I_B = 50$ mA dc                           | $V_{CE(sat)2}$ |        | 1.0 | V dc  |
| Base emitter voltage                                    | 3066        | Test condition A, pulsed (see 4.5.1),<br>$I_C = 250$ mA dc , $I_B = 25$ mA dc       | $V_{BE(sat)1}$ |        | 1.1 | V dc  |
| Base emitter voltage                                    | 3066        | Test condition A, pulsed (see 4.5.1),<br>$I_C = 500$ mA dc , $I_B = 50$ mA dc       | $V_{BE(sat)2}$ |        | 1.3 | V dc  |
| <u>Subgroup 3</u>                                       |             |   |                |        |     |       |
| High temperature operation:                             |             | $T_A = +150^\circ\text{C}$  |                |        |     |       |
| Collector to emitter cutoff current<br>2N5681<br>2N5682 | 3041        | Bias condition A, $V_{BE} = 1.5$ V dc<br>$V_{CE} = 100$ V dc<br>$V_{CE} = 120$ V dc | $I_{CEX2}$     |        | 1.0 | mA dc |
| Low-temperature operation:                              |             | $T_A = -55^\circ\text{C}$   |                |        |     |       |
| Forward current transfer ratio                          | 3076        | Pulsed (see 4.5.1), $I_C = 250$ mA dc<br>$V_{CE} = 2.0$ V dc                        | $h_{FE4}$      | 20     |     |       |

See footnotes at end of table.

\* TABLE I. Group A inspection - Continued.

| Inspection <u>1/</u>   | MIL-STD-750 |  | Symbol     | Limits |     | Unit |
|--|-------------|--|------------|--------|-----|------|
|  | Method      | Conditions   |            | Min    | Max |      |
| <u>Subgroup 4</u>  |             |  |            |        |     |      |
| Small signal short circuit forward current transfer ratio              | 3206        | $I_C = 0.2 \text{ A dc}, V_{CE} = 1.5 \text{ V dc}, f = 1.0 \text{ kHz}$ | $h_{fe}$   | 40     |     |      |
| Magnitude of small-signal short-circuit forward-current transfer ratio | 3306        | $I_C = 100 \text{ mA dc}, V_{CE} = 1.5 \text{ V dc}, f = 10 \text{ MHz}$ | $ h_{FE} $ | 3      |     |      |
| Open circuit output capacitance  | 3236        | $I_E = 0, V_{CB} = 20 \text{ V dc}, f = 1 \text{ MHz}$                   | $C_{obo}$  |        | 50  | pF   |
| <u>Subgroup 5</u>  |             |  |            |        |     |      |
| Safe operating area (continuous dc)                                    | 3051        | $T_C = +25^\circ\text{C}; t \geq 0.5 \text{ s}, 1 \text{ cycle.}$        |            |        |     |      |
| <u>Test 1</u>  |             | $I_C = 1.0 \text{ A dc}, V_{CE} = 2 \text{ V dc},$                       |            |        |     |      |
| <u>Test 2</u>  |             | $I_C = 1.0 \text{ A dc}, V_{CE} = 10 \text{ V dc},$                      |            |        |     |      |
| <u>Test 3</u>  |             | $I_C = 50 \text{ mA dc}, V_{CE} = 90 \text{ V dc},$                      |            |        |     |      |
| Electrical measurements  |             | See <a href="#">table I</a> , subgroup 2                                 |            |        |     |      |
| <u>Subgroups 6 and 7</u>   |             |  |            |        |     |      |
| Not applicable   |             |  |            |        |     |      |

1/ For sampling plan, see [MIL-PRF-19500](#).

2/ For resubmission of failed subgroup A1, double the sample size of the failed test or sequence of tests.

3/ Separate samples may be used.

4/ Not required for laser marked devices.

TABLE II. Groups B, C, and E delta measurements. 1/ 2/ 3/

| Step | Inspection   | MIL-STD-750 |  | Symbol           | Limits   |     | Unit |
|------|--|-------------|--|------------------|--|-----|------|
|      |  | Method      | Conditions   |                  | Min  | Max |      |
| 1.   | Collector to base cutoff current<br><br>2N5681<br>2N5682 | 3036        | Bias condition D<br><br>$V_{CB} = 100 \text{ V dc}$<br>$V_{CB} = 120 \text{ V dc}$ | $\Delta I_{CBO}$ | 100 percent of initial value or 10 nA dc whichever is greater. |     |      |
| 2.   | Forward current transfer ratio                           | 3076        | $I_C = 250 \text{ mA dc}$<br>$V_{CE} = 2.0 \text{ V dc}$ ;<br>Pulsed (see 4.5.1)   | $\Delta h_{FE1}$ | ±25 percent change from initial recorded value.                |     |      |

1/ Devices which exceed the group A limits for this test shall not be shipped.

2/ The delta measurements for group B, 4.4.2 herein are as follows:

- a. Step 1, see table II herein, steps 1 and 2.
- b. Step 2, see table II herein, steps 1 and 2.

3/ The delta measurements for table E-IX of MIL-PRF-19500 are as follows: Subgroup E2, see table II herein, steps 1 and 2.

\* TABLE III. Group E inspection (all quality levels) for qualification or re-qualification only.

| Inspection                       | MIL-STD-750 |  | Qualification       |
|----------------------------------|-------------|--|---------------------|
|                                  | Method      | Conditions   |                     |
| <u>Subgroup 1</u>                |             |  | 45 devices<br>c = 0 |
| Temperature cycling (air to air) | 1051        | Test condition C, 500 cycles   |                     |
| Hermetic seal                    |             |  |                     |
| Fine leak                        | 1071        |  |                     |
| Gross leak                       |             |  |                     |
| Electrical measurements          |             | See <a href="#">table I</a> , subgroup 2 herein                              |                     |
| <u>Subgroup 2</u>                |             |  | 45 devices<br>c = 0 |
| Life test                        | 1039        | Test condition A, 1,000 hours  |                     |
| Electrical measurements          |             | See <a href="#">table I</a> , subgroup 2 and <a href="#">table II</a> herein |                     |
| <u>Subgroup 4</u>                |             |  |                     |
| Thermal impedance                |             | See <a href="#">MIL-PRF-19500</a> .  |                     |
| <u>Subgroup 5</u>                |             |  |                     |
| Not applicable                   |             |  |                     |
| <u>Subgroup 8</u>                |             |  | 45 devices<br>c = 0 |
| Reverse stability                | 1033        | Condition B  |                     |

\*

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 materiel is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Service or Defense Agency, or within the Military Service's system commands. 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. The notes specified in MIL-PRF-19500 are applicable to this specification.)

6.1 Intended use. Semiconductors 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 this specification.
- b. Packaging requirements (see 5.1).
- c. Lead finish (see 3.4.1).

\* d. The complete PIN, see 1.5 and 6.5.

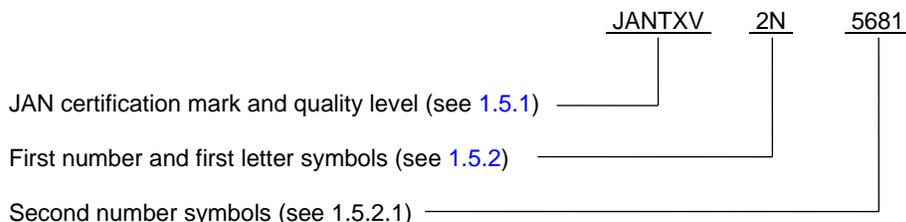
\* 6.3 Qualification. With respect to products requiring qualification, awards will be made only for products which are, at the time of award of contract, qualified for inclusion in Qualified Manufacturers List (QML 19500) whether or not such products have actually been so listed by that date. The attention 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 orders for the products covered by this specification. Information pertaining to qualification of products may be obtained from DLA Land and Maritime, ATTN: VQE, P.O. Box 3990, Columbus, OH 43218-3990 or e-mail [vqe.chief@dla.mil](mailto:vqe.chief@dla.mil). An online listing of products qualified to this specification may be found in the Qualified Products Database (QPD) at <https://assist.dla.mil>.

6.4 Application guidance. The following PNP type transistor is complementary to the NPN device listed herein.

| <u>NPN</u> | <u>PNP</u> |
|------------|------------|
| 2N5681     | 2N5679     |
| 2N5682     | 2N5680     |

\* 6.5 PIN construction example.

\* 6.5.1 Encapsulated devices The PINs for encapsulated devices are constructed using the following form.



\* 6.6 List of PINs. The following is a list of possible PINs available on this specification sheet.

| PINs for types 2N5681 | PINs for types 2N5682 |
|-----------------------|-----------------------|
| JAN2N5681             | JAN2N5682             |
| JANTX2N5681           | JANTX2N5682           |
| JANTXV2N5681          | JANTXV2N5682          |

6.7 Substitution information. Devices covered by this specification are substitutable for the manufacturer's and user's Part or Identifying Number (PIN). This information in no way implies that manufacturer's PIN's are suitable for the military PIN.

| Military PIN                                   | Manufacturer's CAGE Code | Manufacturer's and user's PIN |
|--|--------------------------|-------------------------------|
| JAN2N5681 or<br>JANTX2N5681 or<br>JANTXV2N5681 | 04713                    | 2N5681<br>ST1113H             |
| JAN2N5682 or<br>JANTX2N5682 or<br>JANTXV2N5682 | 04713                    | 2N5682<br>ST1211H             |

6.8 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

Custodians:  
Army - CR  
Navy - EC  
Air Force - 85  
DLA - CC

Preparing activity:  
DLA - CC  
  
(Project 5961-2015-097)

\* NOTE: The activities listed above were interested in this document as of the 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 <https://assist.dla.mil>.