

The documentation and process conversion measures necessary to comply with this revision shall be completed by 15 October 2014.

INCH-POUND

MIL-PRF-19500/384H  
 15 July 2014  
 SUPERSEDING  
 MIL-PRF-19500/384G  
 8 August 2013

PERFORMANCE SPECIFICATION SHEET

SEMICONDUCTOR DEVICE, TRANSISTOR, NPN, SILICON HIGH-POWER,  
 TYPES 2N3584, 2N3585, 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, power transistors. Three levels of product assurance are provided for this device type as specified in [MIL-PRF-19500](#).

1.2 Physical dimensions. See [figure 1](#) (TO-66).

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

| Type   | $P_T$<br>$T_A = +25^\circ\text{C}$ | $P_T$<br>$T_C = +25^\circ\text{C}$<br>(1) | $R_{\theta JC}$                      | $V_{CBO}$   | $V_{CEO}$   | $V_{EBO}$   | $V_{CER}$   | $I_B$       | $I_C$       | $T_J$ and $T_{STG}$                |
|--------|------------------------------------|---|--------------------------------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------------|
|        | <u>W</u>                           | <u>W</u>                                  | <u><math>^\circ\text{C/W}</math></u> | <u>V dc</u> | <u>V dc</u> | <u>V dc</u> | <u>V dc</u> | <u>A dc</u> | <u>A dc</u> | <u><math>^\circ\text{C}</math></u> |
| 2N3584 | 2.5                                | 35  | 5.0                                  | 375         | 250         | 6.0         | 300         | 1.0         | 2.0         | -65 to +200                        |
| 2N3585 | 2.5                                | 35  | 5.0                                  | 500         | 300         | 6.0         | 400         | 1.0         | 2.0         | -65 to +200                        |

(1) Derate linearly, 200 mW/ $^\circ\text{C}$  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/>.

1.4 Primary electrical characteristics.

| Limits | $h_{FE}$ (1)                                       |   | $ h_{fe} $  | $C_{obo}$  | $V_{BE(SAT)}$<br>(1)                               | $V_{CE(SAT)}$<br>(1)                              | Switching   |           |
|--------|--|---|---|--|--|---|---|-----------|
|        | $I_C = 1\text{ A dc}$<br>$V_{CE} = 10\text{ V dc}$ | $I_C = 100\text{ mA dc}$<br>$V_{CE} = 10\text{ V dc}$ |   |  |  |   | $t_{on}$  | $t_{off}$ |
|        |  |   | $f = 5\text{ MHz}$<br>$I_C = 200\text{ mA dc}$<br>$V_{CE} = 10\text{ V dc}$ | $100\text{ KH} < f < 1\text{ MHz}$<br>$V_{CB} = 10\text{ V dc}$<br>$I_E = 0$ | $I_C = 1.0\text{ A dc}$<br>$I_B = 0.1\text{ A dc}$ | $I_C = 1\text{ A dc}$<br>$I_B = 125\text{ mA dc}$ | (See <a href="#">table 1</a> and <a href="#">figure 2</a> herein) |           |
|        |  |   |   | <u>pF</u>  | <u>V dc</u>  | <u>V dc</u>                                       | <u>μs</u>   | <u>μs</u> |
| Min    | 25   | 40  | 3.0   |  |  |   |   |           |
| Max    | 100  |   | 15  | 120  | 1.4  | 0.75  | 3.0   | 7.0       |

(1) Pulsed (see [4.5.1](#)).

2. APPLICABLE DOCUMENTS

\* 2.1 General. The documents listed in this section are specified in sections 3 or 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 or 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

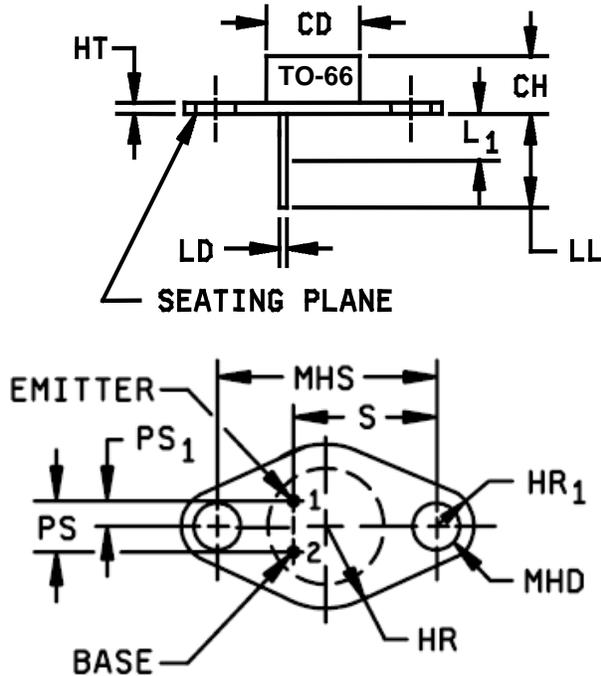
[MIL-PRF-19500](#) - Semiconductor Devices, General Specification for.

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.



| Symbol          | Dimensions |      |             |       | Notes |
|-----------------|------------|------|-------------|-------|-------|
|                 | Inches     |      | Millimeters |       |       |
|                 | Min        | Max  | Min         | Max   |       |
| CD              |            | .620 |             | 15.75 | 3     |
| CH              | .250       | .340 | 6.35        | 8.64  |       |
| HT              | .050       | .075 | 1.27        | 1.91  | 3     |
| HR              |            | .350 |             | 8.89  |       |
| HR <sub>1</sub> | .115       | .145 | 2.92        | 3.68  | 6     |
| LD              | .028       | .034 | 0.71        | 0.86  | 5, 9  |
| LL              | .360       | .500 | 9.14        | 12.70 | 5     |
| L <sub>1</sub>  |            | .050 |             | 1.27  | 5, 9  |
| MHD             | .142       | .152 | 3.61        | 3.86  | 7     |
| MHS             | .958       | .962 | 24.33       | 24.43 |       |
| PS              | .190       | .210 | 4.83        | 5.33  | 4     |
| PS <sub>1</sub> | .093       | .107 | 2.36        | 2.72  | 4     |
| S               | .570       | .590 | 14.48       | 14.99 | 4     |

NOTES:

1. Dimensions are in inches.
2. Millimeters are given for general information only.
3. Body contour is optional within zone defined by CD.
4. These dimensions should be measured at points .050 inch (1.27 mm) to .055 inch (1.40 mm) below seating plane. When gauge is not used, measurement will be made at seating plane.
5. Both terminals.
6. At both ends.
7. Two holes.
8. The collector shall be electrically connected to the case.
9. LD applies between L<sub>1</sub> and LL. Lead diameter shall not exceed twice LD within L<sub>1</sub>.
10. Pin 1 is the emitter, pin 2 is the base. The collector shall be electrically connected to the case.
11. In accordance with ASME Y14.5M, diameters are equivalent to Øx symbology.

FIGURE 1. Physical dimensions (TO-66).

### 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 and physical dimensions. The interface and physical dimensions shall be as specified in [MIL-PRF-19500](#) and [figure 1](#) (TO-66) herein.

3.4.1 Lead finish. Lead finish shall be solderable in accordance with [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](#)).

3.4.2 Transistor construction. These devices shall be constructed in a manner and using materials which enable the transistor to meet the applicable requirements of [MIL-PRF-19500](#) and this document.

3.5 Marking. Devices shall be marked as specified in [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](#).

4.2.1 Group E qualification. 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 levels   |
| (1) 3c                                   | Thermal impedance (see 4.3.2)   |
| 9  | $I_{CEX1}$  |
| 11                                       | $h_{FE2}$ , $I_{CEX1}$ ;<br>$\Delta I_{CEX1} = \pm 100$ percent of initial value or $\pm 0.1$ mA dc, whichever is greater   |
| 12                                       | See 4.3.1   |
| 13                                       | Subgroup 2 of table I herein;<br>$\Delta I_{CEX1} = \pm 100$ percent of initial value or $\pm 0.1$ mA dc,.<br>$\Delta h_{FE2} = \pm 20$ percent of initial value. |

(1) Shall be performed anytime after temperature cycling, screen 3a; and does not need to be repeated in screening requirements.

4.3.1 Power burn-in. Power burn-in conditions are as follows:  $P_T = 2.5$  W,  $V_{CB} = 150$  V dc,  $T_A = +25^\circ\text{C}$ , minimum

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.

4.4.1 Group A inspection. Group A inspection shall be conducted in accordance with MIL-PRF-19500, and table I herein.

\* 4.4.2 Group B inspection. Group B inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500, and as follows. Delta measurements shall be in accordance with table II herein.

| <u>Subgroup</u> | <u>Method</u> | <u>Conditions</u> |
|-----------------|---------------|-------------------|
|-----------------|---------------|-------------------|

|   |    |   |
|---|----|---|
| * | B3 | 1037 $\Delta T_J = +100^\circ\text{C}$ , test condition D. The heating cycle shall be 1 minute minimum. |
|---|----|---|

\* 4.4.3 Group C inspection. Group C inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table E-VII of MIL-PRF-19500 and as follows herein. Delta measurements shall be in accordance with [table II](#) herein.

| <u>Subgroup</u> | <u>Method</u> | <u>Conditions</u>  |
|-----------------|---------------|--|
| C2              | 2036          | Test condition A, weight = 10 pounds, time = 15 s.   |
| C5              | 3131          | See <a href="#">4.3.2</a> , $R_{\theta JC} = 5^{\circ}\text{C/W}$ .                                  |
| * C6            | 1037          | $\Delta T_J = +100^{\circ}\text{C}$ , test condition D. The heating cycle shall be 1 minute minimum. |

\* 4.4.4 Group E inspection. Group E inspection shall be conducted in accordance with the conditions specified for subgroup testing in appendix E, table E-IX of MIL-PRF-19500 and as specified herein. Delta measurements shall be in accordance with [table II](#) herein; they apply to subgroups E1 and E2.

4.5 Methods of inspection. Methods of inspection and test 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.

4.5.2 SBI<sub>C</sub> test. Set  $V_{CC} = 100\text{ V}$  dc without pulse applied. Adjust generator to apply a single pulse of 1 second duration obtain  $I_C = 350\text{ mA}$  dc. The 1 second pulse width shall not be exceeded in adjustment and not more than one pulse shall be applied in any 20 second interval. (See [figure 2](#).)

4.5.3 SBI<sub>CEX</sub> test. Set switch (SW) to required position for test. Adjust  $V_3$  so that the current through  $R_3$  is 2.0 A dc. Device fails test if second breakdown occurs as indicated by collapse of oscilloscope display. (See [figure 3](#).)

4.5.4 SBI<sub>CER</sub> test. Set switch (SW) to required position for test. Adjust  $V_3$  so that the current through  $R_3$  is 1.4 A dc. Device fails test if second breakdown occurs as indicated by collapse of oscilloscope display. (See [figure 3](#).)

4.5.5  $V_{(BR)CEO}$  and  $V_{(BR)CER}$  tests. The breakdown voltages  $V_{(BR)CEO}$  and  $V_{(BR)CER}$  shall not be measured on a curve tracer.  $V_{(BR)CEO}$  and  $V_{(BR)CER}$  should be measured by means of the test circuit shown on [figure 3](#). Set switch (SW) to required position for test. Adjust  $V_3$  so that the current through  $R_3$  is 200 mA. Device fails test if collector to emitter voltage is less than breakdown voltage limit at 200 mA.

MIL-PRF-19500/384H

\* TABLE I. Group A inspection.

| Inspection <u>1/</u>                     | MIL-STD-750 |  | Symbol          | Limits     |      | Unit         |
|--|-------------|--|-----------------|------------|------|--------------|
|  | Method      | Conditions   |                 | Min        | Max  |              |
| <u>Subgroup 1</u>                        |             |  |                 |            |      |              |
| Visual and mechanical examination        | 2071        |  |                 |            |      |              |
| <u>Subgroup 2</u>                        |             |  |                 |            |      |              |
| Thermal Impedance <u>2/</u>              | 3131        | See 4.3.2  | $Z_{\theta JX}$ |            |      | °C/W         |
| Breakdown voltage, collector to emitter  | 3011        | Pulsed (see 4.5.1), $I_C = 10$ mA dc; bias condition D, (see figure 3 and 4.5.5) | $V_{(BR)CEO}$   | 250<br>300 |      | V dc<br>V dc |
| * Breakdown voltage, collector to base   | 3001        | Bias condition D, $I_C = 15$ mA dc, pulsed (see 4.5.1), (see figure 3 and 4.5.5) | $V_{(BR)CBO}$   | 375<br>500 |      | V dc<br>V dc |
| Emitter to base cutoff current           | 3061        | Bias condition D, $V_{EB} = 6.0$ V dc  | $I_{EBO}$       |            | 0.5  | mA dc        |
| Collector to emitter cutoff current      | 3041        | Bias condition A, $V_{BE} = -1.5$ V dc   | $I_{CEX1}$      |            | 1.0  | mA dc        |
| 2N3584                                   |             | $V_{CE} = 300$ V dc  |                 |            |      |              |
| 2N3585                                   |             | $V_{CE} = 400$ V dc  |                 |            | 1.0  | mA dc        |
| Collector to emitter cutoff current      | 3041        | Bias condition D, $V_{CE} = 150$ V dc  | $I_{CEO}$       |            | 5.0  | mA dc        |
| Base emitter voltage (saturated)         | 3066        | Test condition A, pulsed (see 4.5.1), $I_C = 1$ A dc, $I_B = 0.1$ A dc           | $V_{BE(sat)}$   |            | 1.4  | V dc         |
| Collector to emitter voltage (saturated) | 3071        | Pulsed (see 4.5.1) $I_C = 1$ A dc, $I_B = 0.125$ A dc                            | $V_{CE(sat)}$   |            | 0.75 | V dc         |
| Forward-current transit ratio            | 3076        | $V_{CE} = 10$ V dc, $I_C = 1$ A dc, pulsed (see 4.5.1)                           | $h_{FE1}$       | 25         | 100  |              |
| Forward-current transit ratio            | 3076        | $V_{CE} = 10$ V dc, $I_C = 100$ mA dc, pulsed (see 4.5.1)                        | $h_{FE2}$       | 40         |      |              |

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 3</u>   |             | $T_A = +150^\circ\text{C}$   |            |        |     |               |
| High temperature operation:   |             |  |            |        |     |               |
| Collector to emitter cutoff current   | 3041        | Bias condition A, $V_{BE} = -1.5\text{ V dc}$  | $I_{CEX2}$ |        |     |               |
| 2N3584  |             | $V_{CE} = 300\text{ V dc}$   |            |        | 2.0 | mA dc         |
| 2N3585  |             | $V_{CE} = 400\text{ V dc}$   |            |        | 2.0 | mA dc         |
| <u>Subgroup 4</u>   |             |  |            |        |     |               |
| Second breakdown, collector current, base forward biased                              | 3051        | $V_{CE} = 100\text{ V dc}$ (see figure 2 and 4.5.2)  | $SBI_C$    | 350    |     | mA dc         |
| Pulse response  | 3251        | Test condition A, except substitute the NPN symbol for the PNP.  |            |        |     |               |
| Turn-on time  |             | $V_{CC} = 30\text{ V dc}$ ,<br>$I_C = 1\text{ A dc}$ , $I_B = 100\text{ mA dc}$ ,<br>$R_C = 29\ \Omega$              | $t_{on}$   |        | 3.0 | $\mu\text{s}$ |
| Turn-off time   |             | $V_{CC} = 30\text{ V dc}$ ,<br>$I_C = 1\text{ A dc}$ , $I_{B1} = -I_{B2} = 100\text{ mA dc}$ ,<br>$R_C = 29\ \Omega$ | $t_{off}$  |        | 7.0 | $\mu\text{s}$ |
| Magnitude of common emitter small-signal short-circuit forward-current transfer ratio | 3306        | $V_{CE} = 10\text{ V dc}$ ,<br>$I_C = 200\text{ mA dc}$ , $f = 5\text{ MHz}$   | $ h_{fe} $ | 3.0    | 15  |               |
| Open circuit (output capacitance)   | 3236        | $V_{CB} = 10\text{ V dc}$ , $I_E = 0$ ,<br>$100\text{ kHz} \leq f \leq 1\text{ MHz}$                                 | $C_{obo}$  |        | 120 | pF            |
| Small-signal short-circuit forward-current transfer ratio                             | 3206        | $V_{CE} = 10\text{ V dc}$ , $I_C = 1\text{ A dc}$ ,<br>$f = 1\text{ kHz}$  | $h_{fe}$   | 25     | 200 |               |

See footnotes at end of table.

\* TABLE I. Group A inspection - Continued.

| Inspection <sup>1/</sup>  | MIL-STD-750 |   | Symbol      | Limits |     | Unit  |
|---|-------------|---|-------------|--------|-----|-------|
|   | Method      | Conditions  |             | Min    | Max |       |
| <u>Subgroup 5</u>   |             |   |             |        |     |       |
| Safe operating area<br>(continuous dc)                                | 3051        | $T_C = +25^\circ\text{C}$ , power application<br>time = 1 second, 1 cycle   |             |        |     |       |
| Test 1  |             | $V_{CE} = 17.5\text{ V dc}$ , $I_C = 2\text{ A dc}$   |             |        |     |       |
| Test 2  |             | $V_{CE} = 100\text{ V dc}$ , $I_C = 350\text{ mA dc}$   |             |        |     |       |
| Test 3<br>2N3584<br>2N3585  |             | $V_{CE} = 250\text{ V dc}$ , $I_C = 37\text{ mA dc}$<br>$V_{CE} = 300\text{ V dc}$ , $I_C = 17\text{ mA dc}$                                  |             |        |     |       |
| Electrical measurements   |             | See <a href="#">table 1</a> , subgroup 2.   |             |        |     |       |
| Second breakdown,<br>collector current,<br>base forward biased        | 3051        | $V_{CE} = 100\text{ V dc}$ (see <a href="#">figure 2</a> and<br><a href="#">4.5.2</a> )   | $SBI_C$     | 350    |     | mA dc |
| Second breakdown,<br>collector current,<br>base reverse biased        |             | $L = 100\ \mu\text{H}$ , $R_{BE} = 20\ \Omega$ ,<br>$V_{BE} = 4\text{ V dc}$ (see <a href="#">figure 3</a> and<br>and <a href="#">4.5.3</a> ) | $SBI_{CEX}$ | 2.0    |     | A dc  |
| Second breakdown<br>collector current, base<br>with resistance return |             | $L = 500\ \mu\text{H}$ , $R_{BE} = 50\ \Omega$<br>(see <a href="#">figure 3</a> and <a href="#">4.5.4</a> )                                   | $SBI_{CER}$ | 1.4    |     | A dc  |

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

<sup>2/</sup> This test required for the following end-point measurements only:  
Group B, subgroups 2 and 3 (JAN, JANTX, and JANTXV).  
Group C, subgroups 2 and 6.  
Group E, subgroup 1.

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

| Step | Inspection  | MIL-STD-750 |   | Symbol            | Limit  |     | Unit |
|------|---|-------------|---|-------------------|--|-----|------|
|      |   | Method      | Conditions  |                   | Min  | Max |      |
| 1.   | Collector to emitter cutoff current<br><br>2N3584<br>2N3585 | 3041        | Bias condition A;<br>$V_{BE} = -1.5$ V dc<br><br>$V_{CE} = 300$ V dc<br>$V_{CE} = 400$ V dc | $\Delta I_{CEX1}$ | $\pm 100$ percent of initial value or $\pm 0.1$ mA dc, whichever is greater. |     |      |
| 2.   | Forward-current transfer ratio                              | 3076        | $V_{CE} = 10$ V dc; $I_C = 1$ A dc; pulsed (see 4.5.1)                                      | $\Delta h_{FE1}$  | $\pm 25$ percent change from initial value.                                  |     |      |

1/ The delta measurements for table E-VIB (JAN, JANTX, and JANTXV) of MIL-PRF-19500 are subgroup 3, see table II herein, all steps.

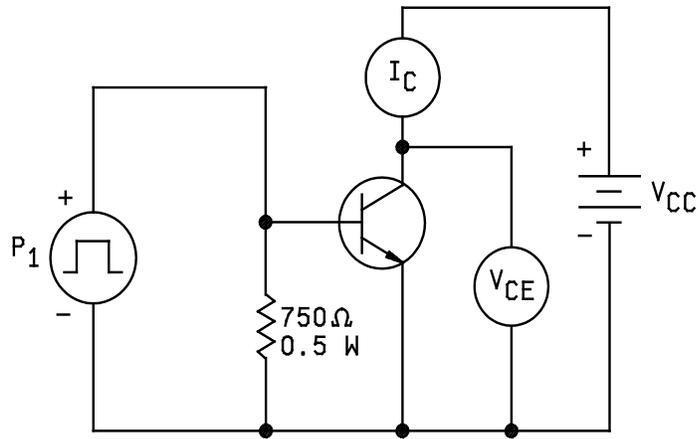
2/ The delta measurements for table E-VII of MIL-PRF-19500 are subgroup 6, see table II herein, all steps.

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

MIL-PRF-19500/384H

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

| Inspection                               | MIL-STD-750 |   | Sample plan         |
|--|-------------|---|---------------------|
|  | Method      | Conditions  |                     |
| <u>Subgroup 1</u>                        |             |   | 45 devices<br>c = 0 |
| Temperature cycling<br>(air to air)      | 1051        | Test condition C, 500 cycles.   |                     |
| Hermetic seal<br>Fine leak<br>Gross leak | 1071        |   |                     |
| * Delta measurements                     |             | See <a href="#">table II</a> herein.  |                     |
| <u>Subgroup 2</u>                        |             |   | 45 devices<br>c = 0 |
| Blocking life                            | 1048        | Test temperature = +125°C; V <sub>CB</sub> = 30 V dc; T = 1,000 hours.  |                     |
| * Delta measurements                     |             | See <a href="#">table II</a> herein.  |                     |
| <u>Subgroup 4</u>                        |             |   | Sample size<br>N/A  |
| Thermal impedance<br>curves              |             | See <a href="#">MIL-PRF-19500</a> .   |                     |
| <u>Subgroup 5</u>                        |             |   | 3 devices<br>c = 0  |
| Barometric pressure                      | 1001        | Normal mounting pressure = 8 mm Hg ±2 mm Hg for 60 seconds (minimum). I <sub>CBO</sub> at 320 V dc and I <sub>C</sub> = 500 μA maximum. |                     |
| <u>Subgroup 8</u>                        |             |   | 45 devices<br>c = 0 |
| Reverse stability                        | 1033        | Condition A for 2N3585, condition B for 2N3584.   |                     |



Adjust  $V_{CC}$  and  $P_1$  for  $V_{CE} = 100\ V$  at  $I_C = 350\ mA$ .

$V_{CC}$ : 110 V, 1 amp capability, current limited, voltage regulated supply,  $\pm 1$  percent line and load.

$P_1$ : Pulse current generator, 0 to +140 mA capability.

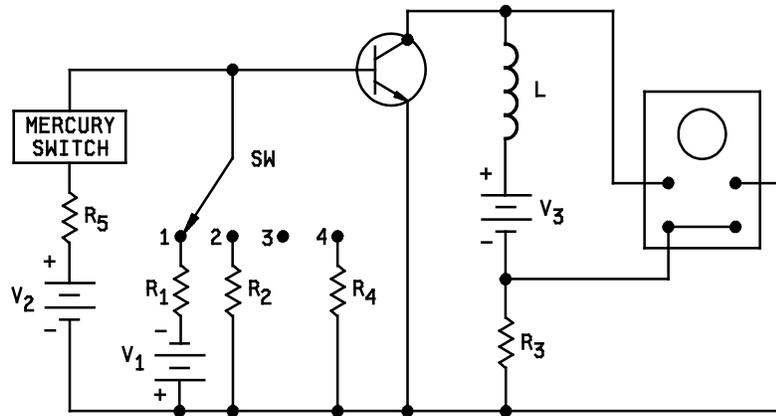
$t_p = 1$  second, Test cycles = 1,  $T_C = +25^\circ C$ .

$I_C$ : Current indicator (meter or sampling resistor and oscilloscope) with voltage drop less than 1 V at 350 mA.

$V_{CE}$ : Voltage indicator with current requirement of  $< 1\ mA$  at 100 V (oscilloscope, VTVM or high impedance multimeter).

Reject criteria: Reject if second breakdown occurs, as indicated by collector current sudden increase and becoming uncontrollable by  $P_1$ .

FIGURE 2. SBI<sub>c</sub> test circuit.



Mercury switch: Clare mercury relay, model number HGP - 1004, or equivalent.  
 Oscilloscope: Hewlett Packard oscilloscope, model number 130B, or equivalent.

| <u>Switch position</u> | <u>Test</u>   | <u>L</u>    | <u>Reject criteria</u>       |
|------------------------|---------------|-------------|------------------------------|
| 1.                     | $SBI_{CEX}$   | 100 $\mu$ H | SB occurs                    |
| 2.                     | $SBI_{CER}$   | 500 $\mu$ H | SB occurs                    |
| 3.                     | $V_{(BR)CEO}$ | 20 mH       | $V_{(BR)CEO} < \text{limit}$ |
| 4.                     | $V_{(BR)CER}$ | 5 mH        | $V_{(BR)CER} < \text{limit}$ |

$R_1 = 20\Omega, 0.5\text{ W}$   
 $R_2 = 50\Omega, 0.5\text{ W}$   
 $R_3 = 1\Omega, 0.5\text{ W}$   
 $R_4 = 200\Omega, 0.5\text{ W}$   
 $R_5 = 27\Omega, 10\text{ W}$

$V_1 = -4\text{ V}$   
 $V_2 = 15\text{ V}$   
 $V_3 = 0\text{ to }50\text{ V}, 3\text{ A}$

FIGURE 3.  $SBI_{CEX}$ ,  $SBI_{CER}$ ,  $V_{(BR)CEO}$ ,  $V_{(BR)CER}$  test circuit.

## 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 Part or Identifying Number (PIN), see title and section 1.

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 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 5961-2014-062)

Review activities

Army - AR, AV, MI, SM  
Navy - AS, MC, OS, SH  
Air Force - 19, 99

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/>.