

MIL-S-19500/126C
 24 March 1971
 SUPERSEDING
 MIL-S-19500/126B
 20 March 1964

MILITARY SPECIFICATION

SEMICONDUCTOR DEVICE, TRANSISTOR, GERMANIUM, HIGH-FREQUENCY
 NPN TYPES 2N1302, 2N1304, 2N1306, 2N1308 AND
 PNP TYPES 2N1303, 2N1305, 2N1307, 2N1309

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

1. SCOPE

1.1 Scope. This specification covers the detail requirements for NPN and PNP, complementary germanium, high-frequency transistors.

1.2 Physical dimensions. See figure 1 (TO-5).

1.3 Maximum ratings.

| P_T 1/ mw | V_{CB} | | V_{EB} | | I_C | | T_{stg} °C |
|----------------|------------|------------|------------|------------|-------------|-------------|-----------------|
| | NPN Vdc | PNP Vdc | NPN Vdc | PNP Vdc | NPN mAdc | PNP mAdc | |
| 150 | 25 | -30 | 25 | -25 | 300 | -300 | -65 to +100 |

1/ Derate linearly 2.5 mW/°C for T_A between 25° C and 85° C.

1.4 Primary electrical characteristics.

| h_{FE} $V_{CE} = 1 \text{ Vdc}, I_C = 10 \text{ mAdc}$ 1/ $V_{CE} = -1 \text{ Vdc}, I_C = -10 \text{ mAdc}$ 2/ | | | | | f_{hfb} $V_{CB} = 5 \text{ Vdc}, I_E = -1 \text{ mAdc}$ 1/ $V_{CB} = -5 \text{ Vdc}, I_E = 1 \text{ mAdc}$ 2/ | | | |
|--|------------------|------------------|------------------|------------------|---|------------------|------------------|------------------|
| | 2N1302 2N1303 | 2N1304 2N1305 | 2N1306 2N1307 | 2N1308 2N1309 | 2N1302 2N1303 | 2N1304 2N1305 | 2N1306 2N1307 | 2N1308 2N1309 |
| | --- | --- | --- | --- | MHz | MHz | MHz | MHz |
| Minimum | 20 | 40 | 60 | 80 | 3 | 5 | 10 | 15 |
| Maximum | --- | 200 | 300 | 400 | --- | --- | --- | --- |

1/ Test conditions for types 2N1302, 2N1304, 2N1306 and 2N1308.

2/ Test conditions for types 2N1303, 2N1305, 2N1307 and 2N1309.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of the specification to the extent specified herein.

SPECIFICATION

MIL-S-19500 - Semiconductor Devices, General Specification for.

STANDARDS

MILITARY

MIL-STD-202 - Test Methods for Electronic and Electrical Component Parts.
MIL-STD-750 - Test Methods for Semiconductor Devices.

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

3. REQUIREMENTS

3.1 General. Requirements shall be in accordance with MIL-S-19500, and as specified herein.

3.2 Abbreviations, symbols, and definitions. The abbreviations, symbols, and definitions used herein are defined in MIL-S-19500, and as follows:

Qsb - - - - - Stored base charge
pC - - - - - Pico-coulombs

3.3 Design, construction, and physical dimensions. Transistors shall be of the design, construction, and physical dimensions shown on figure 1.

3.3.1 Lead material and finish. Lead material shall be Kovar or alloy 52. Lead finish shall be gold-plated. (Leads may be tin-coated if specified in the contract or order, and this requirement shall not be construed as adversely affecting the qualified-product status of the device, or applicable JAN marking, see 6.2.)

3.4 Performance characteristics. Performance characteristics shall be as specified in tables I, II, and III.

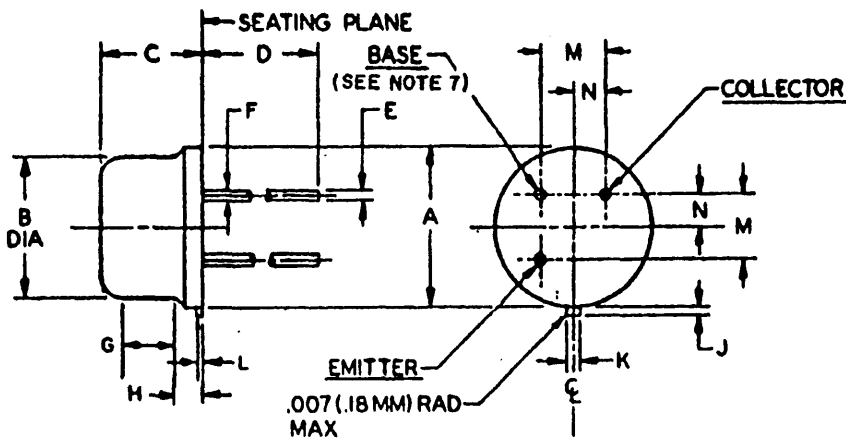
3.5 Marking. The following marking specified in MIL-S-19500 may be omitted from the body of the transistor at the option of the manufacturer:

- (a) Country of origin.
- (b) Manufacturer's identification.

4. QUALITY ASSURANCE PROVISIONS

4.1 Sampling and inspection. Sampling and inspection shall be in accordance with MIL-S-19500, and as specified herein.

4.2 Qualification inspection. Qualification inspection shall consist of the examinations and tests specified in tables I, II, and III.

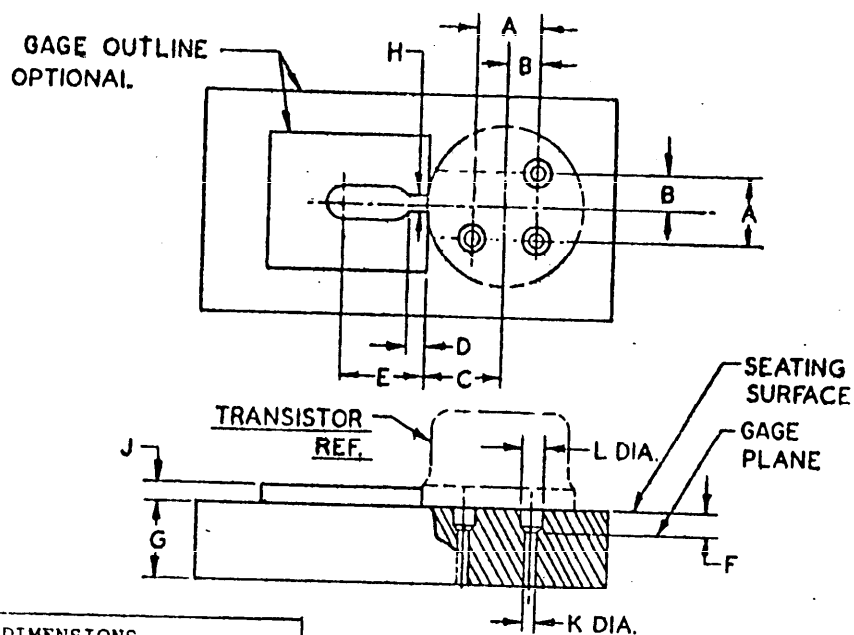


| DIMENSIONS | | | | | N O T A S |
|------------|-----------|-------|-------------|-------|-----------------------|
| LTR | INCHES | | MILLIMETERS | | |
| | MIN | MAX | MIN | MAX | |
| A | .335 | .370 | 8.51 | 9.40 | |
| B | .305 | .335 | 7.75 | 8.51 | |
| C | .240 | .260 | 6.10 | 6.60 | |
| D | 1.500 | 1.750 | 38.10 | 44.45 | 9 |
| E | .016 | .021 | .41 | .53 | 2,9 |
| F | .016 | .019 | .41 | .48 | 3,9 |
| G | .100 | --- | 2.54 | --- | 4 |
| H | --- | --- | --- | --- | 5 |
| J | .029 | .045 | .74 | 1.14 | 8 |
| K | .028 | .034 | .71 | .86 | |
| L | .009 | .041 | .23 | 1.04 | |
| M | .1414 Nom | | 3.59 Nom | | 6 |
| N | .0707 Nom | | 1.80 Nom | | 6 |

NOTES:

1. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.
2. Measured in the zone beyond .250 (6.35 mm) from the seating plane.
3. Measured in the zone .050 (1.27 mm) and .250 (6.35 mm) from the seating plane.
4. Variations on dimension B in this zone shall not exceed .010 (.25 mm).
5. Outline in this zone is not controlled.
6. When measured in a gaging plane .054+.001, -.000 (1.37+.03, -.00 mm) below the seating plane of the transistor, maximum diameter leads shall be within .007 (.18 mm) of their true location relative to a maximum width tab. Smaller diameter leads shall fall within the outline of the maximum diameter lead tolerance. Figure 2 shows the preferred measured method.
7. The base shall be electrically connected to the case.
8. Measured from the maximum diameter of the actual device.
9. All 3 leads.

FIGURE 1. Physical dimensions of transistor types 2N1302 through 2N1309 (TO-5).

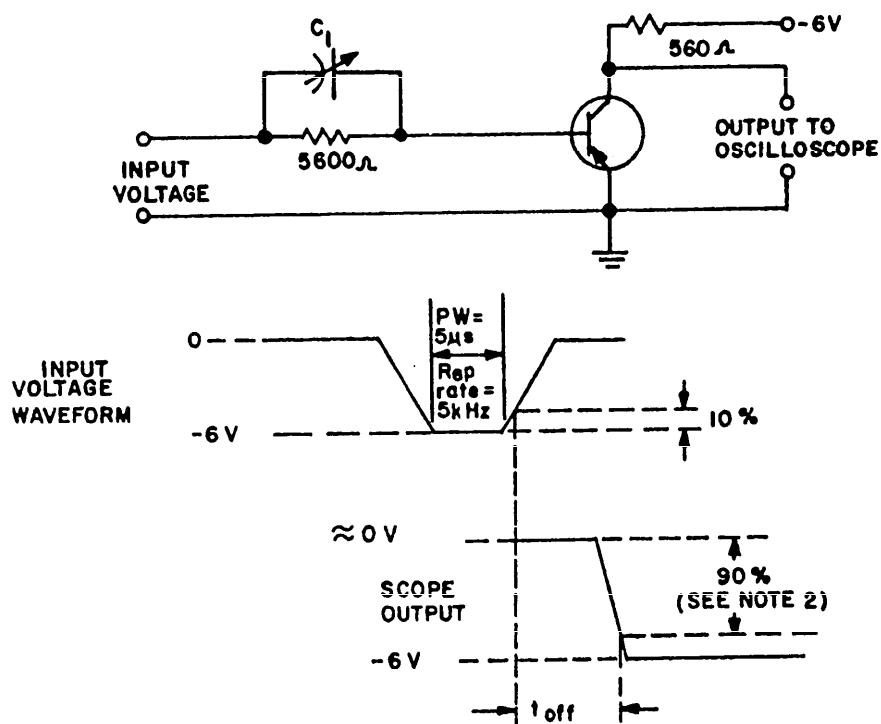


| LTR | DIMENSIONS | | | |
|-----|------------|-------|-------------|------|
| | INCHES | | MILLIMETERS | |
| | MIN | MAX | MIN | MAX |
| A | .1409 | .1419 | 3.58 | 3.60 |
| B | .0702 | .0712 | 1.78 | 1.81 |
| C | .182 | .199 | 4.62 | 5.05 |
| D | .009 | .011 | .23 | .28 |
| E | .125 Nom | | 3.18 Nom | |
| F | .054 | .055 | 1.37 | 1.40 |
| G | .372 | .378 | 9.45 | 9.60 |
| H | .0350 | .0355 | .89 | .90 |
| J | .150 Nom | | 3.81 Nom | |
| K | .0325 | .0335 | .83 | .85 |
| L | .0595 | .0605 | 1.51 | 1.54 |

NOTES:

1. The following gaging procedure shall be used: The use of a pin straightener prior to insertion in the gage is permissible. The device being measured shall be inserted until its seating plane is $.125 \pm .010$ (3.18 \pm .25 mm) from the seating surface of the gage. A spacer may be used to obtain the .125 (3.18 mm) distance from the gage seat prior to force application. A force of 8 oz \pm .05 oz shall then be applied parallel and symmetrical to the device's cylindrical axis. When examined visually after the force application (the force need not be removed) the seating plane of the device shall be seated against the gage.
2. The location of the tab locator, within the limits of dim C, will be determined by the tab and flange dimension of the device being checked.
3. Metric equivalents (to the nearest .01 mm) are given for general information only and are based upon 1 inch = 25.4 mm.

FIGURE 2. Gage for lead and tab location for transistor types 2N1302 through 2N1309.



NOTES:

1. The capacitance of C_1 shall be increased until the t_{off} time of the output waveform is decreased to .2 usec. Q_{sb} in pC is then calculated by $Q_{sb} = C_1 \times E_{in}$ where C_1 is in pF and E_{in} is 6 volts.
2. Any unit that turns on above the 90-percent point, once it starts to turn off, fails the test.

FIGURE 3. Circuit for determining value of stored base charge.
(Polarities shown apply to PNP)

TABLE I. Group A inspection.

| TABLE 1. Group A inspection. | | | | | | | |
|--------------------------------------|-------------|--|------|------------|--------|-----|------------------|
| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
| | Method | Details | | | Min | Max | |
| <u>Subgroup 1</u> | | | | | | | |
| Visual and mechanical examination | 2071 | | 10 | --- | --- | --- | --- |
| <u>Subgroup 2</u> | | | | | | | |
| Breakdown voltage, collector to base | 3001 | | 5 | | | | |
| All NPN devices | | Bias cond. D; $I_C = 100 \mu\text{A dc}$ | | BV_{CBO} | 25 | --- | Vdc |
| All PNP devices | | Bias cond. D; $I_C = -100 \mu\text{A dc}$ | | BV_{CBO} | -30 | --- | Vdc |
| Breakdown voltage, emitter to base | 3026 | | | | | | |
| All NPN devices | | Bias cond. D; $I_E = 100 \mu\text{A dc}$ | | BV_{EBO} | 25 | --- | Vdc |
| All PNP devices | | Bias cond. D; $I_E = -100 \mu\text{A dc}$ | | BV_{EBO} | -25 | --- | Vdc |
| Collector to bas. cutoff current | 3036 | | | | | | |
| All NPN devices | | Bias cond. D; $V_{CB} = 25 \text{ Vdc}$ | | I_{CBO} | --- | 6 | $\mu\text{A dc}$ |
| All PNP devices | | Bias cond. D; $V_{CB} = -25 \text{ Vdc}$ | | I_{CBO} | --- | -6 | $\mu\text{A dc}$ |
| Emitter to base cutoff current | 3061 | | | | | | |
| All NPN devices | | Bias cond. D; $V_{EB} = 25 \text{ Vdc}$ | | I_{EBO} | --- | 6 | $\mu\text{A dc}$ |
| All PNP devices | | Bias cond. D; $V_{EB} = -25 \text{ Vdc}$ | | I_{EBO} | --- | -6 | $\mu\text{A dc}$ |
| Floating potential | 3020 | $R_{BE} = 1 \text{ megohm} \pm 5\%$ including voltmeter input resistance | | | | | |
| NPN devices - 2N1302 | | $V_{CB} = 25 \text{ Vdc}$ | | V_{EBF} | --- | 1 | Vdc |
| 2N1304 | | $V_{CB} = 20 \text{ Vdc}$ | | | --- | 1 | Vdc |
| 2N1306 | | $V_{CB} = 15 \text{ Vdc}$ | | | --- | 1 | Vdc |
| 2N1308 | | $V_{CB} = 15 \text{ Vdc}$ | | | --- | 1 | Vdc |
| PNP devices - 2N1303 | | $V_{CB} = -25 \text{ Vdc}$ | | V_{EBF} | --- | -1 | Vdc |
| 2N1305 | | $V_{CB} = -20 \text{ Vdc}$ | | | --- | -1 | Vdc |
| 2N1307 | | $V_{CB} = -15 \text{ Vdc}$ | | | --- | -1 | Vdc |
| 2N1309 | | $V_{CB} = -15 \text{ Vdc}$ | | | --- | -1 | Vdc |

TABLE I. Group A Inspection. -Continued J

| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
|--|-------------|--|------|----------------------|--------|------|------|
| | Method | Details | | | Min | Max | |
| <u>Subgroup 3</u> | | | 5 | | | | |
| Forward-current transfer ratio | 3076 | | | | | | |
| NPN devices - 2N1302 | | $V_{CE} = 1 \text{ Vdc};$ $I_C = 10 \text{ mAdc}$ | | h_{FE} | 20 | --- | --- |
| 2N1304 | | | | | 40 | 200 | --- |
| 2N1306 | | | | | 60 | 300 | --- |
| 2N1308 | | | | | 80 | 400 | --- |
| PNP devices - 2N1303 | | $V_{CE} = -1 \text{ Vdc};$ $I_C = -10 \text{ mAdc}$ | | h_{FE} | 20 | --- | --- |
| 2N1305 | | | | | 40 | 200 | --- |
| 2N1307 | | | | | 60 | 300 | --- |
| 2N1309 | | | | | 80 | 400 | --- |
| NPN devices - 2N1302 | | $V_{CE} = 0.35 \text{ Vdc};$ $I_C = 200 \text{ mAdc}$ | | h_{FE} | 10 | --- | --- |
| 2N1304 | | | | | 15 | --- | --- |
| 2N1306 | | | | | 20 | --- | --- |
| 2N1308 | | | | | 20 | --- | --- |
| PNP devices - 2N1303 | | $V_{CE} = -0.35 \text{ Vdc};$ $I_C = -200 \text{ mAdc}$ | | h_{FE} | 10 | --- | --- |
| 2N1305 | | | | | 15 | --- | --- |
| 2N1307 | | | | | 20 | --- | --- |
| 2N1309 | | | | | 20 | --- | --- |
| Collector to emitter voltage (saturated) | 3071 | | | | | | |
| NPN devices - 2N1302 | | $I_B = 0.5 \text{ mAdc};$ $I_C = 10 \text{ mAdc}$ | | $V_{CE}(\text{sat})$ | --- | 0.20 | Vdc |
| 2N1304 | | $I_B = 0.25 \text{ mAdc};$ $I_C = 10 \text{ mAdc}$ | | | --- | 0.20 | Vdc |
| 2N1306 | | $I_B = 0.17 \text{ mAdc};$ $I_C = 10 \text{ mAdc}$ | | | --- | 0.20 | Vdc |
| 2N1308 | | $I_B = 0.13 \text{ mAdc};$ $I_C = 10 \text{ mAdc}$ | | | --- | 0.20 | Vdc |

TABLE I. Group A inspection. -Continued

| TABLE I. Group A inspection. -Continued | | | | | | | |
|---|-------------|---|------|-------------------|--------|-------|------|
| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
| | Method | Details | | | Min | Max | |
| <u>Subgroup 3 -Continued</u> | | | | | | | |
| PNP devices - 2N1303 | 3066 | $I_B = -0.5 \text{ mAdc};$ $I_C = -10 \text{ mAdc}$ | | V_{CE} (sat) | --- | -0.20 | Vdc |
| 2N1305 | | $I_B = -0.25 \text{ mAdc};$ $I_C = -10 \text{ mAdc}$ | | --- | -0.20 | Vdc | |
| 2N1307 | | $I_B = -0.17 \text{ mAdc};$ $I_C = -10 \text{ mAdc}$ | | --- | -0.20 | Vdc | |
| 2N1309 | | $I_B = -0.13 \text{ mAdc};$ $I_C = -10 \text{ mAdc}$ | | --- | -0.20 | Vdc | |
| Base emitter voltage (saturated) | | Test cond. A | | | | | |
| NPN devices - 2N1302 | | $I_B = 0.5 \text{ mAdc};$ $I_C = 10 \text{ mAdc}$ | | V_{BE} (sat) | 0.15 | 0.40 | Vdc |
| 2N1304 | | | | | 0.15 | 0.35 | Vdc |
| 2N1306 | | | | | 0.15 | 0.35 | Vdc |
| 2N1308 | | | | | 0.15 | 0.35 | Vdc |
| PNP devices - 2N1303 | | $I_B = -0.5 \text{ mAdc};$ $I_C = -10 \text{ mAdc}$ | | V_{BE} (sat) | -0.15 | -0.40 | Vdc |
| 2N1305 | 3236 | | 5 | | -0.15 | -0.35 | Vdc |
| 2N1307 | | | | | -0.15 | -0.35 | Vdc |
| 2N1309 | | | | | -0.15 | -0.35 | Vdc |
| <u>Subgroup 4</u> | | | | | | | |
| Open circuit output capacitance | | | | | | | |
| All NPN devices | | $V_{CB} = 5 \text{ Vdc}; I_E = 0$ $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$ | | C_{obo} | --- | 20 | pF |
| All PNP devices | | $V_{CB} = -5 \text{ Vdc}; I_E = 0$ $100 \text{ kHz} \leq f \leq 1 \text{ MHz}$ | | C_{obo} | --- | 20 | pF |
| Small-signal short-circuit forward-current transfer- ratio cutoff frequency | 3301 | | | | | | |
| NPN devices - 2N1302 | | $V_{CB} = 5 \text{ Vdc}; I_E = -1 \text{ mAdc}$ | | f_{hfb} | 3 | --- | MHz |
| 2N1304 | | | | 5 | --- | MHz | |
| 2N1306 | | | | 10 | --- | MHz | |
| 2N1308 | | | | 15 | --- | MHz | |

TABLE I. Group A inspection, -Continued

| Examination or test | MIL-STD-750 | | | Symbol | Limits | | Unit | | | | |
|-------------------------------------|-------------|--|----------|-----------|--------|------|------|--|----|-----|-----|
| | Method | Details | | | Min | Max | | | | | |
| <u>Subgroup 4 -Continued</u> | | | | | | | | | | | |
| PNP devices - 2N1303 | | $V_{CB} = -5 \text{ Vdc}; I_E = 1 \text{ mAdc}$ | | f_{hfb} | 3 | --- | MHz | | | | |
| 2N1305 | | | | | 5 | --- | MHz | | | | |
| 2N1307 | | | | | 10 | --- | MHz | | | | |
| 2N1309 | | | | | 15 | --- | MHz | | | | |
| Stored base charge | --- | (See figure 3) | 10 | Q_{sb} | --- | 1400 | pC | | | | |
| NPN devices - 2N1302 | | | | | --- | 1200 | pC | | | | |
| 2N1304 | | | | | --- | 1000 | pC | | | | |
| 2N1306 | | | | | --- | 1000 | pC | | | | |
| 2N1308 | | | | --- | 1200 | pC | | | | | |
| PNP devices - 2N1303 | | | | Q_{sb} | --- | 1600 | pC | | | | |
| 2N1305 | | | | | --- | 1400 | pC | | | | |
| 2N1307 | | | | | --- | 1200 | pC | | | | |
| 2N1309 | | | | | --- | 1200 | pC | | | | |
| <u>Subgroup 5</u> | | | | | | | | | | | |
| High-temperature operation: | 3041 | $T_A = +55^\circ \text{C}$ | | 10 | | | | | | | |
| Collector to emitter cutoff current | | Bias cond. A | | | | | | | | | |
| NPN devices | | $V_{CE} = 15 \text{ Vdc}$ $V_{BE} = -0.2 \text{ Vdc}$ | | | | | | | | | |
| PNP devices | | $V_{CE} = -15 \text{ Vdc}$ $V_{BE} = 0.2 \text{ Vdc}$ | | | | | | | | | |
| Low-temperature operation: | 3076 | $T_A = -65^\circ \text{C}$ | | 10 | | | | | | | |
| Forward-current transfer ratio | | | | | | | | | | | |
| NPN devices 2N1302 | | $V_{CE} = 1 \text{ Vdc}$ $I_C = 10 \text{ mAdc}$ | h_{FE} | | | | | | 10 | --- | --- |
| 2N1304 | | | | | | | | | 20 | 200 | --- |
| 2N1306 | | | | | | | | | 30 | 300 | --- |
| 2N1308 | | | | | | | | | 40 | --- | --- |
| PNP devices 2N1303 | | $V_{CE} = -1 \text{ Vdc}$ $I_C = -10 \text{ mAdc}$ | h_{FE} | | | | | | 10 | --- | --- |
| 2N1305 | | | | | | | | | 20 | 200 | --- |
| 2N1307 | | | | | | | | | 30 | 300 | --- |
| 2N1309 | | | | | | | | | 40 | --- | --- |

TABLE II. Group B inspection.

| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
|--|-------------|--|------|-----------|--------|-----|-----------------|
| | Method | Details | | | Min | Max | |
| <u>Subgroup 1</u> | | | 20 | | | | |
| Physical dimensions | 2066 | (See figure 1) | | --- | --- | --- | --- |
| <u>Subgroup 2</u> | | | 15 | | | | |
| Solderability | 2026 | | | --- | --- | --- | --- |
| Thermal shock (temperature cycling) | 1051 | Test cond. C, except in step 3, $T_A = +85 \pm 5^\circ \text{C}$ | | --- | --- | --- | --- |
| Thermal shock (glass strain) | 1056 | Test cond. A | | --- | --- | --- | --- |
| Moisture resistance | 1021 | | | --- | --- | --- | --- |
| End points: | | | | | | | |
| Collector to base cutoff current | 3036 | Bias cond. D | | | | | |
| All NPN devices | | $V_{CB} = 25 \text{ Vdc}; I_E = 0$ | | I_{CBO} | --- | 6 | μAdc |
| All PNP devices | | $V_{CB} = -25 \text{ Vdc}; I_E = 0$ | | I_{CBO} | --- | -6 | μAdc |
| Forward-current transfer ratio | 3076 | | | | | | |
| NPN devices - 2N1302 | | $V_{CE} = 1 \text{ Vdc}$ $I_C = 10 \text{ mAdc}$ | | h_{FE} | 20 | --- | --- |
| 2N1304 | | | | | 40 | 200 | --- |
| 2N1306 | | | | | 60 | 300 | --- |
| 2N1308 | | | | | 80 | 400 | --- |
| PNP devices - 2N1303 | | $V_{CE} = -1 \text{ Vdc}$ $I_C = -10 \text{ mAdc}$ | | h_{FE} | 20 | --- | --- |
| 2N1305 | | | | | 40 | 200 | --- |
| 2N1307 | | | | | 60 | 300 | --- |
| 2N1309 | | | | | 80 | 400 | --- |
| <u>Subgroup 3</u> | | | 15 | | | | |
| Shock | 2016 | Nonoperating; 1,500 G; 0.5 ms; 5 blows in each orientation: X_1 , Y_1 , Y_2 and Z_1 | | --- | --- | --- | --- |
| Vibration, variable frequency | 2056 | | | --- | --- | --- | --- |
| Constant acceleration | 2006 | 10,000 G in each orienta- tion: X_1 , Y_1 , Y_2 , and Z_1 | | --- | --- | --- | --- |
| End points: (Same as subgroup 2) | | | | | | | |
| <u>Subgroup 4</u> | | | 20 | | | | |
| Terminal strength (lead fatigue) | 2036 | Test cond. E | | --- | --- | --- | --- |

TABLE II. Group B inspection. -Continued

| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
|--------------------------------------|-------------|--|------|-----------|--------|--------------------|------------------|
| | Method | Details | | | Min | Max | |
| <u>Subgroup 4 -Continued</u> | | | | | | | |
| End points: | | | | | | | |
| Hermetic seal | 1071 | Test cond. G or H for fine leaks; test cond. A, C, D, or F for gross leaks | | --- | --- | 1×10^{-7} | atm cc/s |
| <u>Subgroup 5</u> | | | | | | | |
| Salt atmosphere (corrosion) | 1041 | | 20 | --- | --- | --- | --- |
| <u>Subgroup 6</u> | | | | | | | |
| High-temperature life (nonoperating) | 1032 | $T_{stg} = +100^{\circ} \text{C}$ time = 340 hours (see 4.3.4) | 7 | --- | --- | --- | --- |
| End points: | | | | | | | |
| Collector to base cutoff current | 3036 | Bias cond. D | | | | | |
| All NPN devices | | $V_{CB} = 25 \text{ Vdc}; I_E = 0$ | | I_{CBO} | --- | 12 | μAdc |
| All PNP devices | | $V_{CB} = -25 \text{ Vdc}; I_E = 0$ | | I_{CBO} | --- | -12 | μAdc |
| Forward-current transfer ratio | 3076 | | | | | | |
| NPN devices - 2N1302 | | $V_{CE} = 1 \text{ Vdc}$ $I_C = 10 \text{ mAdc}$ | | h_{FE} | 16 | --- | --- |
| 2N1304 | | | | | 32 | --- | --- |
| 2N1306 | | | | | 48 | --- | --- |
| 2N1308 | | | | | 64 | --- | --- |
| PNP devices 2N1303 | | $V_{CE} = -1 \text{ Vdc}$ $I_C = -10 \text{ mAdc}$ | | h_{FE} | 16 | --- | --- |
| 2N1305 | | | | | 32 | --- | --- |
| 2N1307 | | | | | 48 | --- | --- |
| 2N1309 | | | | | 64 | --- | --- |
| <u>Subgroup 7</u> | | | | | | | |
| Steady-state operation life | 1027 | $P_T = 150 \text{ mW}$ time = 340 hours (see 4.3.4) | 7 | | | | |
| All NPN devices | | $V_{CB} = 10 \text{ Vdc}$ | | --- | --- | --- | --- |
| All PNP devices | | $V_{CB} = -10 \text{ Vdc}$ | | --- | --- | --- | --- |
| End points: (Same as subgroup 6) | | | | | | | |

TABLE III. Group C inspection.

| Examination or test | MIL-STD-750 | | LTPD | Symbol | Limits | | Unit |
|---|-------------|---|----------------|--------|--------|-----|------|
| | Method | Details | | | Min | Max | |
| <u>Subgroup 1</u> | | | 10 | | | | |
| Resistance to solvents | --- | MIL-STD-202, Method 215 (see 4.4.1) | | --- | --- | --- | --- |
| <u>Subgroup 2</u> | | | $\lambda = 10$ | | | | |
| High-temperature life (nonoperating) | 1031 | $T_{sig} = +100^{\circ} \text{C}$ (see 4.3.4) | | --- | --- | --- | --- |
| End points: (Same as subgroup 6 of Group B) | | | | | | | |
| <u>Subgroup 3</u> | | | $\lambda = 10$ | | | | |
| Steady-state operation life | 1026 | $P_T = 150 \text{ mW}$ (see 4.3.4) | | | | | |
| All NPN devices | | $V_{CB} = 10 \text{ Vdc}$ | | --- | --- | --- | --- |
| All PNP devices | | $V_{CB} = -10 \text{ Vdc}$ | | --- | --- | --- | --- |
| End points: (Same as subgroup 6 of Group B) | | | | | | | |

4.3 Quality conformance inspection. Quality conformance inspection shall consist of group A, B, and C inspections. A lot shall consist of transistors of only one family (NPN or PNP). For subgroups 1 through 5 of group B tests and subgroup 1 of group C, where a lot consists of more than one type, only one type need be tested as a representative of the lot for all types in the lot. For subgroups 6 and 7 of group B tests and subgroups 2 and 3 of group C tests, the samples for each subgroup shall consist of all types within the lot to be tested and the number of devices of each type shall be proportional to the distribution of the types within the lot.

4.3.1 Group A inspection. Group A inspection shall consist of the examinations and tests specified in table I.

4.3.2 Group B inspection. Group B inspection shall consist of the examinations and tests specified in table II.

4.3.3 Group C inspection. Group C inspection shall consist of the tests specified in table III. This inspection shall be conducted on the initial lot and thereafter every six months during production.

4.3.4 Group B and group C life-test samples. Samples that have been subjected to group B, 340-hours life-test, may be continued on test to 1,000 hours in order to satisfy group C life-test requirements. These samples shall be predesignated, and shall remain subjected to the group C 1,000-hour acceptance evaluation after they have passed the group B, 340-hour acceptance criteria. The cumulative total of failures found during 340-hour test and during the subsequent interval up to 1,000 hours shall be computed for 1,000-hour acceptance criteria, see 4.3.3.

4.4 Methods of examination and test. Methods of examination and test shall be as specified in tables I, II, and III, and as follows:

4.4.1 Resistance to solvents. Transistors shall be subjected to tests in accordance with method 215 of MIL-STD-202. The following details shall apply:

- All areas of the transistor body where marking has been applied shall be brushed.
- After subjection to the tests there shall be no evidence of mechanical damage to the device and markings shall have remained legible.

5. PREPARATION FOR DELIVERY

5.1 See MIL-S-19500, section 5.

6. NOTES

6.1 Notes. The notes specified in MIL-S-19500 are applicable to this specification.

6.2 Ordering data.

(a) Lead finish if other than gold-plated (see 3.3.1).

Custodians:

Army - EL
Navy - EC
Air Force - 17

Review activities:

Army - MU, MI

Air Force - 11, 70, 80
DSA - ES

User activities:

Army - SM
Navy - AS, CG, MC, OS, SH
Air Force - 13, 15, 19

Preparing activity:

Navy - EC

Agent:

DSA - ES

(Project 5961-0214)

SPECIFICATION ANALYSIS SHEETForm Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: This sheet is to be filled out by personnel, either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES ☐ NO (If "yes", in what way?)

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity - Optional)

DATE

DD FORM 1426
1 JAN 66

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.

S/N-0102-014-1801 C-25254