

MILITARY SPECIFICATION

CV 7455 - 58

SEMICONDUCTOR DEVICE, TRANSISTOR
 2N1483, 2N1484, 2N1485, 2N1486

Description: This specification covers the detail requirements for Silicon NPN medium power transistors and is in accordance with K1007 Issue 3 except where otherwise stated.

Mechanical Dimensions and Outlines: K1007 Section B 10.3.2.5 and 10.4.2.5.
 Retaining Clamp. Fig.5 Page 14.

Connections: Collector connected to Case.
 Pin 1. Emitter, Pin 2. Base, Pin 3. Collector.

Absolute Maximum Ratings

| Device | Rating | V _{CBO} | V _{EBO} | V _{CEO} | V _{CEX} | I _C | I _B | T _{stg} | θ _{j-c} | T _{opr} | P _c |
|----------|--------|------------------|------------------|------------------|------------------|----------------|----------------|------------------|------------------|------------------|----------------|
| | Unit | V | V | V | V | A | A | °C | °C/W | °C | W |
| CV7455 | Min | - | - | - | - | - | - | -55 | - | - | - |
| & CV7457 | Max | 60 | 12 | 40 | 60 | 3.0 | 1.5 | +200 | 7 | +200 | 25 |
| CV7456 | Min | - | - | - | - | - | - | -55 | - | - | - |
| & CV7458 | Max | 100 | 12 | 55 | 100 | 3.0 | 1.5 | +200 | | +200 | 25 |

| Device | Rating | Shock | Vibration |
|--------|--------|-------|-----------|
| | Unit | g | g |
| All | Max | 1500 | 20 |
| | Notes | A | |

Note A: Duration 0.5 mSec.
 B: Commercial equivalents ZT1483-1486
 CV numbers run consecutively.

15th October, 1963

(152613)

CV7455-58

Primary Electrical Characteristics:

| Characteristic | | I_{CBO} | I_{EBO} | V_{CE} (sat) | V_{BE} | h_{FE} | I_{CBO} | f_{hfb} |
|-----------------------|---------------|-----------|-----------|-------------------|----------|----------|-----------|-----------|
| Unit | | μA | μA | V | V | | mA | kc/s |
| CV7455 & CV7456 | Min | - | - | - | - | 20 | - | 600 |
| | Max | 15 | 15 | 2.0 | 3.0 | 60 | | - |
| CV7457 & CV7458 | Min | - | - | - | - | 35 | - | 600 |
| | Max | 15 | 15 | 0.75 | 2.0 | 100 | | - |
| CONDITIONS | T_{case} °C | 25 | 25 | 25 | 25 | 25 | 175 | 25 |
| | V_{CB} V | 30 | - | - | - | - | 30 | 28 |
| | V_{CE} V | - | - | - | 4.0 | 4.0 | - | - |
| | V_{EB} V | - | 12 | - | - | - | - | - |
| | I_C mA | - | 0 | 750 | 750 | 750 | - | 5 |
| | I_E mA | 0 | - | - | - | - | 0 | - |
| | I_B mA | - | - | Note 1 | - | - | - | - |

Note 1 CV7455 & 7456 $I_B = 75mA$, CV7457 & 7458 $I_B = 40mA$

Reliability Assurance Requirements:-

Under discussion

Requirements:-

Marking: The device shall be marked as K1007 Section B 1.3.4., as space permits, any other marking shall be on the pack.

Quality Assurance Provisions

Destructive Tests The tests listed in Table 2, Group B Inspection, Sub Groups 2 and 3 and Group C Sub Group 2 are considered destructive.

Group C Inspection This Inspection shall be conducted on the initial lot, and thereafter every ninety days or every fifth lot, whichever occurs first.

Preparation for Delivery:-

Packaging: The device shall be packed according to K1007, Section A. 1.2(c). Insulating washers and retaining clamp will be packed with each device.

Joint Service Catalogue Numbers:-

| | | |
|--------|---|------------------|
| CV7455 | = | 5960-99-037-3578 |
| CV7456 | = | 5960-99-037-3579 |
| CV7457 | = | 5960-99-037-3580 |
| CV7458 | = | 5960-99-037-3581 |

This specification has been prepared by, and the Qualification Approval Authority is:-

Ministry of Aviation, Royal Radar Establishment, Malvern, Worcs. England.

15th October, 1963

TABLE 1 GROUP A INSPECTION

| Examination or Test | K1007/NATO Ref. | TEST CONDITIONS | | AQL % | Insp. Level | Sym-bol | LIMITS | | Units |
|---|-----------------|-----------------------------------|--------------------------------------|-------|-------------|----------------------|-----------|------|---------|
| | | Specific Conditions | | | | | Min. | Max. | |
| <u>SUB GROUP 1</u> Visual and Mechanical Inspection | 5.1 | Excluding Physical Dimensions | | 0.65 | I | | | | |
| <u>SUB GROUP 2</u> Collector-Base cut-off Current (1) | 7.2.5.1 | $V_{CB} = 30V$ $I_E = 0$ | | 0.65 | II | I_{CBO} | - | 15 | μA |
| Collector-Emitter Sustaining Voltage | 7.2.2.2.1 | $I_C = 100mA$ $I_B = 0$ | CV74-55, CV74-57 CV74-56, CV74-58 | | | V_{CEO} (sust.) | 40 55 | - | V V |
| Emitter Base Cut off Current | 7.2.6 | $I_C = 0.25mA$ $V_{EB} = 1.5V$ | CV74-55, CV74-57 CV74-56, CV74-58 | | | V_{CEX} | 60 100 | - | V V |
| <u>SUB GROUP 3</u> Static Forward Current Transfer Ratio (1) | 7.3.4 | $I_C = 750mA$ $V_{CE} = 4.0V$ | CV74-55, CV74-57 CV74-56, CV74-58 | 2.5 | I | I_{EBO} | - | 15 | μA |

TABLE 1 GROUP A INSPECTION (Cont'd)

| Examination or Test | K1007/NATO Ref. | TEST CONDITIONS | | AQL % | Insp. Level | Sym- bol | LIMITS | | Units |
|--|-----------------|--|--|-------|-------------|----------------|----------|-------------|---------------|
| | | Specific Conditions | | | | | Min. | Max. | |
| Collector-Emitter Saturation Voltage | 7.3.3 | $I_C = 750\text{mA}$ $I_B = \text{CV74-55, CV74-56} = 75\text{mA}$ $\text{CV74-57, CV74-58} = 45\text{mA}$ | | | | V_{CE} (sat) | - | 2.0 0.75 | V V |
| Base-Emitter Voltage | 7.3.2 | $I_C = 750\text{ mA}$ $V_{CE} = 4.0\text{V}$ | | | | V_{BE} | - | 3.0 | V |
| <u>SUB GROUP 4</u> Small-Signal Forward Current Transfer Ratio, | 7.5.2 | $V_{CB} = 28\text{V}$ $I_C = 5\text{ mA}$ | | 4.0 | 1A | f_T | 600 | - | kc/s |
| Collector-Base Cut-off | 7.2.5.1 | $T_{amb} = 175^\circ\text{C}$ $V_{CB} = 30\text{V}$ $I_E = 0$ | | | | I_{CBO} | - | | μA |
| Static Forward Current Transfer Ratio (2) | 7.3.4 | $T_{amb} = -55^\circ\text{C}$ $I_C = 750\text{mA}$ $V_{CE} = 4.0\text{V}$ | | | | h_{FE} | 15 25 | - - | |
| | | | | | | | | | |

CV74-55, CV74-56
CV74-57, CV74-58

TABLE 2 GROUP B INSPECTION

See Page 3, Quality Assurance Provisions, Destructive Tests

| Examination or Test | K1007/NATO Ref. | TEST CONDITIONS | | AQL % | Insp. Level | Sym- bol | LIMITS | | Units |
|--|--------------------|------------------------------|--|-------|-------------|----------|--------|------|-------|
| | | Specific Conditions | | | | | Min. | Max. | |
| <u>SUB GROUP 1</u> Physical Dimensions | 5.1 | According to drawing Page 13 | | 6.5 | IC | | | | |
| <u>SUB GROUP 2</u> Solderability | 5.13 | | | 4.0 | IA | | | | |
| Temperature Cycling | 5.5 | -55°C to +200°C | | | | | | | |
| Moisture Resistance | 5.3.1 | | | | | | | | |
| <u>SUB GROUP 3</u> Vibration Fatigue | 5.15 | Non operating | | 4.0 | I Note 1 | | | | |
| <u>SUB GROUP 4</u> Omitted | | | | | | | | | |
| <u>SUB GROUP 5</u> Omitted | | | | | | | | | |
| <u>SUB GROUP 6</u> Omitted | | | | | | | | | |
| <u>SUB GROUP 7</u> High Temperature Life (non-operating) | 6.2.1 6.6.1.2.2 | T _{stg} = +200°C | | 4.0 | I Note 1 | | | | |

TABLE 2 GROUP B INSPECTION (Cont'd)

| Examination or Test | TEST CONDITIONS | | AQL % | Insp. Level | Sym-bol | LIMITS | | Units |
|--|------------------|---|-------|-------------|------------------|----------|------|-------|
| | K1007/NATO Ref. | Specific Conditions | | | | Min. | Max. | |
| <u>SUB GROUP 8</u> Operating Life | 6.3 6.6.1.2.2 | T _{amb} at any temperature between +100°C and +160°C V _{CB} = max for devices. P _c = to wattage shown on Derating curve for chosen temperature Fig.1 | 4.0 | IA | | | | |
| <u>Post Test End Points for Sub Groups 2 and 3</u> | | | | | | | | |
| Collector-Base Cut-off Current (1) | 7.2.5.1 | V _{CB} = 30V I _E = 0 | | | I _{CBO} | - | 45 | μA |
| Static Forward Current Transfer Ratio | 7.3.4 | V _{CB} = 4.0V I _C = 750mA CV7455 CV7456 CV7457 CV7458 | | | h _{FE} | 10 25 | | |
| <u>Post Test End Points for Sub Groups 7 and 8</u> | | | | | | | | |
| Collector Base Cut-off Current (1) | 7.2.5.1 | V _{CB} = 30V I _E = 0 | | | I _{CBO} | - | 45 | μA |

TABLE 2 GROUP B INSPECTION (Cont'd)

| Examination or Test | K1007/NATO Ref. | TEST CONDITIONS | | AQL % | Insp. Level | Sym- bol | LIMITS | | Units |
|-------------------------------|-----------------|---------------------|---------------|-------|-------------|----------|--------|------|-------|
| | | Specific Conditions | | | | | Min. | Max. | |
| Static Forward Transfer Ratio | 7.3.4 | $V_{CB} = 4.0V$ | CV7455 CV7456 | | | h_{FE} | 15 | | |
| | | $I_C = 750mA$ | CV7457 CV7458 | | | | 25 | | |

TABLE 3 GROUP C INSPECTION
See Page 3. Quality Assurance Provisions. Destructive Tests and Gp. C.

| Examination or Test | K1007/NATO Ref. | TEST CONDITIONS | | AQL Insp. Level % | Sym- bol | LIMITS | | Units |
|---|-----------------|---|--|-------------------|------------------|--------|----------|-------|
| | | Specific Conditions | | | | Min. | Max. | |
| <u>SUB GROUP 1</u> Omitted | | | | | | | | |
| <u>SUB GROUP 2</u> Shock | | 5 blows in each of three mutually perpendicular directions. | | 6.5 IA | | | | |
| <u>POST TEST END POINTS for SUB GROUP 2</u> | | | | | | | | |
| Collector Base Cut-off Current (1) | 7.2.5.1 | V _{CB} = 30V I _E = 0 | | | I _{CBO} | - | 45 | μA |
| Static Forward Current Transfer Ratio | 7.3.4 | V _{CB} = 4.0V I _C = 750 mA CV74-55 CV74-56 CV74-57 CV74-58 | | | h _{FE} | | 15 25 | |

NOTES

1. Maximum Sample size will be 125

FIG 1

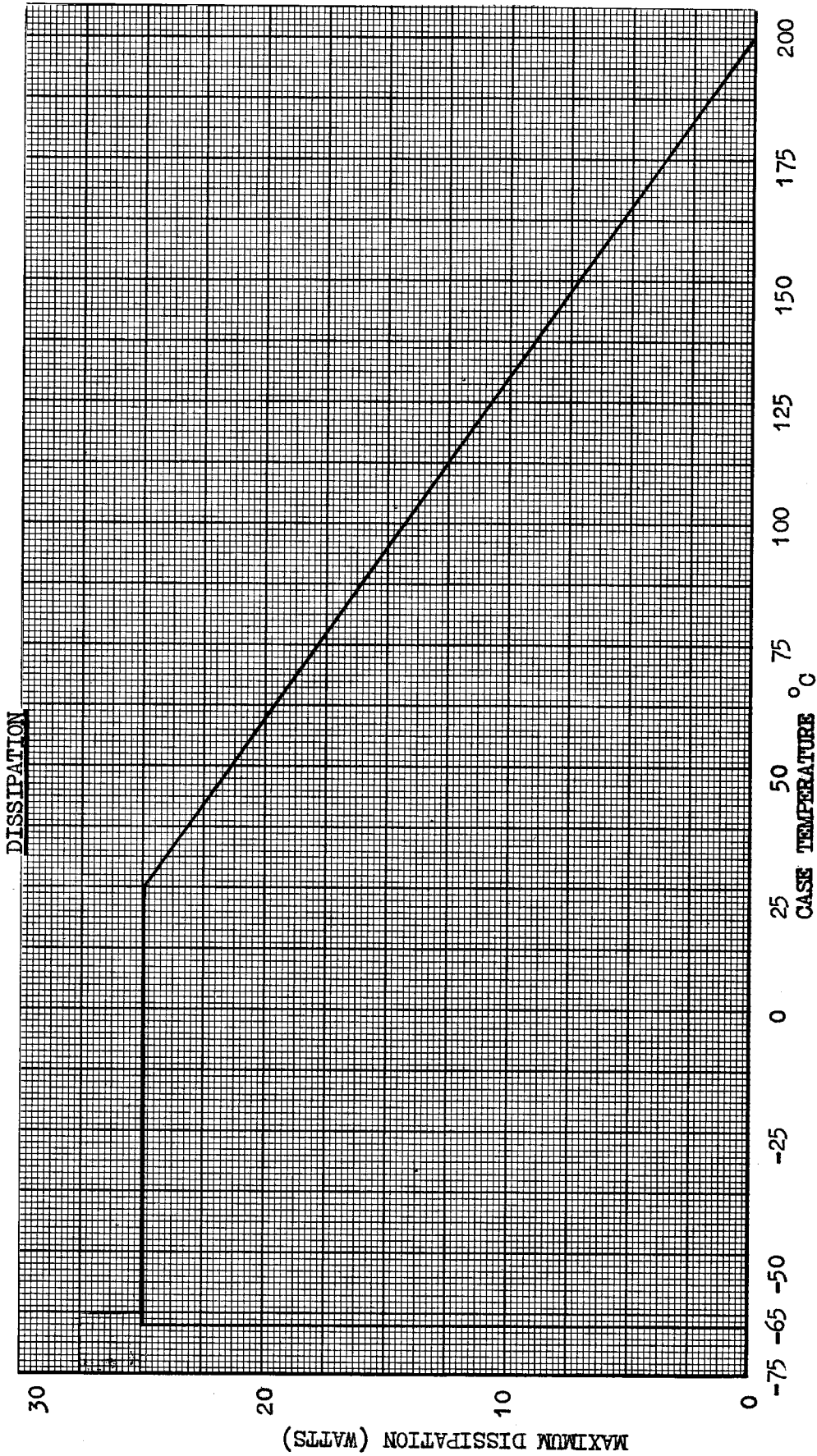
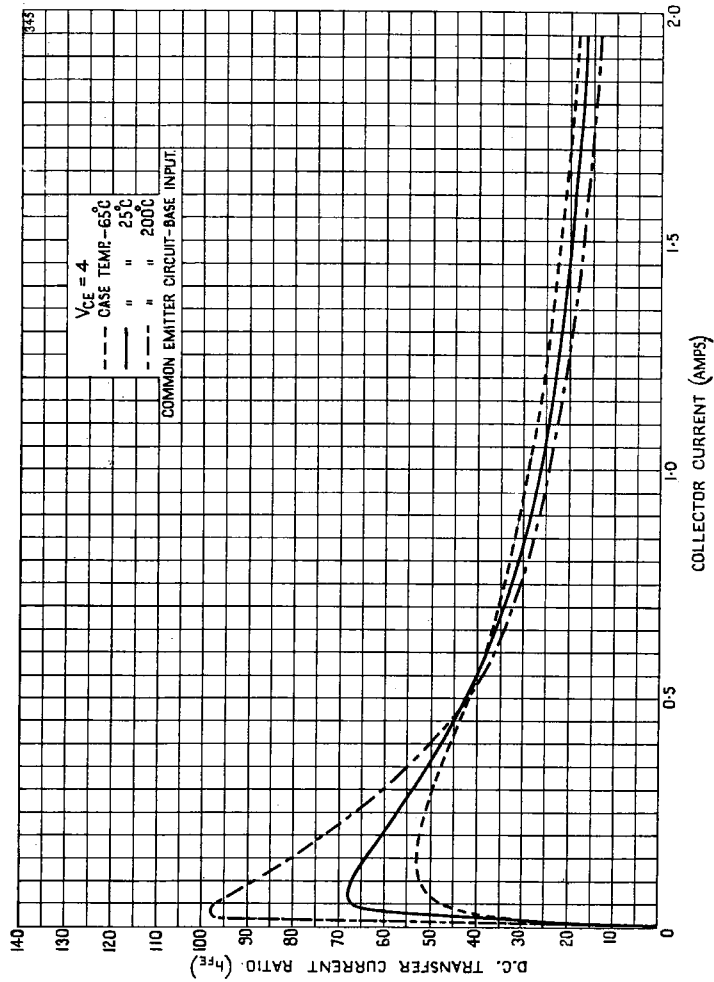


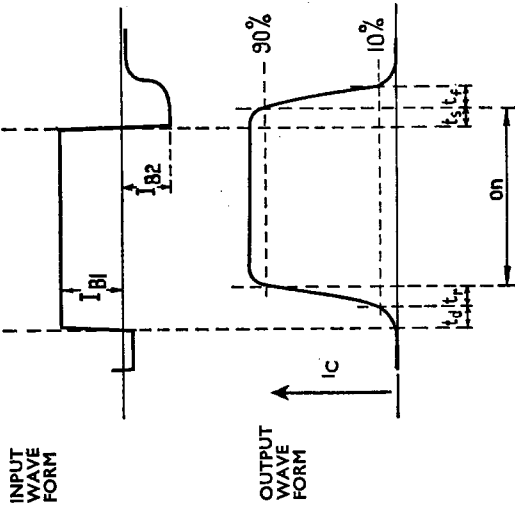
FIG 2

TYPICAL VARIATION OF DC CURRENT GAIN (h_{FE})
with Collector current and Ambient Temperature.



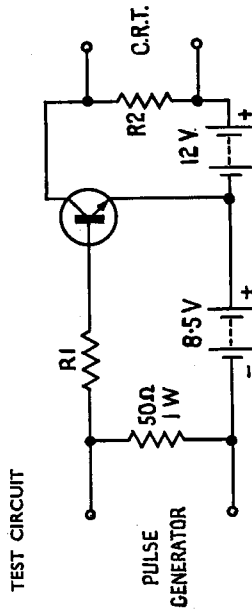
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FIG 3



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TYPICAL POWER-SWITCHING PERFORMANCE



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TYPICALLY:
 $t_{on} = t_d + t_r = 200 + 1000 = 1200 \text{ } \mu\text{s}$
 $t_{off} = t_s + t_f = 800 + 1100 = 1900 \text{ } \mu\text{s}$
 'On' DC Collector current ... = 750 mA
 'Turn on' Base current (I_{B1}) ... = 65 mA
 'Turn off' Base current (I_{B2}) ... = -35 mA

R1 220Ω 1W.
 R2 15-9Ω 2W.

FIG. 4
RETAINING CLAMP

