

MILITARY SPECIFICATION
CV7441-46
 SEMICONDUCTOR DEVICE, DIODE

Description: This specification covers the detail requirements for a stud mounted Silicon Power Rectifier and is in accordance with K1007, Issue 3 except where otherwise stated.

Mechanical Dimensions and Outlines: See Drawing Page 9.
 Also Note C

Connections: CV7441-2-3 Stud Anode - Cathode end shall be marked with a Red band (i.e. Flexible lead end).
 CV7444-5-6 Stud Cathode - Stud end shall be marked with a Red band.

Absolute Maximum Ratings:

| Device | Ratings | V_{RW} | V_{RS} | I_O | I_{FS} | T_{case} | T_{stg} | Vib. | Shock |
|--------|---------|----------|----------|-------|----------|------------|-----------|------|-------|
| | Unit | V | V | A | A | °C | °C | g | g |
| CV7441 | Min | - | - | - | | -40 | -40 | | |
| CV7444 | Max | 100 | 100 | 35 | 3 | +125 | +150 | 10 | 500 |
| CV7442 | Min | - | - | - | Figure | -40 | -40 | | |
| CV7445 | Max | 200 | 200 | 35 | | +125 | +150 | 10 | 500 |
| CV7443 | Min | - | - | - | See | -40 | -40 | | |
| CV7446 | Max | 400 | 400 | 35 | | +125 | +150 | 10 | 500 |
| Note | | | | A | | | | | |

Notes: A at 100°C.

B Commercial Equivalent ZR31, ZR32, ZR34 Stud Anode
 ZR31R, ZR32R, ZR34R Stud Cathode

C Identical to the CV7077-79 except that the lead length from the seating to the centre of the connecting lug is changed from 80-85 mm to 120 - 135 mm.

CV7441-46

Primary Electrical Characteristics:

| Characteristic | | V_F | I_R | I_R |
|----------------|---------------|-------|--------|--------|
| Unit | | V | mA | mA |
| CV7441 | Min | - | - | - |
| | Max | 1.2 | 0.5 | 2.0 |
| -CV7446 | | | | |
| CONDITIONS | T_{case} °C | 25 | 25 | 100 |
| | V_R V | | Note C | Note C |
| | I_F A | 30 | | |

Note C: At appropriate V_{RW} for each device

Reliability Assurance Requirements:- Under discussion

Applicable Documents:-

TVC Information Sheets No. 9 and 10

Requirements:-

Marking The device shall be marked as K1007 Section B 1.3.4 as space permits.

Quality Assurance Provisions:-

Destructive Tests The tests listed in Table 2, Group B Inspection, Sub Group 2, 3 and 4 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:-

The device shall be packed according to K1007, Issue 3 Section A 1.2 (c).

Joint Services Catalogue Number:

| | | |
|--------|---|------------------|
| CV7441 | = | 5960-99-037-3508 |
| CV7442 | = | 5960-99-037-3509 |
| CV7443 | = | 5960-99-037-3510 |
| CV7444 | = | 5960-99-037-3511 |
| CV7445 | = | 5960-99-037-3512 |
| CV7446 | = | 5960-99-037-3513 |

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

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

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> | | | | | | | | | |
| <u>Visual and Mechanical Inspection</u> | 5.1 | Excluding Physical Dimensions | | 0.65 | I | | | | |
| <u>SUB-GROUP 2</u> | | | | | | | | | |
| Forward Voltage | 8A.3.2 | $I_f = 30A$ a.c. | $T_{stud} = 30^\circ C$ | | | I_F | - | 1.1 | V |
| Reverse Current | 8A.2.2/2 | $T_{amb} = 15^\circ C - 30^\circ C$ | V_{RRM} 100V 200V 400V | | | I_R | - | 10 25 50 | μA μA μA |
| <u>SUB-GROUP 3</u> | | | | | | | | | |
| Reverse Current | 8A.2.2/2 | $T_{amb} = 100^\circ C$ min. | V_{RRM} 100V 200V 400V | 2.5 | I | I_R | - | 0.5 1.0 2.0 | mA mA mA |

TABLE 2 GROUP B INSPECTION

| Examination or Test | TEST CONDITIONS | | Insp. Level | Sym- bol | LIMITS | | Units |
|---|-----------------|---|-------------|----------------|--------|-------------------|----------------|
| | K1007/NATO Ref. | Specific Conditions | | | Min. | Max. | |
| <u>SUB-GROUP 1</u> Physical Dimensions | | | IC | | | | |
| <u>SUB-GROUP 2</u> Temperature Cycling | 5.5 | -40 to +125°C Three cycles | IA | | | | |
| Moisture Resistance | 5.3 | | | | | | |
| Shock | 5.17.1 | 5 blows in each of four directions. Three of which shall be mutually perpendicular. Hammer Angle = 60° | | | | | |
| <u>SUB-GROUP 3</u> Vibration Fatigue | 5.15.1 | | | | | | |
| <u>Post Sub-Groups 2 and 3 End Points</u> Forward Voltage Drop | 8A.3.2 | As in Group A. Sub-Group 2 | | V _f | - | 1.2 | V |
| Reverse Current | 8A.2.2/2 | As in Group A. Sub Group 2 V _{RRM} 100V 200V 400V CV7441 & CV7444 CV7442 & CV7445 CV7443 & CV7446 | | I _r | - | 0.6 1.2 2.5 | mA mA mA |

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. | |
| <u>Sub-Groups 4, 5 and 6 omitted</u> <u>SUB-GROUP 7</u> | | | | 4.0 | I | | | | |
| High Temperature Life | 6.2.1 | Non-operating $T_{amb} = +100^{\circ}C,$ | | | | | 150 | - | hrs |
| Low Temperature Life | 6.2.1 | Non-operating $T_{amb} = -40^{\circ}C,$ | | | | | 150 | - | hrs |
| <u>SUB-GROUP 8</u> Operation Life | 6.3.3.2 | Max P.I.V. Single or three phase rectifier circuit with resistance load. $f = 50 \text{ c/s.}$ Stud temp. not less than $100^{\circ}C$ Note | | 4.0 | IA | | | | |
| <u>Post Sub-Groups 7 and 8 End Points</u> Forward Voltage Drop | 8A.3.2 | As in Group A Sub-Group 2 | | | | V_f | - | 1.2 | V |
| Reverse Current (1) | 8A.2.2/2 | As in Group A Sub-Group 2 V_{RRM} CV7441 & CV7444 100V CV7442 & CV7445 200V CV7443 & CV7446 400V | | | | I_r | - | 0.6 1.2 2.5 | mA mA mA |

FIG. 2.
 $\frac{1}{2}$ WAVE MEAN D.C. AMPS / DIODE DISSIPATION.

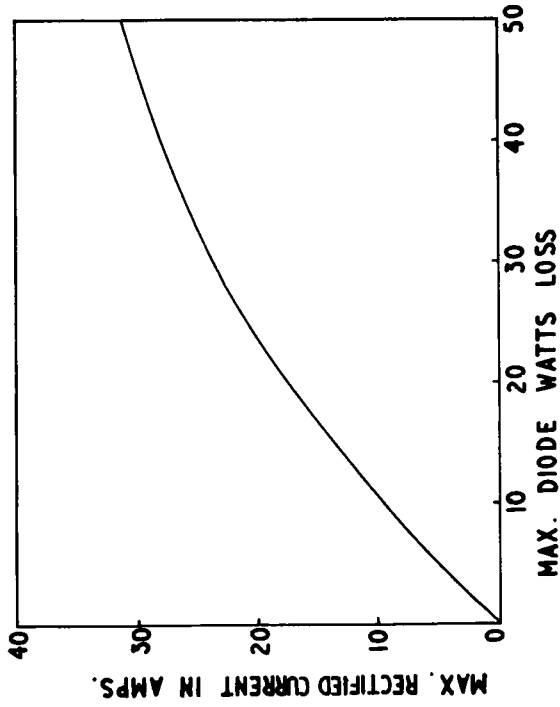
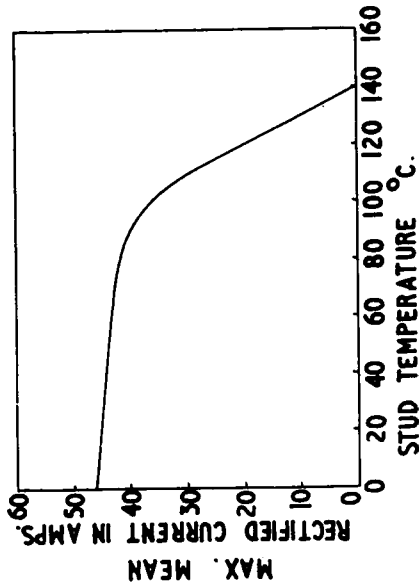


FIG. 1.
 MAX. MEAN CURRENT / STUD TEMPERATURE.



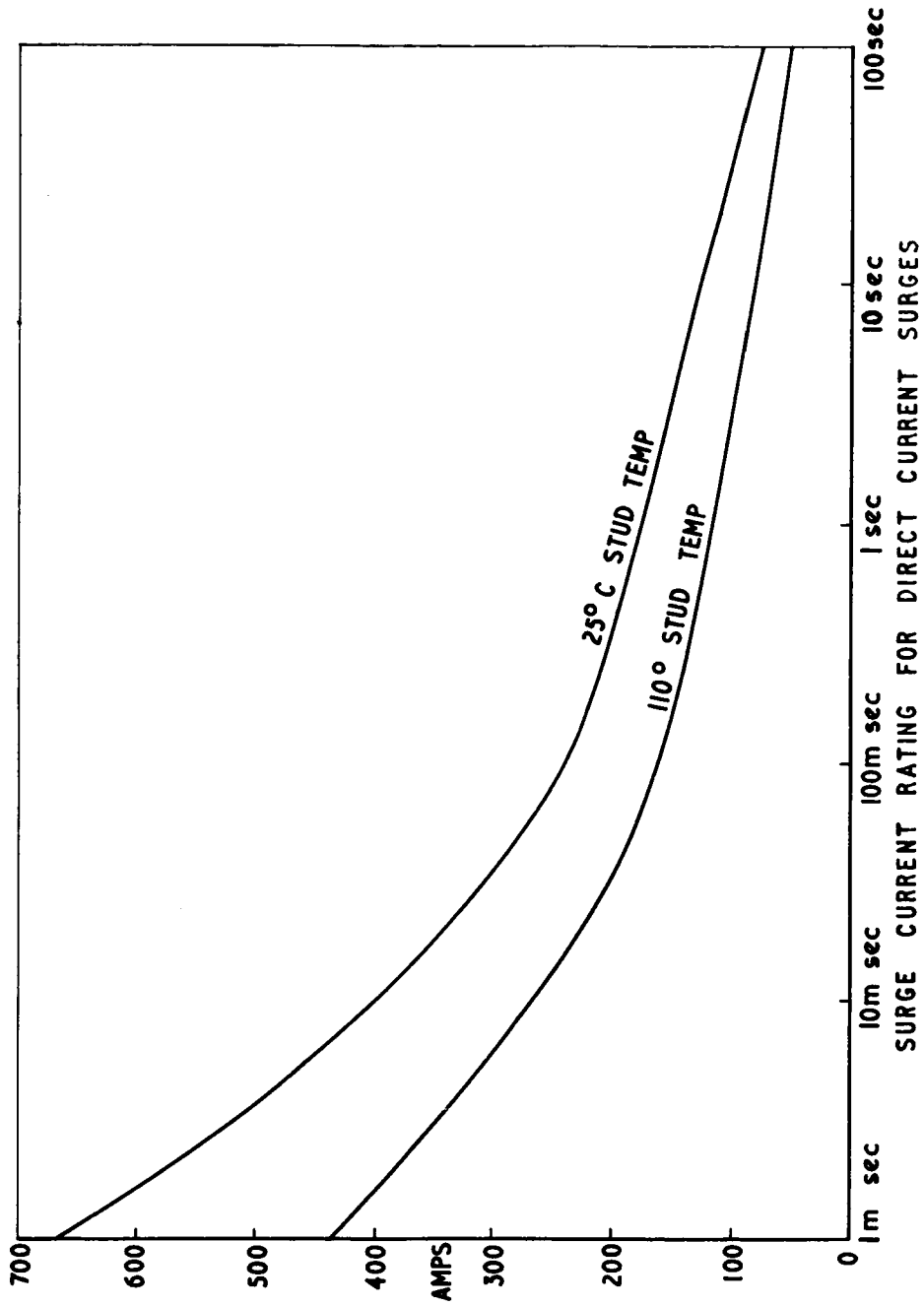
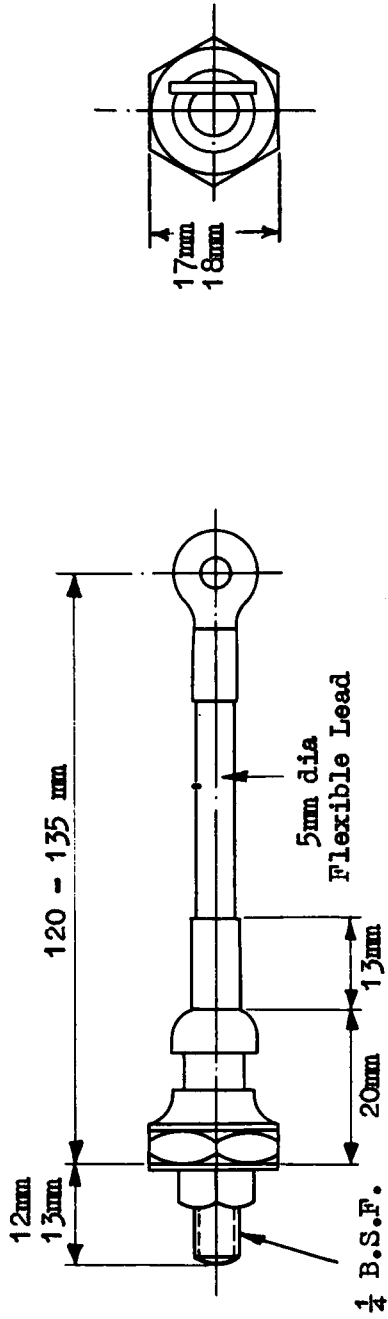


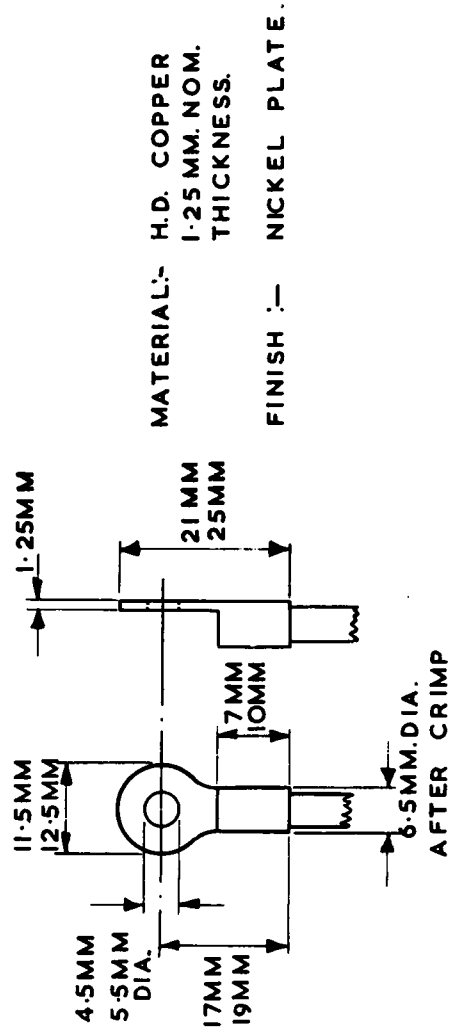
FIG. 3

FIG 4

DIMENSIONAL OUTLINE



DETAIL OF CONNECTOR



APPENDIX AInspection Level

For lot sizes up to 200, at least one rectifier shall be taken from each lot and life tested for 1000 hours. For lot sizes 201 and over, at least two rectifiers shall be taken from each lot and life tested for 1000 hours.

Merit Life

Merit Life is defined as the ratio of the actual life hours for one or more rectifiers to the total life hours that would have occurred had there been no failures, expressed as a percentage:--

$$\text{Merit Life} = \frac{\text{Actual hours run}}{\text{Total possible hours}} \times 100\%$$

Classification of failures

Electrical inoperatives shall be the only criterion of failures, and the life test positions shall be so arranged as to indicate a failure when it occurs. If a failure occurs, the number of hours run when the rectifier was last recorded as operating shall be taken as the actual life.

Procedure for continuous production

When 1000 hours have elapsed since the sample drawn from the first lot was placed on life test, there should be at least four additional samples undergoing life test, with various numbers of hours on test. The Merit Life shall be computed for the first five lots. If the Merit Life exceed 90%, the first lot is acceptable. When 1000 hours have elapsed since the sample from the second lot was placed on life test, the merit life shall be computed using the test results from the first five lots. If this exceeds 90% the second lot is acceptable. The acceptability of the third, fourth and fifth lots is determined from the first five lots.

If when the sample from one of the first five lots have been life tested for 1000 hours, the computed Merit Life is 90% or less, the lot from which the sample was drawn shall be held in store. If when the sample from the subsequent lot has been life tested for 1000 hours, the computed Merit Life exceeds 90%, both lots shall be accepted. If the Merit Life is 90% or less both lots shall be held. When the sample from the fifth lot has been life tested for 1000 hours, if the computed Merit Life for all five samples exceeds 90% all lots being held shall be accepted. If the Merit Life is 90% or less, all lots being held shall be rejected.

APPENDIX A (Cont'd)

When the sample from the sixth lot has been life tested for 1000 hours, the Merit Life shall be computed for the samples from lots 2 to 6. If this exceeds 90%, lot 6 shall be accepted; if it is 90% or less, lot 6 shall be rejected. A similar procedure shall apply for subsequent lots, the Merit Life being computed on the combined results of the completed life test of the lot under consideration and the previous four consecutive lots.

When any sample has passed the prescribed life test period or has failed it shall be removed from test.

Reduced Duration

When five consecutive lots have been accepted without any of them having been held due to failure to meet the 90% merit life requirement, reduced duration life testing is applicable, and the Merit Life shall then be computed after the sample from a lot has been life tested for 240 hours. If when a sample from a given lot has been life tested for 240 hours the computed Merit Life is 90% or less, the lot shall be held in store and the life test of that sample and subsequent samples shall continue to 1000 hours, the Merit Life being computed after 1000 hours for each sample. Reduced duration testing shall be again applicable after five consecutive lots have been accepted.

Single Lot or non-continuous production

If production is not continuous (see Section 6.6) the above procedure cannot be used. In this case the manufacturer shall place at least five rectifiers on life test from a given lot. After 1000 hours the Merit Life for the sample shall be computed and if this exceeds 90% the lot shall be accepted. If it is 90% or less the lot shall be rejected.

If production is continuous, (section 6.6), but an interval of more than one week occurs between any two lots at the start of a production run, either the manufacturer shall place additional rectifiers on life test from one or more lots, or lots shall be held in store for a period after the sample has completed 1000 hours of life test, so that the Merit Life is computed from the results of life tests on not less than five rectifiers before a determination of acceptability is made.

Additional samples

The manufacturer may place on life test any number of additional samples from each lot, provided the minimum requirement of 1, 2 or 5 (as the case may be) is met. In addition, after the life test has started for any lot, the manufacturer may add an additional quantity to the initial life test sample, but this may be done only for any life test lot.