

BRITISH STANDARDS INSTITUTION  
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BS CECC 50007-001  
ISSUE 1, Sept. 1978.



Specification available from:-

MULLARD LIMITED  
Mullard House, Torrington Place, London, WC1E 7HD

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ELECTRONIC COMPONENTS OF ASSESSED QUALITY  
DETAIL SPECIFICATION IN ACCORDANCE WITH

BS, CECC 50000: 1977

Generic specification for discrete semiconductor devices

MANUFACTURER'S TYPE NUMBER

BLW78

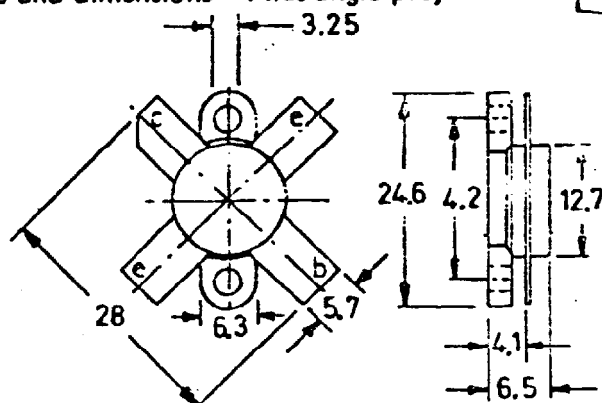
For ordering information  
see page 3

V.H.F. POWER TRANSISTOR FOR  
TRANSMITTING APPLICATION

NPN SILICON PLANAR EPITAXIAL  
TRANSISTOR  
METAL AND CERAMIC CASE WITH  
EPOXY SEAL

LEVEL OF QUALITY ASSESSMENT  
L + ADDITIONAL REQUIREMENTS

Outline and dimensions First angle projection



CAUTION: This device has exposed Beryllium oxide in its assembly  
(see Note 1 for precautions).

Marking information BLW78

#### 4. LIMITING VALUES (over the operating temperature range unless otherwise stated)

|            |                                                             |     |    |      |
|------------|-------------------------------------------------------------|-----|----|------|
| $T_{case}$ | Minimum and maximum operating case temperature              | -40 | °C | min. |
|            |                                                             | 125 | °C | max. |
| $T_{stg}$  | Minimum and maximum storage temperature                     | -65 | °C | min. |
|            |                                                             | 125 | °C | max. |
| $V_{CBO}$  | Maximum collector-to-base continuous (direct) voltage       | 65  | V  | max. |
| $V_{CEO}$  | Maximum collector-to-emitter continuous (direct) voltage    | 35  | V  | max. |
| $V_{EBO}$  | Maximum emitter-to-base continuous (direct) reverse voltage | 4   | V  | max. |
| $I_E$      | Maximum emitter current (r.m.s.)                            | 10  | A  | max. |
| $I_{EM}$   | Maximum peak emitter current                                | 25  | A  | max. |
| $I_B$      | Maximum base current (r.m.s.)                               | 5   | A  | max. |

Maximum total power dissipation as a function of temperature

See Figure 2

Area of safe operation

See Figure 3

Operation at  $V_{CE} = 28$  V with  $P_{out} = 70$  W (into 50  $\Omega$ )

$T_{case} = 70$  °C into a load

v.s.w.r. of 50:1

any phase for 1.0 hour

Refer to Qualified Products List PD 9002 and/or CECC 00200 for details of manufacturers approved to this specification.

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5. CHARACTERISTICS (Specified at  $T_{case} = 25^{\circ}C$  unless otherwise stated)

|               |                                                                                                                                                          | Min. | Max. | Unit |
|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|------|------|------|
| $h_{21E(1)}$  | Common emitter forward current transfer ratio<br>$V_{CE} = 5 V, I_C = 1 A$                                                                               | 20   | 80   |      |
| $h_{21E(2)}$  | Common emitter forward current transfer ratio<br>$V_{CE} = 5 V, I_C = 5 A$                                                                               | 10   |      |      |
| $f_T^*$       | Transition frequency<br>$V_{CE} = 28 V, I_C = 5 A, f = 100 MHz$                                                                                          | 300  |      | MHz  |
| $I_{CBO(1)}$  | Leakage currents<br>Maximum collector-to-base cut-off current (1)<br>$V_{CB} = 65 V, I_E = 0$                                                            |      | 50   | mA   |
| $I_{CBO(3)}$  | Maximum collector-to-base cut-off current (3)<br>$V_{CB} = 35 V, I_E = 0$                                                                                |      | 2.0  | mA   |
| $I_{CEO}$     | Maximum collector-to-emitter cut-off current<br>$V_{CE} = 35 V, I_B = 0$                                                                                 |      | 100  | mA   |
| $I_{EBO}$     | Maximum emitter-to-base cut-off current<br>$V_{EB} = 4 V, I_C = 0$                                                                                       |      | 5    | mA   |
| $I_{CBO(2)}$  | Leakage current at high temperature<br>Maximum collector-to-base cut-off current<br>$V_{CB} = 35 V, I_E = 0$<br>$T_{case} = 125^{\circ}C \pm 3^{\circ}C$ |      | 20   | mA   |
| $V_{CE(sat)}$ | Maximum collector-to-emitter saturation voltage<br>$I_C = 10 A, I_B = 1.0 A$ pulsed                                                                      |      | 2.5  | V    |
| $P_{out}$     | Minimum output power and power gain<br>Minimum output power<br>$V_{CE} = 28 V, P_{in} = 25 W, f = 150 MHz$                                               | 100  |      | W    |
| $G_{P(1)}$    | Power gain (1)<br>$V_{CE} = 28 V, P_{out} = 100 W, f = 150 MHz$                                                                                          | 6    |      | dB   |
| $\eta_c$      | Minimum collector efficiency<br>$V_{CE} = 28 V, P_{out} = 100 W, f = 150 MHz$                                                                            | 70   |      | %    |
| $C_{22b}$     | Capacitances<br>Output capacitance<br>$V_{CB} = 30 V, I_E = 0, f = 1 MHz$                                                                                | 100  | 170  | pF   |
| $C_{11b}$     | Input capacitance<br>$V_{EB} = 0, I_C = 0, f = 1 MHz$                                                                                                    | 1300 | 1700 | pF   |

\* Measurement time  $\leq 10$  seconds

## 6. MARKING

- (1) Each device shall bear the following markings:
  - (a) Type number, BLW78
  - (b) Date code
  - (c) Manufacturer's trade mark or factory identification code
- (2) Each package containing one or more of these transistors shall bear the above marking and, in addition, this detail specification number: BS CECC 50007.001

## 7. RELATED DOCUMENTS

This specification shall be read in conjunction with:

CECC 00100 BS E9000 General requirements for electrical components of assessed quality.

CECC 00007 BS E9007 Sampling plans and procedures for inspection by attributes.

CECC 50000 BS CECC 50000 Generic specification for discrete semiconductor devices.

## 8. ORDERING INFORMATION

Orders for this transistor shall include the following minimum information:

(Qty) Transistor type BLW78 to BS CECC 50007- 001, Issue 1, dated September, 1978.

### Note 1: Beryllium oxide precautions

It is perfectly safe to handle beryllium oxide in the solid form. If, however, the solid has been abraded or cracked, great care should be taken not to get any particles into cuts, or if a fine powder is present to avoid any possible inhalation.

In the event of a piece of the solid being found chipped or abraded, all loose particles or dust should be carefully swabbed up with a moist cloth and the whole sealed in a strong polythene bag for disposal in the approved manner.

Gloves should be worn.

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# 9. TEST CONDITIONS AND INSPECTION REQUIREMENTS

All tests are non-destructive

Group A

Lot by lot

| Examination<br>or<br>test                                                                                                                                                                                                                                                                                                                             | Ref.                                                               | Conditions at $T_{case} = 25^{\circ}C$<br>unless otherwise stated                                                                                                                                                     | Inspection requirements       |                                                       |                                  |      |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|-------------------------------------------------------|----------------------------------|------|------|
|                                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                                                                                                                                                                       | Limits                        |                                                       | Units                            | IL   | AQL% |
|                                                                                                                                                                                                                                                                                                                                                       |                                                                    |                                                                                                                                                                                                                       | Min.                          | Max.                                                  |                                  |      |      |
| <b>Subgroup A0</b><br>Power gain (1)<br>$G_{P(1)}$                                                                                                                                                                                                                                                                                                    | Annex<br>A1                                                        | $V_{CE} = 28 V, R_L = 50 \Omega$<br>$P_{out} = 100 W$<br>$f = 150 MHz$                                                                                                                                                | 6.0                           |                                                       | dB                               | 100% |      |
| <b>SUBGROUP A1 (a)</b><br>Visual Inspection                                                                                                                                                                                                                                                                                                           | See<br>Note<br>2                                                   | NON OPERATIVES                                                                                                                                                                                                        | See note 2                    |                                                       |                                  | I    | 0.25 |
| <b>SUBGROUP A1 (b)</b><br>Visual Inspection                                                                                                                                                                                                                                                                                                           | 4.2.1.                                                             | 4.2.1.                                                                                                                                                                                                                | Correct                       |                                                       |                                  | I    | 1.5  |
| <b>SUBGROUP A2 (a)</b>                                                                                                                                                                                                                                                                                                                                | Annex<br>A2                                                        | NON OPERATIVES                                                                                                                                                                                                        | open-circuit<br>short-circuit |                                                       |                                  | II   | 0.25 |
| <b>Subgroup A2 (b)</b><br>Collector-base<br>cut-off current (1)<br>$I_{CBO(1)}$<br>Collector-base<br>cut-off current (3)<br>$I_{CBO(3)}$<br>Emitter-base<br>cut-off current<br>$I_{EBO}$<br>Collector-emitter<br>cut-off current<br>$I_{CEO}$<br>Static value of common-<br>emitter forward-current<br>transfer ratio<br>$h_{21E(1)}$<br>$h_{21E(2)}$ | 4.3.4<br>T.001<br><br>T.001<br><br>T.002<br><br>T.009<br><br>T.006 | $V_{CB} = 65 V$<br>$I_E = 0$<br><br>$V_{CB} = 35 V$<br>$I_E = 0$<br><br>$V_{EB} = 4 V$<br>$I_C = 0$<br><br>$V_{CE} = 35 V$<br>$I_B = 0$<br><br>$V_{CE} = 5 V$<br>$I_C = 1 A^*$<br><br>$V_{CE} = 5 V$<br>$I_C = 5 A^*$ |                               | 50<br><br>2.0<br><br>5<br><br>100<br><br>20<br><br>10 | mA<br><br>mA<br><br>mA<br><br>mA | II   | 1.0  |

\* Pulsed  $t_p = 300 \mu s$  Note 2: Visual non-operative devices are defined as devices with  
Duty cycle  $\leq 2\%$  broken terminals, broken case, no type indication, not readable  
designation or wrong type designation.

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## GROUP A – Lot by lot (contd.)

| Examination<br>or<br>test                                                                                          | Ref.                              | Conditions at $T_{case} = 25^{\circ}C$<br>unless otherwise stated                                         | Inspection requirements |      |            |    |      |
|--------------------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------------------------------------------------------------------------------|-------------------------|------|------------|----|------|
|                                                                                                                    |                                   |                                                                                                           | Limits                  |      | Units      | IL | AQL% |
|                                                                                                                    |                                   |                                                                                                           | Min.                    | Max. |            |    |      |
| <b>Subgroup A3</b><br>Collector-emitter<br>saturation voltage<br>$V_{CE(sat)}$<br>Collector efficiency<br>$\eta_c$ | 4.3.4<br>T.003<br><br>Annex<br>A1 | $I_C = 10 A$<br>$I_B = 1 A$<br><br>$V_{CE} = 28 V, R_L = 50 \Omega$<br>$P_{out} = 100 W$<br>$f = 150 MHz$ | 70                      | 2.5  | V<br><br>% | I  | 2.5  |

## GROUP B

Lot by lot

Only tests marked '(D)' are destructive (3.5.6 of CECC 50000)

|                                                |                    |                                                                                                                            |                                                                                               |                                                               |                                                               |                                                        |    |     |
|------------------------------------------------|--------------------|----------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------|----|-----|
| <b>Subgroup B1</b><br>Dimensions               | 4.2.2              | See Figure 1<br>for outline                                                                                                | Q<br>A<br>q<br>U <sub>1</sub><br>U <sub>3</sub><br>$\phi_P$<br>U <sub>2</sub><br>$\beta$<br>a | 3.8<br>6.0<br>18.25<br>24.3<br>12.1<br>2.9<br>6.2<br>42<br>87 | 4.4<br>7.0<br>18.55<br>25.2<br>12.5<br>3.2<br>6.5<br>48<br>93 | mm<br>mm<br>mm<br>mm<br>mm<br>mm<br>mm<br>Deg.<br>Deg. | S2 | 2.5 |
| <b>Subgroup B3</b><br>Lead bending (D)         | 4.4.9              | Force = 5 N<br>One bend in each direction                                                                                  |                                                                                               |                                                               |                                                               |                                                        | S2 | 4.0 |
| <b>Subgroup B4</b><br>Solderability (D)        | 4.4.7              | Soldering iron method                                                                                                      |                                                                                               |                                                               |                                                               |                                                        | S4 | 2.5 |
| <b>Subgroup B8</b><br>Electrical endurance (D) | Annex<br>B1<br>4.5 | $V_{CE} = 28 V, T_{case} = 70^{\circ}C$<br>$P_{out} = 100 W, R_L = 50 \Omega$<br><br>$f = 150 MHz$<br>Duration = 168 hours |                                                                                               |                                                               |                                                               |                                                        | S3 | 1.5 |