

MILITARY SPECIFICATION

**CV 7598**

SEMICONDUCTOR DEVICE, TRANSISTOR

Description: This specification covers the detail requirements for a Silicon P-N-P General Purpose transistor, and is in accordance with K1007, Issue 3, except as otherwise stated.

Mechanical Dimensions and Outline: K1007, Section B. 10.3.2.2 and 10.4.2.2. Type 1.

Connections: 1. Emitter, 2. Base, 3. Collector. The case shall be insulated from all leads.

Absolute Maximum Ratings:

RATINGS	V <sub>CB</sub>	V <sub>CE</sub>	V <sub>EB</sub>	I <sub>CAV</sub>	I <sub>CM</sub>	P <sub>tot</sub>	T <sub>opr</sub>	T <sub>stg</sub>	Shock	Vib.
UNIT	V	V	V	mA	mA	mW	°C	°C	g	g
MIN.	-	-	-	-	-	-	-55	-55	-	-
MAX.	-80	-80	-30	-100	-150	300	+200	+200	1500	20
NOTES									A	

- Notes
- A. Duration 0.5 mS
  - B. Prototype 2S301

# CV 7598

## Primary Electrical Characteristics

CHARACTERISTIC		$I_{CBO}$	$I_{CBO}$	$I_{EBO}$	$h_{fe}$	$h_{fe}$	$h_{fe}$	$h_{FE}$
UNIT		$\mu A$	$\mu A$	$\mu A$				
MIN.		-	-	-	10	5	8	10
MAX.		10	10	10	40	24	-	45
Conditions	$T_{amb}$ °C	25	100	25	25	25	-55	25
	$V_{CB}$ V	-80	-50	-	-	-	-	-
	$V_{CE}$ V	-	-	-80	-6	-6	-6	-5
	$I_C$ mA	-	-	-	1	0.1	1	10
	$I_E$ mA	0	0	-	-	-	-	-
	$I_B$ mA	-	-	0	-	-	-	-
	f k/cs	-	-	-	1	1	1	-

CHARACTERISTIC		$V_{BE(sat)}$	$V_{CE(sat)}$	$f_T$	$C_{ob}$
UNIT		V	mV	Mc/s	pF
MIN		-	-	0.25	-
MAX		1.0	150	5.0	70
Conditions	$T_{amb}$ °C	25	25	25	25
	$V_{CB}$ V	-	-	-	-5
	$V_{CE}$ V	-	-	-5	-
	$I_C$ mA	10	10	1	-
	$I_E$ mA	-	-	-	0
	$I_B$ mA	1.5	1.5	-	-
	f kc/s	-	-	300	1000

Reliability Assurance Requirements:-

Under discussion.

## Requirements:-

### Marking

The device shall be marked as K1007. Section B 1.3.4. The minimum requirements are 1.3.4.1 (a), (c), (d) and (f).

## Quality Assurance Provisions:-

### Destructive Tests

The tests listed in Group B Inspection, Sub Groups 2, 3 and 4 and Group C Inspection, 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).

### N.A.T.O. Stock Number

5960-99-037-3969

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

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

TABLE 1 Group A Inspection

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym-bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u>			0.65	I				
Physical Examination	5.1.1							
<u>SUB GROUP 2</u>			1.0	II				
Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = -80V$ $I_E = 0$			$I_{CBO}$	-	10	$\mu A$
Collector-Emitter Cut-off Current		$V_{CE} = -80V$ $I_B = 0$			$I_{CEO}$	-	10	$\mu A$
Small Signal Forward Current Transfer Ratio	7.4.2	$V_{CE} = -5V$ $I_C = 1mA$ $f = 1 Kc/s$			$h_{fe}$	10	40	
Base-Emitter Saturation Voltage	7.3.1	$I_C = 10mA$ $I_B = 1.5mA$			$V_{BE} (Sat)$	-	1.0	V
Collector-Emitter Saturation Voltage	7.3.3	$I_C = 10mA$ $I_B = 1.5mA$			$V_{CE} (Sat)$	-	150	mV
<u>SUB GROUP 3</u>			2.5	I				
Static Forward Current Transfer Ratio	7.3.4	$V_{CE} = -5V$ $I_C = 10mA$			$h_{FE}$	10	45	
Small Signal Forward Current Transfer Ratio	7.4.2	$V_{CE} = -5V$ $I_C = 100 \mu A$ $f = 1 kc/s$			$h_{fe}$	5	24	

TABLE 1 GROUP A 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 4</u> Transition Frequency	7.5.2	$V_{CE} = -5V$ $I_C = 1mA$ $f = 0.3 Mc/s$	4.0	IA	fT	0.25	5.0	Mc/s
Output Capacitance	7.4.8	$V_{CB} = -5V, I_E = 0$ $f=1Mc/s$			$C_{ob}$		70	pF
Collector Base Cut-off Current (2)	7.2.5.1	$T_{amb} = +100^{\circ}C$ $V_{CB} = 150V$ $I_E = 0$			$I_{CBO}$	-	10	$\mu A$
Small Signal Forward Current Transfer	7.4.2	$T_{amb} = -55^{\circ}C$ $V_{CE} = -5V$ $I_C = 1mA$ $f = 1kc/s$			$h_{fe}$	8	-	

TABLE 2 GROUP B INSPECTION  
See Page 3 Quality Assurance Provisions

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u> Physical Dimensions	5.1.2	According to drawings 10.3.2.2 and 10.4.2.2. Type 1	6.5	IC				
<u>SUB GROUP 2</u> Solderability	5.13		4.0	IA				
Temperature Cycling	5.5	-55 to +200°C						
Moisture Resistance	5.3							
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1	Non operating	4.0	IA				
<u>SUB GROUP 4</u> Lead Fatigue	5.10	2 cycles	6.5	IA				
<u>SUB GROUPS 5 and 6</u> Omitted								
<u>SUB GROUP 7</u> High Temperature Life	6.2.1 6.6.1.2.2 Note 2	T <sub>stg</sub> = +200°C Duration = 1000 hours	4.0	I Note 1				

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 GROUP 8</u>				4.0	IA				
Operating Life	6.3 6.6.1.2.2	Duration = 1000 hours V <sub>CB</sub> shall be not less than 80% of the maximum V <sub>CE</sub> rating T <sub>amb</sub> = 25°C P <sub>tot</sub> = 300 mW							
<u>Post Test End Point Limits for Sub Groups 2, 3 &amp; 7</u>									
Collector-Base Cut-off Current	7.2.5.1	V <sub>CB</sub> = -80V I <sub>E</sub> = 0				I <sub>CB0</sub>	-	20	µA
Small Signal Forward Current Transfer Ratio	7.4.2	V <sub>CE</sub> = -5V I <sub>C</sub> = 1mA f = 1 kc/s				h <sub>fe</sub>	8	50	%
<u>Post Test End Point Limits for Sub Group 8</u>									
Collector-Base Cut-off Current	7.2.5.1	V <sub>CB</sub> = -80V I <sub>E</sub> = 0				I <sub>CB0</sub>	-	20	µA
Small Signal Forward Current Transfer Ratio	7.4.2	V <sub>CE</sub> = -5V I <sub>C</sub> = 1mA f = 1 Kc/s				Δ h <sub>fe</sub>		± 20	%

**TABLE 3 GROUP C INSPECTION**

See Page 3 Quality Assurance Provisions

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym- bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>SUB GROUP 1</u> Omitted								
<u>SUB GROUP 2</u> Shock	5.17	Non operating. 5 blows in each of three mutually perpendicular directions.	6.5	IA				
<u>Post Test End Point</u> <u>Limits for Sub Group 2</u> Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = -80V$ $I_E = 0$			$I_{CBO}$		20	$\mu A$
Small Signal Forward Current Transfer Ratio	7.4.2	$V_{CE} = -5V$ $I_C = 1 \text{ mA}$ $f = 1 \text{ kc/s}$			$h_{fe}$		8	

NOTES

1. The maximum sample size will be 125.
2. Less clause 1.3.3.2 for this particular test.



