

MILITARY SPECIFICATION

CV 7605

SEMICONDUCTOR DEVICE, TRANSISTOR

Description: This specification covers the detail requirements for a NPN Silicon Planar Transistor and is in accordance with K1007 Issue 3, except as otherwise stated.

Mechanical Dimensions and Outlines:- K1007, Section B.
10.3.2.4 and 10.4.2.4

Connections:- Lead 1, Emitter, Lead 2, Base, Lead 3, Collector.
Collector connected to case.

Absolute Maximum Ratings

Rating	V _{CB}	V _{EB}	V _{CEO}	P _{tot}	P _{tot}	P _{tot}	T _{stg}	T _{op}	Shock	Vibration
Unit	V	V	V	W	W	W	°C	°C	g	g
Min	-	-	-	-	-	-	-65	-	-	-
Max	45	5.0	25	1.2	0.68	0.36	+200	200	1500	20
Notes				A	B	C			D	

- Note A. Case temperature 25°C
 B. Case temperature 100°C
 C. Ambient temperature 25°C
 D. Duration 0.5 mS.
 E. Commercial prototype 2N916

CV7605

Primary Electrical Characteristics:-

Characteristic	I_{CBO}	I_{CBO}	h_{fe}	h_{fe}	h_{fe}	h_{FE}	V_{CE} (sat)	V_{BE} (sat)
Unit	nA	μ A					V	V
Min	-	-	40	50	3.0	50	-	-
Max	10	10	200	250	-	200	0.5	0.9
CONDITIONS	T_{amb} °C	25	150	25	25	25	25	25
	V_{CB} V	30	30	-	-	-	-	-
	V_{CE} V	-	-	5	5	15	1.0	-
	I_C mA	-	-	1.0	5.0	10	10	10
	I_B mA	-	-	-	-	-	-	1.0
	I_E mA	0	0	-	-	-	-	-
	f Mc/s	-	-	10^{-3}	10^{-3}	100	-	-

Characteristic	h_{FE}	C_{ob}	C_{ib}
Unit		pF	pF
Min	20	-	-
Max	-	6.0	10
CONDITIONS	T_{amb} °C	-55	25
	V_{CE} V	1.0	-
	V_{CB} V	-	5.0
	V_{EB} V	-	-
	I_C mA	10	-
	I_E mA	-	0
	f Mc/s	-	1.0

Reliability Assurance Provisions:

Under discussion

Requirements:-

Marking The device shall be marked as K1007 Section B 1.3.4.
Minimum requirements are 1.3.4.1 (a) and (c).

Quality Assurance Provisions:-

Destructive Tests The tests listed in Table 2 Group B Inspection, Sub Groups 2, 3 and 4 and Table 3 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, Issue 3 Section A 1.2 (c).

NATO Stock Number 5960-99-037-4061

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

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

18th January 1965

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TABLE 1 GROUP A INSPECTION

Examination or Test	K1007/NATO Ref.	TEST CONDITIONS Specific Conditions	AQL %	Insp. Level	Sym-bol	LIMITS		Units
						Min.	Max.	
<u>SUB GROUP 1</u> Visual and Mechanical Inspection	5.1.1		.65	I				
<u>SUB GROUP 2</u> Collector Voltage	7.2.1	$I_C = 10 \mu A$ $I_E = 0$	1.0	II	BV_{CBO}	45	-	V
Collector Emitter Sustaining Voltage	7.2.2.2.1	$I_C = 10 mA$ tp 300 μSec 1% duty cycle			V_{CE0} (sust)	25	-	V
Emitter Breakdown Voltage	7.2.3	$I_E = 10 \mu A$ $I_C = 0$			BV_{EBO}	5.0	-	V
Static Forward Current Transfer Ratio	7.3.4	$I_C = 10 mA$ $V_{CE} = 1.0V$			h_{FE}	50	200	-
Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = 30V$ $I_E = 0$			I_{CBO}	-	10	nA
<u>SUB GROUP 3</u> Collector Emitter Saturation Voltage	7.3.5	$I_C = 10mA$ $I_B = 1.0 mA$	2.5	I	V_{CE} (sat)	-	0.5	V
Base Emitter Saturation Voltage	7.3.1	$I_C = 10mA$ $I_B = 1.0 mA$			V_{BE} (sat)	-	0.9	V

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 3</u> (Cont'd)							
Transition Frequency	7.5.2	$I_C = 10\text{mA}$ $V_{CE} = 15\text{V}$ $f = 100 \text{ Mc/s.}$		f_T	300	-	Mc/s
<u>SUB GROUP 4</u>			4.0				
Output Capacitance	7.4.8	$V_{CB} = 5.0\text{V}$ $I_E = 0$ $f = 1 \text{ Mc/s.}$ $V_{EB} = 0.5\text{V}$ $I_C = 0$ $f = 1 \text{ Mc/s.}$	IA	C_{ob}	-	6.0	pF
Input Capacitance				C_{ib}	-	10	pF
Collector Base Cut-off Current	7.2.5.1	$T_{amb} = +150^\circ\text{C}$ $V_{CB} = 30\text{V}$ $I_E = 0$		I_{CBO}	-	10	μA
Static Forward Current Transfer Ratio	7.3.4	$T_{amb} = -55^\circ\text{C}$ $I_C = 10\text{mA}$ $V_{CE} = 1.0\text{V}$		h_{FE}	20	-	

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 10.3.2.4 and 10.4.2.4	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							
Thermal Shock	5.6.2	100°C to 0°C						
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1	Non operating	4.0	IA				
Constant Acceleration	5.14	20,000g						
<u>SUB GROUP 4</u> Lead Fatigue	5.10.1	3 cycles	6.5	IA				
<u>SUB GROUP 5 and 6</u> Omitted								
<u>SUB GROUP 7</u> High Temperature Life	6.2.1 6.6.1.2.1	T _{stg} = +200°C Duration 1000 hours.	4.0	I Note 1				

TABLE 2. GROUP B INSPECTION (Cont'd).
See Page 3. Quality Assurance Provisions

Examination or Test	K1007/NATO Ref.	TEST CONDITIONS		AQL %	Insp. Level	Sym-bol	LIMITS		Units
		Specific Conditions					Min.	Max.	
<u>SUB GROUP 8</u> Operating Life	6.3 6.6.1.2.1	Duration 1000 hours $V_{CB} = 20V$ min. $T_{amb} =$ Any single temperature between $25^{\circ}C$ and $175^{\circ}C$ P_C According to the derating curve of the chosen temperature		4.0	IA				
<u>Post Test End Points for SUB GROUPS 2 and 3</u> Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = 30V$ $I_E = 0$				I_{CBO}	-	20	nA
Collector-Emitter Saturation Voltage	7.3.5	$I_C = 10mA$ $I_B = 1.0 mA$				$V_{CE} (sat)$	-	0.55	V
Base Emitter Saturation Voltage	7.3.1	$I_C = 10mA$ $I_B = 1.0 mA$				$V_{BE} (sat)$	-	0.99	V
<u>Post Test End Points for SUB GROUPS 7 and 8</u> Collector-Base Cut-off Current	7.2.5.1	$V_{CB} = 30V$ $I_E = 0$				I_{CBO}	-	20	nA
Static Forward Current Transfer Ratio		$I_C = 10 mA$ $V_{CE} = 1.0 V$				h_{FE}	37.5	250	

TABLE 3. GROUP C INSPECTION
See Page 3. Quality Assurance Provisions

Examination or Test	K1007/NATO Ref.	TEST CONDITIONS		AQL %	Insp. Level	Sym. bol	Limits		Units
		Specific Conditions					Min.	Max.	
SUB GROUP 1 Small Signal Forward Current Transfer Ratio	7.4.2	$I_C = 1 \text{ mA}$	II	2.5		h_{fe}	40	200	
		$V_{CE} = 5V$							
		$f = 1 \text{ kc/s}$							
		$I_C = 5 \text{ mA}$							
		$V_{CE} = 5 V$							
Small Signal Input Resistance	7.4.1	$I_C = 1 \text{ mA}$				h_{ie}	-	6000	ohms
		$V_{CE} = 5.0V$							
		$f = 1 \text{ kc/s.}$							
		$I_C = 5 \text{ mA}$							
		$V_{CE} = 5V$							
Small Signal Output Conductance	7.4.4	$f = 1 \text{ kc/s.}$				h_{oe}	-	75	μ/mhos
		$I_C = 1.0 \text{ mA}$							
		$V_{CE} = 5V$							
		$f = 1 \text{ kc/s.}$							
		$I_C = 5.0 \text{ mA}$							
	7.4.4	$V_{CE} = 5V$				h_{oe}	-	125	μ/mhos
		$f = 1 \text{ kc/s.}$							
		$f = 1 \text{ kc/s.}$							

TABLE 3. GROUP C INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQI %	Insp. Level	Sym- bol	Limits		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<p><u>SUB GROUP 2</u></p> <p>Shock</p> <p><u>Post Test End Points</u></p> <p>As for Group B Inspection, Sub- Groups 2 and 3</p>	5.17.1	5 blows in each of three mutually perpendicular directions	6.5	IA				

NOTES

1. The maximum sample size is 125

