

ELECTRONIC VALVE SPECIFICATIONS
SPECIFICATION CV7492
ISSUE 1. DATED 12th DECEMBER, 1963.

AMENDMENT No. 1

Page 8. Sub Group 8. Insert 6.6.1.2.2 below 6.3.

January, 1965.

Ministry of Aviation /RRE

N.253566

ELECTRONIC VALVE SPECIFICATIONS
SPECIFICATION CV7492 ISSUE 1. DATED 12.12.1963.
AMENDMENT No. 2

Page 8. Against 6.6.1.2.2. Under "Specific Conditions"

Delete: +75°C
Insert: +25°C

Under K1007/NATO Ref.

Delete: 6.6.1.2.2.
Insert: 6.6.1.2.1.

/Page 9.

P.T.O.

Page 9. Against 7.4.1. in Min and Max Columns

Delete: 2 Min 40 Max

Insert: 1.5 Min 9 Max

Against 7.4.3. in Max Col.

Delete: 4 x 10^{-4}

Insert: 8 x 10^{-4}

Against 7.4.4. in Min and Max Cols.

Delete: 8 Min 50 Max

Insert: 6 Min 15 Max

Ministry of Aviation/RRE

February, 1965.

(269198)

MILITARY SPECIFICATION
CV 7492
SEMICONDUCTOR DEVICE, TRANSISTORS

2N929

Description:- This specification covers the detail requirements for Silicon Planar NPN transistors intended for low level, low noise amplifier applications 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:- Collector connected to case.
Lead 1. Emitter, Lead 2. Base and Lead 3. Collector.

Absolute Maximum Ratings:-

RATING	V _{CB}	V _{CE}	V _{EB}	I _C	I _B	I _E	P _{tot}	T _{opr}	T _{stg}	Shock	Vibration
UNIT	V	V	V	mA	mA	mA	mW	°C	°C	g	g
MIN	-	-	-	-	-	-	-	-	-65	-	-
MAX	45	45	5	30	5	35	300	175	+200	1500	20
NOTE							A			B	

- Notes : A See derating curve Fig. 1 Page 12
 B Duration 0.5 mS.
 C Commercial equivalent 2N929

CV7492

Primary Electrical Characteristics:-

Characteristic		$I_{CES(1)}$	$I_{CES(2)}$	h_{FE}	V_{CE} (sat)	fT	C_{ob}	F
Unit		nA	μ A	-	V	Mc/s	pF	db
CV7492	Min.	-	-	40	-	30	-	-
	Max.	10	10	120	1.0	-	8	4
CONDITIONS	T_{amb} °C	25	150	25	25	25	25	25
	V_{CB} V	-	-	-	-	-	5	5
	V_{CE} V	45	45	5	-	5	-	-
	V_{EB} V	0	0	-	-	-	-	-
	I_C mA	-	-	.01	10	0.5	-	0.01
	I_E mA	-	-	-	-	-	0	-
	I_B mA	-	-	-	0.5	-	-	-
	f Mc/s	-	-	-	-	30	1	10c/s- 10Kc/s

Reliability Assurance Requirements:-

Under discussion

Requirements:-

Marking: The device shall be marked according to K1007, Issue 3. 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 Group 2 and 3 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 Issue 3. Section A.1.2 (c).

Joint Service Catalogue Number:-

CV7492 = 5960-99-037-3703

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

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

12th December, 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	II					
<u>SUB GROUP 2</u> Collector-emitter cut-off current (1)	7.2.5.4	$V_{CE} = 4.5V$ $V_{BE} = 0$	1.0	II		I_{CES}	-	10	nA
Collector-emitter cut-off current	7.2.5.2	$V_{CE} = 5V$ $I_B = 0$				I_{CEO}	-	2	nA
Emitter-base cut-off current	7.2.6	$V_{EB} = 5V$ $I_C = 0$				I_{EBO}	-	10	nA
Static Forward Current Transfer Ratio (1)	7.3.4	$V_{CE} = 5V$ $I_C = 10\mu A$				h_{FE}	40	120	V
Collector-emitter Saturation Voltage	7.3.3	$I_C = 10mA$ $I_B = 0.5mA$ Pulse Duty cycle $\leq 2\%$ Pulse width $\leq 300 \mu S$				$V_{CE} (sat)$	-	1.0	V
<u>SUB GROUP 3</u> Static Forward Current Transfer Ratio (2)	7.3.4	$V_{CE} = 5V$ $I_C = 500 \mu A$	4.0	I		h_{FE}	60	-	

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.	
SUB GROUP 3 (Cont'd) Static Forward Current Transfer Ratio (3)	7.3.4	$V_{CE} = 5V$ $I_C = 10mA$ Pulse Duty cycle 2% Pulse width 300 μS				h_{FE}	100	350	
		$V_{CE} = 5V$ $I_C = 1mA$ $f = 1 Kc/s$				h_{fe}	60	-	
		$I_C = 10mA$ $I_B = 0.5mA$ Pulse Duty Cycle 2% Pulse width 300 μS				V_{BE} (sat)	-	1.0	V
Base-emitter Saturation Voltage	7.3.1	$V_{CE} = 5V$ $I_C = 10\mu A$ $R_g = 10Kohm$ Bandwidth 10 c/s - 10Kc/s See Note 3				F	-	4	dB

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.	
SUB GROUP 4 Collector-emitter out-off current (2)	7.2.5.4	T_{amb}	= 150°C	4	IA	I_{CES}	-	10	μA
		V_{CE}	= 45V						
		V_{BE}	= 0						
Static Forward Current Transfer Ratio (4)	7.3.4	T_{amb}	= 55°C	4	IA	h_{FE}	10	-	μA
		V_{CE}	= 5V						
		I_C	= 10 μA						
Small Signal Forward Current Transfer Ratio	7.5.2	V_{CE}	= 5V	4	IA	h_{fe}	1	-	μA
		I_C	= 500 μA						
		f	= 30 Mc/s						
Collector Base Capacitance	7.4.8	V_{CB}	= 5V	4	IA	C_{ob}	-	8	pF
		I_E	= 0						
		f	= 1 Mc/s						

TABLE 2 GROUP B 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.	
<u>SUB GROUP 1</u> Physical Dimensions	5.1	According to drawings 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	-65°C to +200°C							
Moisture Resistance	5.3								
<u>SUB GROUP 3</u> Vibration Fatigue	5.15.1								
<u>SUB GROUP 4</u> Lead Fatigue	5.10.2	3 cycles							
<u>SUB GROUP 5</u> Omitted									
<u>SUB GROUP 6</u> Omitted									
<u>SUB GROUP 7</u> High Temperature Life	6.2.1 6.6.1.2.2	T _{stg} = 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. Sym- Level	Sym- bol	LIMITS		Units
		Specific Conditions					Min.	Max.	
<u>SUB GROUP 8</u> Operating Life	6.3	<p>T_{amb} at any single temperature between $+75^{\circ}C$ and $+150^{\circ}C$.</p> <p>$V_{CB} = 30V$ min.</p> <p>P_{tot} corresponding to the appropriate temperature on the derating curve.</p> <p>Duration 1000 hours,</p>	4.0	IA					
<u>Post Test End Points for Sub Groups 2, 3, 7 and 8</u>									
Collector-Emitter cut-off Current (1)	7.2.5.4	<p>$V_{CE} = 4.5V$</p> <p>$I_E = 0$</p>				I_{CES}	-	20	nA
Static Forward Current Transfer Ratio (1)	7.3.4	<p>$V_{CE} = 5V$</p> <p>$I_C = 10\mu A$</p>				h_{FE}	32	144	

TABLE 3 GROUP C INSPECTION
See Page 3 Quality Assurance Provisions

Examination or Test	K1007/NATO Ref.	TEST CONDITIONS Specific Conditions	AQL %	Insp. Level	Sym-bol	LIMITS		Units
						Min.	Max.	
<u>SUB GROUP 1</u> Collector-Emitter Breakdown Voltage	7.2.2.1	$I_C = 10\text{mA}$ $I_B = 0$ Pulse duration 300 μSec Duty Cycle 2%	1.0	II	BV_{CEO}	45	-	V
Small-signal short-circuit input impedance	7.4.1	$V_{CE} = 5\text{V}$ $I_C = 1\text{mA}$ $f = 1 \text{ Kc/s}$			h_{ie}	2	40	kohms.
Small-signal open-circuit reverse voltage transfer ratio	7.4.3	$V_{CE} = 5\text{V}$ $I_C = 1 \text{ mA}$ $f = 1 \text{ Kc/s}$			h_{re}	-	4×10^{-4}	
Small-signal open-circuit output admittance	7.4.4	$V_{CE} = 5\text{V}$ $I_C = 1 \text{ mA}$ $f = 1 \text{ Kc/s}$			h_{oe}	8	50	μmho
<u>SUB GROUP 2</u> Shock	5.17.1	Non operating. 5 blows in each of 3 mutually perpendicular directions	6.5	IA				

TABLE 3 GROUP C INSPECTION (Cont'd)

Examination or Test	TEST CONDITIONS		AQL %	Insp. Level	Sym-bol	LIMITS		Units
	K1007/NATO Ref.	Specific Conditions				Min.	Max.	
<u>Post Test End Points</u> Collector-Emitter cut-off Current (1)	7.2.5.4	$V_{CE} = 4.5V$ $I_E = 0$			I_{CES}	-	20	nA
Static Forward Current Transfer Ratio (1)		$V_{CE} = 5V$ $I_C = 10\mu A$			h_{FE}	32	144	

Fig 1

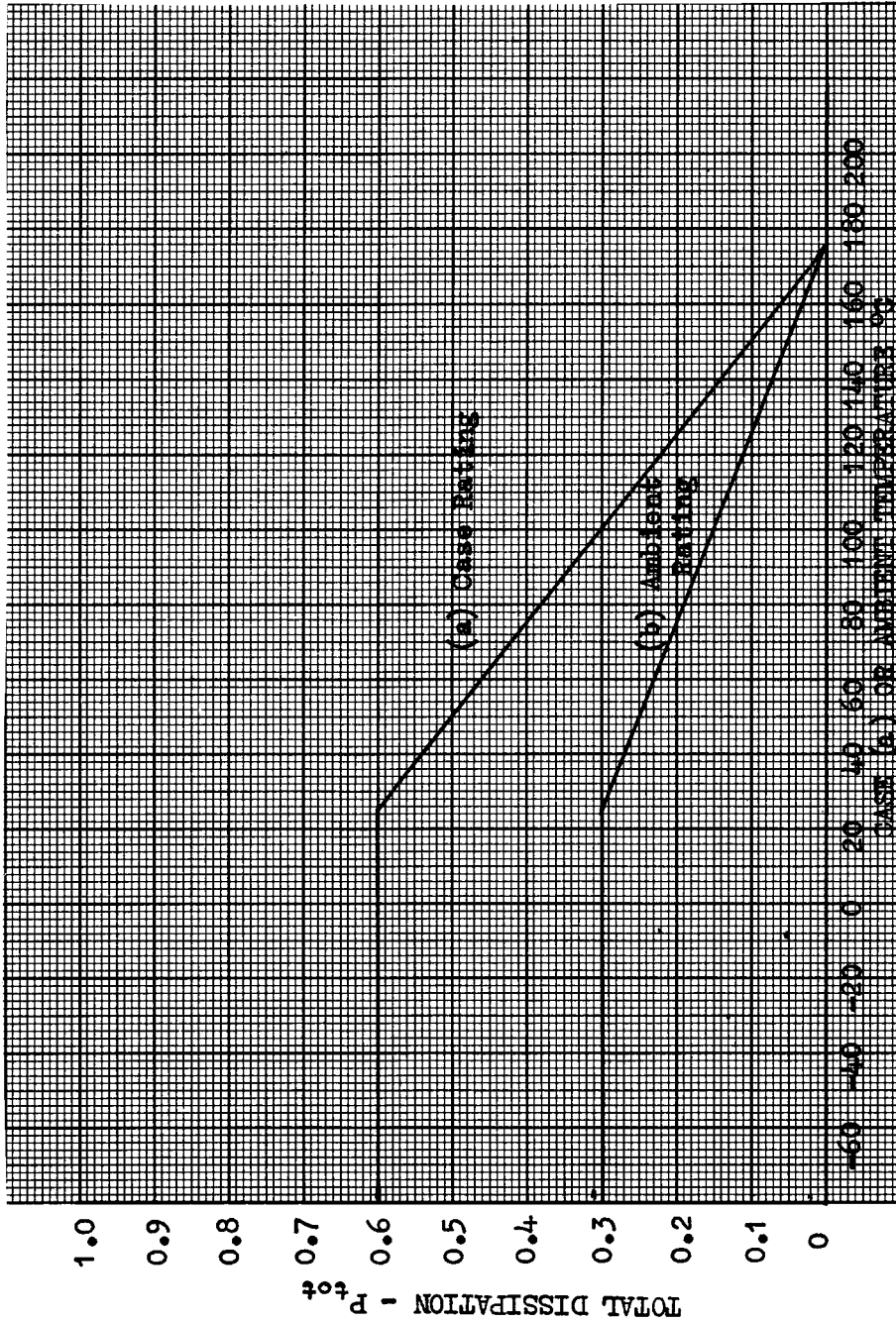


Fig 2

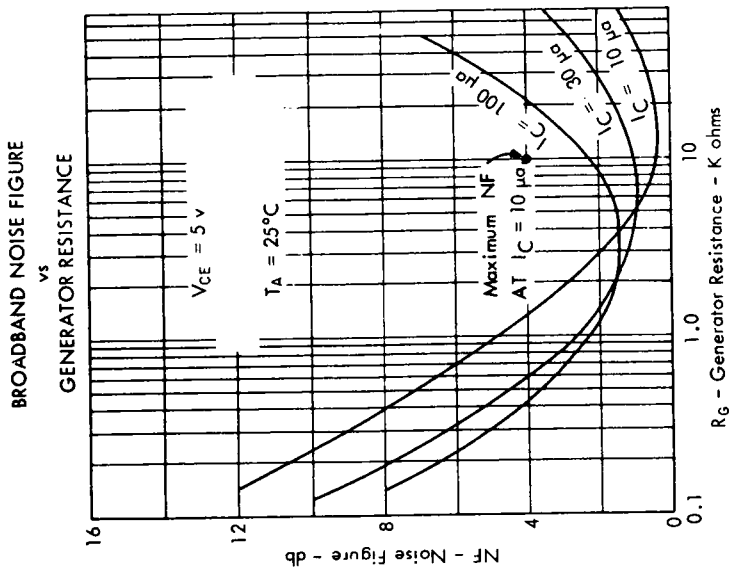
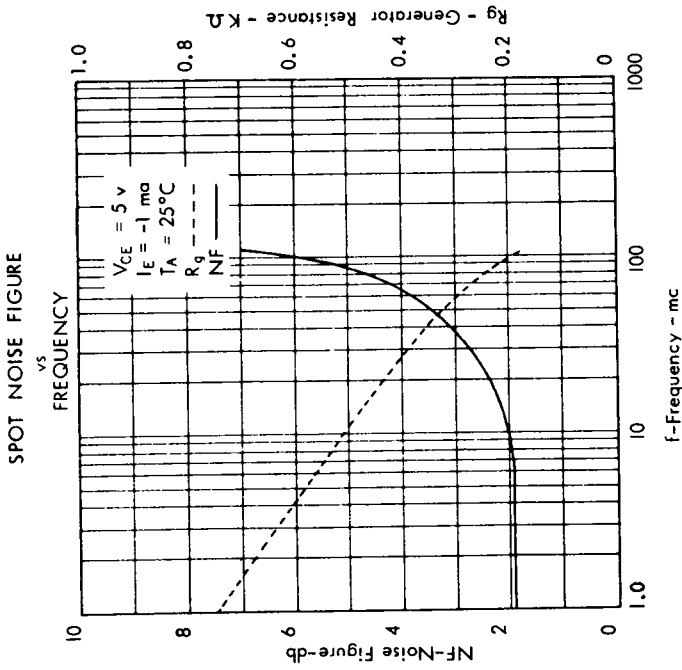


Fig 3



NOTE: R_G adjusted at each frequency to value shown on curve above.