

## MILITARY SPECIFICATION

## CV7397 - 7403

SEMICONDUCTOR DEVICE, DIODES  
IN950, IN951, IN952, IN953, IN954, IN955, IN956

Description:- This specification covers the detail requirements for Silicon Variable Capacitance Diodes and is in accordance with Specification K1007, except as otherwise stated.

Mechanical Dimensions and Outlines:- K1007, Section B, 10.3.3.4.

Connections:- K1007, Section B, 1.3.4.4.

Absolute Maximum Ratings:-

Rating	V <sub>R</sub>							T <sub>amb</sub>	P <sub>(avg)</sub>	Shock	Vibra- tion
	CV7397	CV7398	CV7399	CV7400	CV7401	CV7402	CV7403				
Unit	V	V	V	V	V	V	V	°C	°C	g	g
Min.								-55	-55		
Max.	130	80	60	25	25	25	25	150	150	1500	20
Note										1	

NOTES:-  
1. 0.5 mS duration  
2. Commercial Equivalents:-

CV7397 - HC7001  
CV7398 - HC7002  
CV7399 - HC7004  
CV7400 - HC7005  
CV7401 - HC7006  
CV7402 - HC7007  
CV7403 - HC7008

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1st August 1963

Page 1

# CV7397-7403

## Primary Electrical Characteristics

Characteristic		$I_R$		$C$	Capacitance Range	$Q$	
Unit		$\mu A$		pF	pF	-	
CV7397	Min.			28	6	100	
	Typ.					450	45
	Max.	1.0	10	42	88		
CV7398	Min.			40	12	200	
	Typ.					550	55
	Max.	1.0	10	60	120		
CV7399	Min.			56	20	200	
	Typ.					550	55
	Max.	1.0	10	84	170		
CV7400	Min.			80	46	200	
	Typ.					425	43
	Max.	1.0	10	120	240		
CV7401	Min.			28	14	30	
	Typ.					175	18
	Max.	1.0	10	42	88		
CV7402	Min.			40	22	150	
	Typ.					275	28
	Max.	1.0	10	60	120		
CV7403	Min.			56	32	300	
	Typ.					425	43
	Max.	1.0	10	84	170		
Conditions	$V_R$	V		Rated Maximum	4	0.1V to Rated Max.	
	$f$	Mc/s		-	-	5	50
	$T_{amb.}$	°C		25	100	25	25

REQUIREMENTS:-

Marking. K1007, Section B.1.3.4.

QUALITY ASSURANCE PROVISIONS:-

Destructive Tests. The tests listed in Table II Group B Inspection, Subgroups 2, 3 and 4 and in Table III Group C Inspection, Subgroup 2 are considered destructive.

Group C Inspection. Inspection shall be conducted on the initial lot and thereafter every 90 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).

JOINT SERVICE CATALOGUE NUMBERS:-

CV7397	5960-99-037-3429
CV7398	5960-99-037-3430
CV7399	5960-99-037-3431
CV7400	5960-99-037-3432
CV7401	5960-99-037-3433
CV7402	5960-99-037-3434
CV7403	5960-99-037-3435

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

Admiralty Surface Weapons Establishment,  
Pertsdown, Cosham,  
Pertsmouth, Hants, England.

1st August, 1963

Page 3

**GROUP A INSPECTION**

**Table I**

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	MIL-STD-1007/ MIL-STD-100 Ref.	Specific Conditions				Min.	Max.	
<u>SUBGROUP 1</u> Visual and Mechanical Inspection.	5.1	Excluding Physical Dimensions	0.65	I				
<u>SUBGROUP 2</u> Capacitance	8A.5.1.	$V_R = -4V$ $f = 5 \text{ Mc/s}$ CV7397, CV7401 CV7398, CV7402 CV7399, CV7403 CV7400.	0.65	II	c	28 40 56 80	42 60 84 120	pF pF pF pF
Reverse Current	8A.2.2.	$T_{amb.} = 25^\circ C$ $V_R = -130V$ $V_R = -80V$ $V_R = -60V$ $V_R = -25V$ CV7397 CV7398 CV7399 CV7400-3			I <sub>R</sub>		1.0 1.0 1.0 1.0	$\mu A$ $\mu A$ $\mu A$ $\mu A$

Table I GROUP A INSPECTION CONT'D

Examination or Test	Test Conditions	AQL %	Insp. Level	Symbol	Limits		Units
					Min.	Max.	
<u>SUBGROUP 3</u> Quality Factor	K1007/ NATO Ref.	4.0	I	Q			
	8A.5.1.						
	Using circuit of Fig. 8A.5.1/1 measure R and C of device on the R.F. Bridge. Then $Q = \frac{1}{2fCR}$ $V_R = -130V$ CV7397 $V_R = -80V$ CV7398 $V_R = -60V$ CV7399 $V_R = -25V$ (CV7400 (CV7401 (CV7402 (CV7403				100 200 200 200 30 150 300		

**Table II**  
**GROUP B INSPECTION**  
 See Page 3 Quality Assurance Provisions

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ MIL-STD-200 Ref.	Specific Conditions				Min.	Max.	
<u>SUBGROUP 1</u> Physical Dimensions	5.1	According to drawing 10.3.3.4.	6.5	IG				
<u>SUBGROUP 2</u> Solderability	5.13		4.0	IA				
Temperature Cycling	5.5	-55°C to + 100°C						
Moisture Resistance	5.3							
<u>SUBGROUP 3</u> Vibration Fatigue	5.15	Non-operating	4.0	IA				
<u>SUBGROUP 4</u> Lead Fatigue	5.10.2	1 cycle	6.5	IA				
<u>SUBGROUP 5</u> Omitted								
<u>SUBGROUP 6</u> Omitted								

GROUP B INSPECTION CONT'D

Table II

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ MATO Ref.	Specific Conditions				Min.	Max.	
<u>SUBGROUP 7</u> High Temperature Life (Non-operating)	6.2.1, 6.6.1.2.2.	T <sub>amb.</sub> = +100°C t = 1000 hrs.	4.0	IA				
<u>SUBGROUP 8</u> Operating Life	6.3. 6.5. 6.6.1.1. 6.6.1.2.2.	T <sub>amb.</sub> = 100°C VR = -130V VR = -80V VR = -60V VR = -25V	4.0	IA				
<u>POST TEST END POINTS FOR SUBGROUPS 2, 3, 7 AND 8</u> Capacitance	8A.5.1.	As in Group A, Subgroup 2  CV7397, CV7401 CV7398, CV7402 CV7399, CV7403 CV7400			C	27 39 55 78	43 62 86 123	pF pF pF pF
Reverse Current	8A.2.2.	As in Group A, Subgroup 2			IR		1.5	/uA

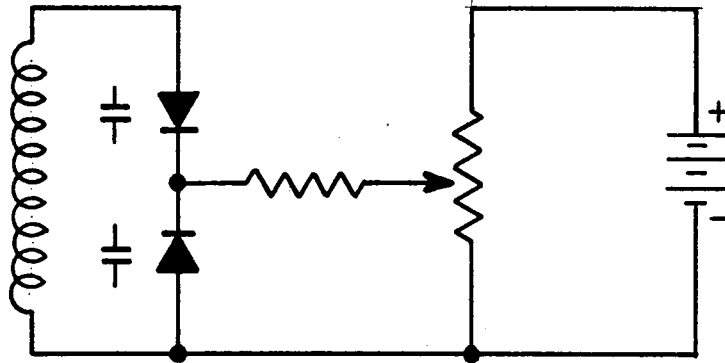
Table III

GROUP C INSPECTION

See Page 3 Quality Assurance Provisions

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ MAYO REF.	Specific Conditions				Min.	Max.	
<u>SUBGROUP 1</u>								
Omitted.								
<u>SUBGROUP 2</u>			6.5	IA	G			
Sheek	5.17	Non-operating. Five blows each orientation: Y1, Y2, X and Z.				27	43	PF
<u>POST TEST END POINTS FOR SUBGROUP 2</u>						39	62	PF
Capacitance	8A.5.1.	As in Group A, Subgroup 2				55	86	PF
		CV7397, CV7401 CV7398, CV7402 CV7399, CV7403 CV7400.				78	123	PF
Reverse Current	8A.2.2.	As in Group A, Subgroup 2			IR		1.5	/uA





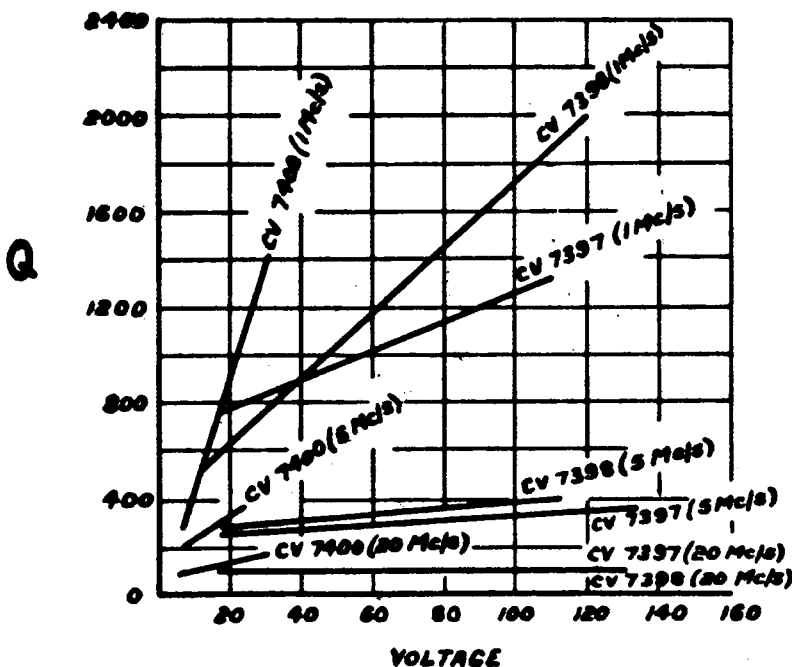
### TYPICAL BIASING ARRANGEMENT

To obtain the greatest capacitance range, the bias voltage range should be as large as possible.

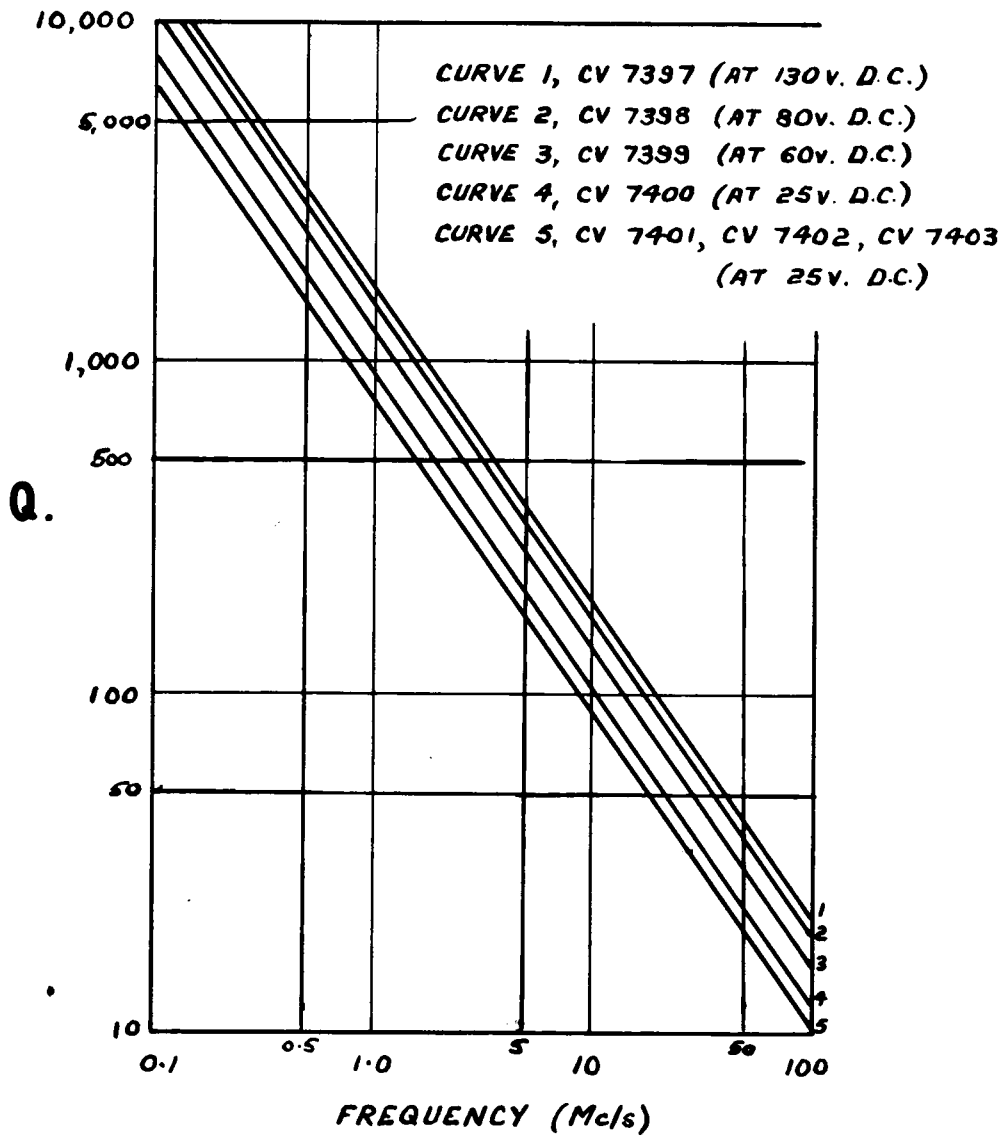
The minimum bias voltage is normally zero but to obtain the maximum capacitance, a small voltage (up to 0.4 Volts) in the opposite direction is permissible. At low bias voltages the peaks of signal voltage may exceed the bias voltage and cause conduction and clipping of the signal. This produces distortion and self-biasing due to rectification of the signal. Distortion may be prevented by connecting two capacitors back to back so that no current can flow. With this arrangement, capacitance changes of 10 to 1 have been achieved and frequency ranges comparable with the broadcast band have been covered.

The bias circuit may be isolated from the signal circuit by resistors with values up to several megohms. The bias current, and therefore the voltage drop across the resistors, is negligible.

When the bias voltage contains high frequency components, the biasing network must be arranged so that it does not load the Q of the RF tuned circuit below a usable level. In addition, the biasing network looking toward the tuned circuit must not attenuate the desired high frequency components of the bias voltage.



TYPICAL Q AGAINST VOLTAGE CURVES AT  
VARIOUS FREQUENCIES AT 25<sup>0</sup>C



## TYPICAL Q vs. FREQUENCY CURVES

