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_R							T_{amb}	$T_{(stg)}$	Shock	Vibration
	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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Primary Electrical Characteristics

Characteristic		I_R		C	Capacitance Range	Q	
Unit		/uA		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.	Rated Maximum	
	f Mc/s	-	-			5	50
	Tamb. °C	25	100	25	25	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,
Portsdown, Cosham,
Portsmouth, Hants, England.

Table I

GROUP A INSPECTION

Examination or Test	Test Conditions		AQL %	Insp. Level	Symbol	Limits		Units
	K1007/ NATO Ref.	Specific Conditions				Min.	Max.	
SUBGROUP 1			0.65	I				
Visual and Mechanical Inspection.	5.1	Excluding Physical Dimensions						
SUBGROUP 2			0.65	II				
Capacitance	8A.5.1.	V_R = -4V f = 5 Mc/s			C			
		CV7397, CV7401				28	42	pF
		CV7398, CV7402				40	60	pF
		CV7399, CV7403				56	84	pF
		CV7400.				80	120	pF
Reverse Current	8A.2.2.	$T_{amb.}$ = 25°C			I_R			
		V_R = -130V CV7397					1.0	/uA
		V_R = -80V CV7398					1.0	/uA
		V_R = -60V CV7399					1.0	/uA
		V_R = -25V CV7400-3					1.0	/uA

Table I

GROUP A INSPECTION CONT'D

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

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Table II

GROUP B INSPECTION

See Page 3 Quality Assurance Provisions

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

Table II

GROUP B INSPECTION CONT'D

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

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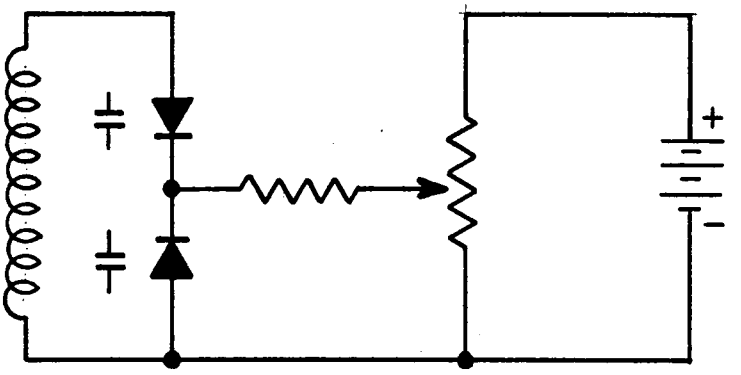
Table III

GROUP C INSPECTION

See Page 3 Quality Assurance Provisions

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



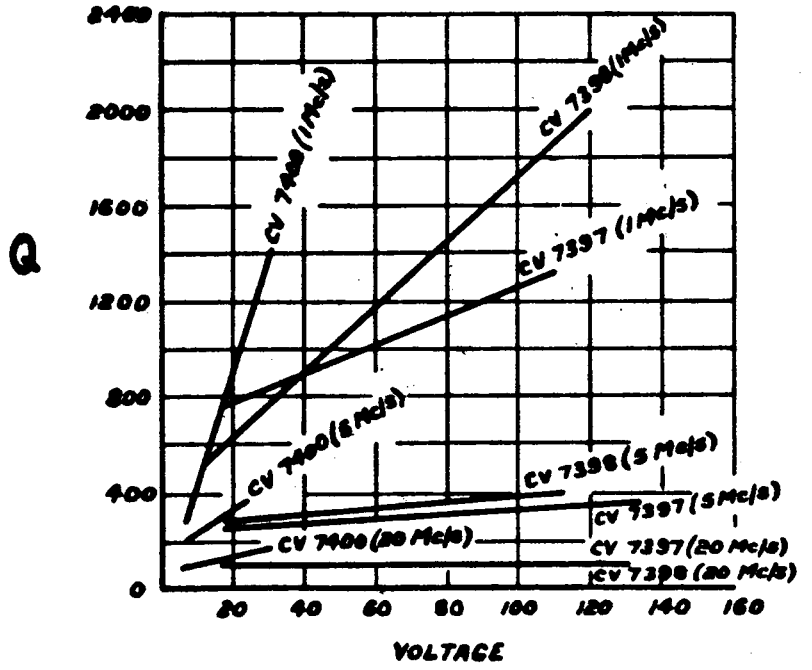
TYPICAL BIASING ARRANGEMENT

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

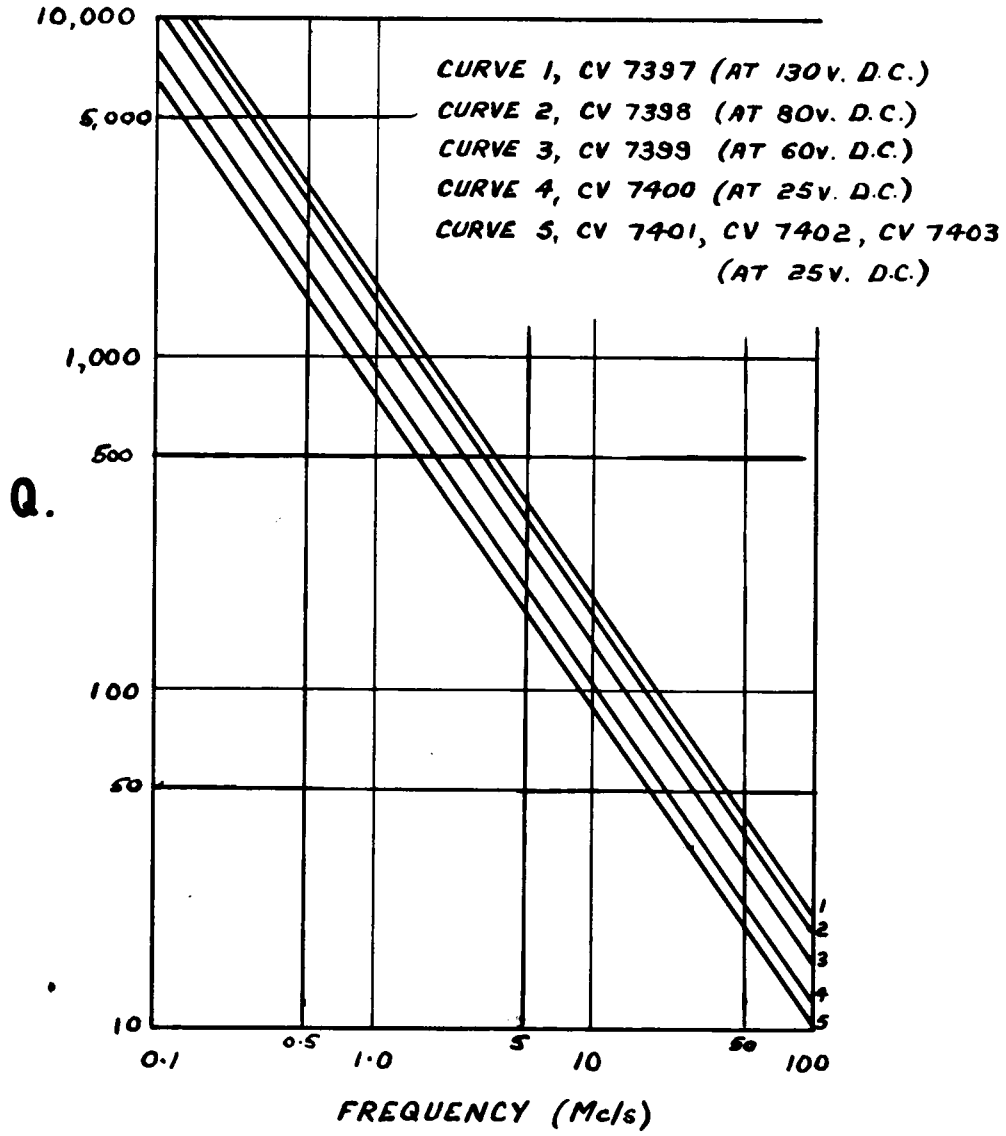
The minimum bias voltage is normally zero but to obtain the maximum capacitance, a small voltage (up to 0.4 Volts) in the opposite direction is permissible. At low bias voltages the peaks of signal voltage may exceed the bias voltage and cause conduction and clipping of the signal. This produces distortion 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.

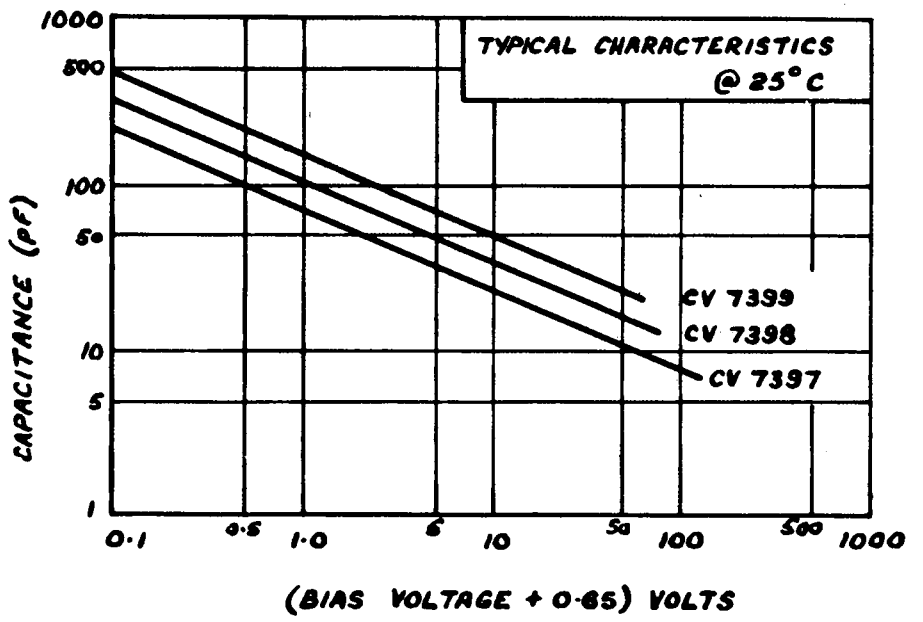
When the bias voltage contains high frequency components, the biasing network must be arranged so that it does not load the Q of the RF tuned circuit below a usable level. In addition, the biasing network looking toward the tuned circuit must not attenuate the desired high frequency components of the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

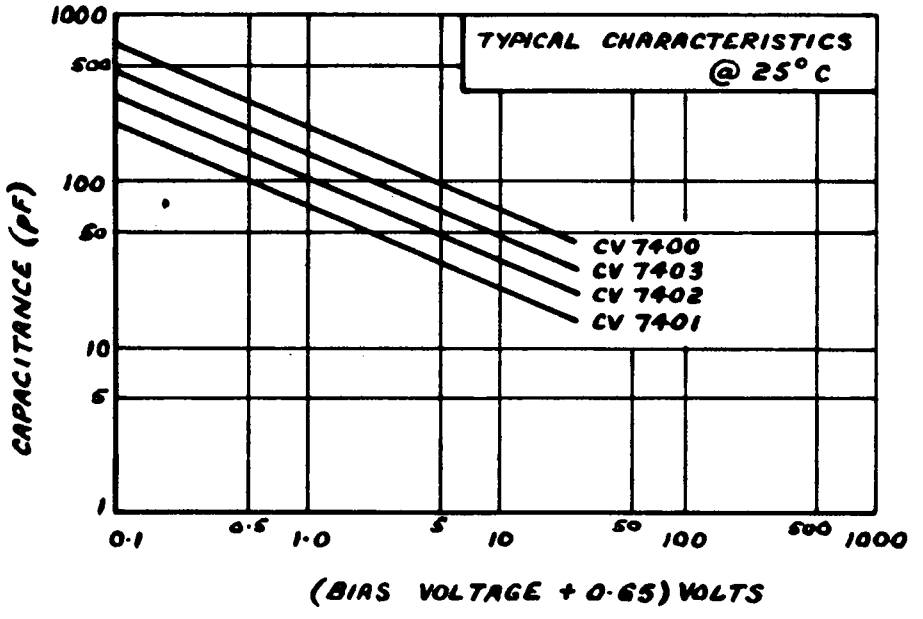


TYPICAL Q AGAINST VOLTAGE CURVES AT VARIOUS FREQUENCIES AT 25°C



TYPICAL Q vs. FREQUENCY CURVES


TYPICAL CHARACTERISTICS
@ 25°C
CV 7399
CV 7398
CV 7397
CAPACITANCE (pF)
1000
500
100
50
10
5
1
0·1
0·5
1·0
5
10
50
100
500
1000
(BIAS VOLTAGE + 0·65) VOLTS


TYPICAL CHARACTERISTICS
@ 25°C
CV 7400
CV 7403
CV 7402
CV 7401
CAPACITANCE (pF)
1000
500
100
50
10
5
1
0·1
0·5
1·0
5
10
50
100
500
1000
(BIAS VOLTAGE + 0·65) VOLTS