Mullard
tubes and special products

quick reference and equivalents guide 1972-73

Also available, companion guides covering semiconductors and passive components

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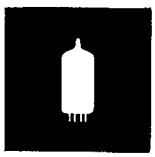

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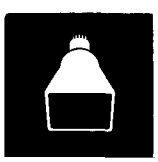

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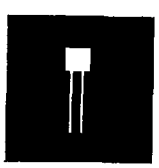

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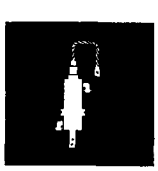

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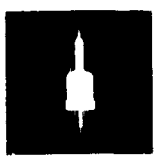

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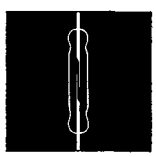

60 **Dry Reed Switch**

† Abridged data on phototransistors, photodiodes and infrared photoconductive detectors appear in a companion guide called "Semiconductor Quick Reference Guide".

Tubes and special products quick reference and equivalents guide 1972/73

This guide presents quick reference data on the Design and Current ranges of Mullard tubes and special products, together with a guide to the valves and tubes for which Mullard types may be used as replacements.

Product information is deliberately abbreviated to give a rapid appreciation of salient characteristics, and to enable the performance of similar types to be compared quickly.

Full technical data on individual products, and details of the Mullard Technical Handbook, may be obtained from Mullard Ltd.

For the convenience of Handbook users, the relevant book and part number are indicated at the top of each data table in the guide ; data sheets for some new types may still be in preparation.

Mullard technical information service

Quick reference information

The most important characteristics of the current ranges of Mullard valves, tubes and special products are given in this guide.

Full technical data

Individual data sheets giving full technical data on each product are readily available, and may be obtained by quoting the relevant type number. In addition, laboratory reports, applications reports and technical publications of many kinds are regularly issued.

Technical Handbook system

The Mullard Technical Handbook system of data is made up of three sets of books, each comprising several parts.
The three sets of books, easily identifiable by the colours of their covers, are as follows :

Book 1	(blue)	Semiconductor devices and integrated circuits
Book 2	(orange)	Valves and tubes
Book 3	(green)	Passive components and materials

New editions are issued at approximately yearly intervals.

New product information

As a further part of the information service, advance details of each new product or technique are published in the Mullard Bulletin, which is sent automatically to people who have asked to be kept informed of new introductions.

Mullard Limited, Mullard House, Torrington Place, London WC1 E 7HD Telephone 01-580 6633 Telex 264341.

Index and equivalents

Foreword

This section presents an index of all Mullard Valves and Tubes, together with a comprehensive guide to various valves and tubes for which Mullard types may be used as replacements.

For ease of reference all types are listed together in alphabetical-numerical order in the 'Type Number Index' column which comprises Mullard types, CV types, American/E.I.A. types, and types from other manufacturers.

status code

In view of the wide variety of Mullard types, and in order that their status may be readily assessed, the following coding has been used :

D Design Type. Recommended for new equipment designs.

C Current Type. Available for equipment production and use in existing equipment installations. No longer recommended for new equipment designs.

M Maintenance Type. Available for the maintenance of existing equipments only. No longer recommended for equipment production.

O Obsolete Type. No longer generally available, although in some cases limited stocks may still exist.

S Special Type. Subject to negotiation at time of ordering.

Index and equivalents

Type number index	Mullard replacements: Mullard type number	Status	Data Page
A28-14W	**A28-14W**	M	
A31-120W	**A31-120W**	D	22
A44-120W	**A44-120W**	D	22
A44-120W/R	**A44-120W/R**	D	22
A47-11W	**A47-26W**	M	
A47-13W	**A47-26W/inckit**	M	
A47-14W	**A47-14W**	M	
A47-15W	**A47-14W**	M	
A47-17W	**A47-26W**	M	
A47-18W	**A47-26W**	M	
A47-25W	**A47-26W**	M	
A47-26W	**A47-26W**	M	
A47-26W/R	**A47-26W/R**	M	
A47-27W	**A47-26W**	M	
A47-28W	**A47-26W**	M	
A47-28W/R	**A47-26W/R**	M	
A49-11X	**A49-120X**	C	22
A49-15X	**A49-120X**	C	22
A49-18X	**A49-120X**	C	22
A49-191X	**A49-120X**	C	22
A49-120X	**A49-120X**	C	22
A49-200X	**A49-120X**	C	22
A50-120W	**A50-120W**	D	22
A50-120W/R	**A50-120W/R**	D	22
A56-120X	**A56-120X**	D	22
A59-11W	**A59-23W**	M	
A59-12W	**A59-23W**	M	
A59-13W	**A59-23W/inckit**	M	
A59-14W	**A59-23W/inckit**	M	
A59-15W	**A59-15W**	M	
A59-16W	**A59-23W/inckit**	M	
A59-23W	**A59-23W**	M	
A59-23W/R	**A59-23W/R**	M	
A59-25W	**A59-23W**	M	
A61-120W	**A61-120W**	D	22
A61-120W/R	**A61-120W/R**	D	22
A63-11X	**A63-120X**	M	
A63-120X	**A63-120X**	M	
A63-200X	**A63-120X**	M	
A65-11W	**A65-11W**	M	
A66-120X	**A66-120X**	D	22
*A206	**RY12-100**	O	
*A1834	**6080**	C	
A2327	**TD03-10F**	M	
AAY34	**AAY34**	D	52
AAY39	**AAY39**	D	52
AAY39A	**AAY39A**	D	52
AAY50	**AAY50**	C	52
AAY50R	**AAY50R**	C	52
AAY51	**AAY51**	D	52
AAY51R	**AAY51R**	D	52
AAY52	**AAY52**	D	52
AAY52R	**AAY52R**	D	52
AAY56	**AAY56**	C	
AAY56R	**AAY56R**	C	
AAY59	**AAY59**	D	52
ACS4	**QY5-3000A**	C	
ACT70	**TY6-5000B** / **YD1120**	M	
AEY13	**AEY13**	C	52
AEY15	**AEY15**	C	52
AEY16	**AEY16**	C	52
AEY17	**AEY17**	D	53
AEY29	**AEY29**	D	53
AEY29R	**AEY29R**	D	
AEY31	**AEY31**	D	53
AEY31A	**AEY31A**	D	53

Type number index	Mullard replacements: Mullard type number	Status	Data Page
AG866A	**RG3-250A**	C	37
AG5209	†**85A2**	D	33
AG5210	†**108C1**	D	33
AG5211	†**150C2**	D	33
AH201	**RG3-250A**	C	37
AH221	**RG4-1250**	C	37
AH238	**RG3-1250**	C	37
AN1	**AN1**	O	
AR10	**ZX1052**	C	36
AR10T	**ZX1052**	C	36
AR14	**ZX1051**	C	36
AR14T	**ZX1051**	C	36
ASG5121	†**EN91**	D	36
ASG5823	**Z900T**	C	35
AW43-88	**AW43-88**	O	
AW43-89	**AW43-89**	O	
AW47-90	**A47-14W**	M	
AW47-91	**A47-14W**	M	
AW53-88	**AW53-88**	O	
AW59-90	**A59-15W**	M	
AW59-91	**A59-15W**	M	
AX224	**RR3-250**	C	37
AX228	**RR3-1250A**	C	37
AX230	**RR3-1250**	C	37
AX9900	**TY2-125**	C	39, 43
AX9901	**TY4-400**	C	39, 43
AX9902	**TY4-500**	D	39, 43
AX9903	**QQV06-40A**	C	42
AX9904	**TY6-5000W**	C	43
AX9904R	**TY6-5000A**	C	43
AX9906	**TY12-50W**	M	
AX9907	**QY5-3000W**	C	40, 41
AX9907R	**QY5-3000A**	C	40, 41
AX9908	**QY5-500**	D	40, 41
AX9910	**QQV03-20A**	C	42
AX9911	**XH8-100**	O	
AX9912	**XH16-200**	O	
B109	**UCC85**	M	
B152	†**ECC81**	C	20
B309	†**ECC81**	C	20
B310AL	**B310AL**	D	56
B310BL	**B310BL**	D	56
B312AL	**B312AL**	D	56
B312BL	**B312BL**	D	56
B318AL	**B318AL**	D	56
B318BL	**B318BL**	D	56
B319	**PCC84**	M	
B329	†**ECC82**	C	20
B330AL	**B330AL**	D	56
B330BL	**B330BL**	D	56
B339	†**ECC83**	C	20
B410AL	**B410AL**	D	56
B410BL	**B410BL**	D	56
B419AL	**B419AL**	D	56
B419BL	**B419BL**	D	56
*B593	**55335**	D	50
B719	**ECC85**	M	
B1135	**TY4-400**	C	39, 43
B1152	**TY5-500**	D	39
*B5031	**ZM1020**	C	34
BAV22	**BAV22**	D	52
BAV22R	**BAV22R**	D	52
BAV46	**BAV46**	D	53
BAV75	**BAV75**	D	53
BAW95D	**BAW95D**	D	52
BAW95E	**BAW95E**	D	52
BAW95F	**BAW95F**	D	52

Type number index	Mullard replacements: Mullard type number	Status	Data Page
BAW95G	**BAW95G**	D	52
BAY66	**BAY66**	M	
BAY96	**BAY96**	D	53
BK24	**ZX1052**	C	36
BK24B	**ZX1052**	C	36
BK24C	**ZX1052**	C	36
BK34	**ZX1053**	C	36
BK34B	**ZX1053**	C	36
BK42	**ZX1051**	C	36
BK42B	**ZX1051**	C	36
BK42C	**ZX1051**	C	36
BK46	**5555**	O	
BK146	**ZX1053**	C	36
BK146B	**ZX1053**	C	36
BK168B	**ZX1061**	C	36
BLM167	**YJ1410**	D	44
BM1002	**JP9-15B**	D	46
BM1048	**YJ1110**	D	46
BM1049	**2J42**	D	46
*BR191	**TY6-5000A**	C	43
BR191B	**TY6-5000B** / **YD1120**	M	
BT5	**XG1-2500**	C	37
*BT17	**XG2-6400**	C	37
BT19	**XG2-500**	O	
BT69	**XG15-12**	O	
*BT77	**XR1-6400A**	C	36
BT77A	**XR1-6400A**	C	36
*BT79	**XH3-045**	O	
BT83	**XH16-200**	O	
BT85	**XH8-100**	O	
*BT91	**XR1-3200A**	C	36
BT91A	**XR1-3200A**	C	36
*BT109	**XR1-6400A**	C	36
BT111	**ZT1011/ XR1-1600A**	C	36
BXY27	**BXY27**	D	53
BXY28	**BXY28**	D	53
BXY29	**BXY29**	D	53
BXY32	**BXY32**	D	53
BXY35	**BXY35**	D	53
BXY36	**BXY36**	D	53
BXY37	**BXY37**	D	53
BXY38	**BXY38**	D	53
BXY39	**BXY39**	D	53
BXY40	**BXY40**	D	53
BXY41	**BXY41**	D	53
*C3J / C3JA	**ZT1011/ XR1-1600A**	C	36
*C6J	**XR1-6400A**	C	36
C6L	**XR1-6400A**	C	36
C17/7A	**AW43-88**	O	
C17AA	**AW43-88**	O	
C19/7A	**A47-14W**	M	
C19/10A	**A47-14W**	M	
C19/10AP	**A47-26W/inckit**	M	
C19AK	**A47-14W**	M	
C21/7A	**AW53-88**	O	
C21AA	**AW53-88**	O	
C23/7A	**A59-15W**	M	
C23/10A	**A59-15W**	M	
C23/10AP	**A59-23W/inckit**	M	
C23AK	**A59-15W**	M	
C23AKT	**A59-23W/inckit**	M	
C143	**QY2-100**	M	
C178A	**QQV06-40A**	C	42
C1108	**QY3-125**	D	41
C1112	**QY4-250**	D	40, 41

*Replacements shown are near equivalents only.

§This is a Special Quality type.

†There is a Special Quality version of this type.

‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

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C1134	**QQV03-20A**	C	42
C1136	**QY4-400**	D	40, 41
CAG29	**90AG**	D	32
CAV29	**90AV**	D	32
CAY10	**CAY10**	C	53
CAY17	**CAY17**	D	52, 53
CCa	§**E88CC**	C	20
*CE306	**XR1-6400A**	C	36
CE309	**XG5-500**	M	
CEM4010	**B330AL** / **B330BL**	D	56
*CEM4013	**B318AL** / **B318BL**	D	56
*CEM4028	**B419AL** / **B419BL**	D	56
*CG8	**52CG**	O	
*CG9	**58CG**	M	
*CK571AX	**CV2348**	D	21
*CK5886	**CV2348**	D	21
*CK5889	**CV2348**	D	21
CL5091	**CL5091**	D	55
CL5171	**CL5171**	D	55
CL5181	**CL5181**	D	55
CL5191	**CL5191**	D	55
CL5251	**CL5251**	D	55
CL6001	**CL6001**	D	55
CL6201	**CL6201**	D	55
CL6251	**CL6251**	D	55
CL7330	**CL7330**	D	54
CL7331	**CL7331**	D	54
CL7332	**CL7332**	D	54
CL8300	**CL8300**	D	54
CL8310	**CL8310**	D	54
CL8360	**CL8360**	D	54
CL8370	**CL8370**	D	54
CL8380	**CL8380**	D	54
CL8390	**CL8390**	D	54
CL8430	**CL8430**	D	54
CL8441	**CL8441**	D	54
CL8450	**CL8450**	D	54
CL8460	**CL8460**	D	54
CL8470	**CL8470**	D	54
CL8630	**CL8630**	D	54
CL9010	**CL9010**	D	55
CL9011	**CL9011**	D	55
CL9012	**CL9012**	D	55
CL9070	**CL9070**	D	55
CME1706	**AW43-88**	O	
CME1713R	**A44-120W/R**	D	22
CME1902	**A47-14W**	M	
CME1903	**A47-14W**	M	
CME1905	**A47-26W**	M	
CME1906	**A47-26W/inckit**	M	
CME1907	**A47-26W**	M	
CME1908	**A47-14W**	M	
CME1913	**A47-26W**	M	
CME1913R	**A47-26W/R**	M	
CME1913S	**A47-26W**	M	
CME2013R	**A50-120W/R**	D	22
CME2302	**A59-15W**	M	
CME2303	**A59-15W**	M	
CME2305	**A59-23W**	M	
CME2306	**A59-23W/inckit**	M	
CME2308	**A59-15W**	M	
CME2312	**A59-23W**	M	
CME2313R	**A59-23W/R**	M	
CME2313S	**A59-23W**	M	
CME2413R	**A61-120W/R**	D	22
CME2501	**A65-11W**	M	
CMG22	**52CG**	M	
CMG29	**90CG**	D	32
CMV29	**90CV**	D	32
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*CST1-6000	**XG2-6400**	C	37
*CT1-2500	**XG1-2500**	C	37
*CT1-5000	**XG2-6400**	C	37
*CT1-6000	**XG2-6400**	C	37
*CV5	**RG4-1250**	C	37
CV26	**QY2-100**	M	
CV32	**RG3-250A**	C	37
CV131	†**EF92**	C	19
CV136	†**EL91**	M	
CV138	†**EF91**	C	19
CV140	†**EB91**	C	19
*CV152	**RG4-1250**	C	37
CV216	**150C3**	O	
CV273	**TD03-10**	M	
CV283	†**6AL5**	M	
CV284	**75B1**	O	
CV286	**95A1**	O	
CV287	**150B3**	O	
CV309	**QV04-7**	O	
CV354	**TD03-5**	M	
CV370	**JP9-7A**	D	46
*CV372	**XH3-045**	O	
CV417	†**EC91**	M	
*CV424	**QQVO6-40A**	C	42
CV426	**EY51**	M	
CV431	**85A1**	M	
CV432	**CV432**	D	21
CV449	†**85A2**	D	33
CV455	†**ECC81**	C	20
CV474	**EN70**	O	
CV491	†**ECC82**	C	20
CV492	†**ECC83**	C	20
CV495	**CV495**	D	21
CV635	**TY4-350**	M	
CV722	**725A**	D	46
CV753	**DA90**	O	
CV797	†**EN91**	D	36
CV850	†**EF95**	C	19
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CV918	**12K7GT**	O	
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CV1787	**XH8-100**	O	
CV1795	**723A/B**	D	50
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CV1833	†**108C1**	D	33
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CV2128	**ECH81**	M	
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CV2154	**SIM2**	C	52
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*CV2175	**DG7-5**	M	
CV2191	**DG13-2**	O	
CV2204	**TD03-10F**	M	
*CV2210	**XR1-3200A**	C	36
*CV2215	**XR1-6400A**	C	36
CV2225	†**150B2**	D	33
CV2235	†**EY84**	C	
CV2238	**DL620**	O	
CV2240	**DL98**	O	
CV2253	**EN32**	D	36
CV2254	**DF60**	O	
CV2269	**CV2269**	C	
CV2270	**90AG**	D	32
CV2271	**Z303C**	O	
*CV2281	**YJ1070**	S	48
CV2284	**4J50**	S	45
CV2302	**DH3-91**	D	24
CV2325	**Z502S**	O	
CV2348	**CV2348**	D	21
CV2373	**JP9-180**	D	45
CV2382	**EL822**	C	
CV2387	**CV2387**	S	
CV2391	**SIM8**	M	
CV2392	**SIM9**	M	
CV2395	**TD03-10**	M	
CV2399	**RR3-1250A**	C	37
CV2411	**CV2411**	S	
CV2420	**JPT9-01**	S	44
CV2421	**JPT9-02**	S	44
CV2424	**JP9-250E**	S	45
CV2425	**JP9-250D**	S	45
CV2426	**JP9-250B**	S	45
CV2427	**JP9-250C**	S	45
CV2431	**CV2431**	O	
CV2434	**Z803U**	C	35
CV2463	**CV2463**	S	
CV2466	**QQV02-6**	C	42
CV2469	**CV2469**	S	
CV2473	**JP9-250F**	S	45
*CV2487	**QV2-250C**	D	40, 41
CV2492	§**E88CC**	C	20
CV2493	§**E88CC/01**	C	20
CV2518	**RR3-1250**	C	37
CV2519	**QV1-150A**	M	
CV2520	**XH16-200**	O	
CV2522	†**6AS6**	C	19
CV2524	**6AU6**	O	
CV2573	**5651**	D	
CV2666	**QQV07-40**	O	
CV2721	**EL81**	M	
CV2729	§**E80F**	M	

*Replacements shown are near equivalents only.

§This is a Special Quality type.

†There is a Special Quality version of this type.

‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

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CV2730	**CV2730**	D	21
CV2738	**RG1-240A**	C	37
CV2792	**2K25**	D	
CV2797	**QQV06-40A**	C	42
CV2798	**QQV03-10**	C	42
CV2799	**QQV03-20A**	C	42
CV2876	**§M8204**	D	36
CV2896	**52CG**	O	
*CV2901	**EF86**	M	
CV2957	**XG5-500**	M	
CV2966	**EY86/87**	M	
CV2967	**RY12-100**	O	
CV2975	**EL84**	M	
CV2984	**6080**	C	
‡CV3508	**§M8162**	C	20
CV3512	**EN92**	C	36
CV3521	**XH25-500**	O	
CV3522	**QY5-500**	D	40, 41
CV3523	**QV06-20**	C	40, 41
CV3526	**EL85**	O	
*CV3528	**YJ1110**	D	46
CV3602	**5J26**	D	45
CV3611	**5586**	D	45
CV3670	**RG4-1000**	O	
CV3676	**2J42**	D	46
CV3926	**TY6-5000A**	C	43
CV3927	**12K8GT**	O	
CV3933	**§M8190**	O	
*CV3946	**DG7-36**	O	
CV3953	**4J78**	S	45
CV3960	**§M8190**	O	
CV3997	**YJ1110**	D	46
CV3998	**§E180F**	D	19
CV4003	**§M8136**	C	20
CV4004	**§M8137**	C	20
CV4007	**§M8212**	C	
CV4010	**§M8100**	C	19
CV4011	**§M8196**	C	19
CV4014	**§M8083**	C	19
CV4015	**§M8161**	C	19
CV4018	**§M8204**	D	36
CV4020	**§M8223**	D	33
CV4024	**§M8162**	C	20
CV4025	**§M8079**	C	19
CV4028	**§M8224**	D	33
CV4031	**§M8081**	C	
CV4039	**§M8096**	M	
CV4044	**§M8091**	C	
CV4048	**§M8098**	C	33
CV4054	**§M8142**	S	
CV4058	**§M8080**	C	
CV4059	**§M8097**	O	
CV4063	**§M8082**	C	
CV4066	**§M8190**	O	
CV4070	**§M8099**	O	
CV4076	**§M8179**	S	
CV4080	**§M8225**	D	33
CV4100	**§CV4100**	D	
CV4101	**§CV4101**	D	
CV4104	**§M8163**	D	33
CV4108	**§CV4108**	S	
CV4122	**CV4122**	S	
CV5018	**4J52A**	D	47
CV5027	**XG1-2500**	C	37
*CV5035	**DG13-34**	O	
CV5055	**EM81**	O	
CV5065	**ECF82**	M	
CV5072	**EZ81**	M	
CV5077	**PL81**	M	
CV5080	**EF37A**	M	
CV5094	**EL86**	M	
CV5106	**E1T**	M	
CV5120	**20CV**	O	
CV5122	**Z900T**	C	35
CV5123	**JP9-15D**	D	46
*CV5125	**DP13-34**	O	
CV5132	**§M8163**	D	33
CV5134	**2J51A**	D	47
CV5140	**EA52**	C	19
CV5157	**DP13-2**	O	
CV5171	**DP7-5**	M	
CV5173	**†90C1**	D	33
‡CV5183	**§M8080**	C	
*CV5186	**§M8098**	C	33
*CV5188	**§E182CC**	C	
‡CV5189	**§M8212**	C	
‡CV5212	**M8162**	C	20
CV5215	**ECF80**	C	20
‡CV5216	**§M8100**	C	19
CV5219	**QY5-3000A**	C	40, 41
‡CV5231	**§E88CC**	C	20
CV5234	**ZT1011/XR1-1600A**	C	36
CV5239	**TY7-6000A**	C	39, 43
CV5247	**XH8-100**	O	
CV5269	**DG7-6**	M	
CV5274	**MG6-2**	O	
CV5277	**ET51**	M	
CV5278	**ZM1020**	C	34
CV5291	**Z503M**	O	
CV5304	**§6463**	O	
CV5311	**§M8248**	S	
CV5331	**ECC189**	M	
CV5354	**§E188CC**	C	
CV5358	**ECC88**	C	20
CV5377	**CV5377**	S	
CV5397	**EC157**	M	
CV5412	**DM160**	C	21
CV5418	**CV5418**	O	
CV5434	**EM84**	M	
CV5443	**JPG9-02C**	S	44
CV5458	**TD03-10E**	M	
CV5472	**§E88CC**	C	20
CV5473	**QQV02-6**	C	42
CV5766	**§E182CC**	C	
*CV5793	**DN13-34**	O	
CV5808	**§E55L**	C	21
CV5809	**§E810F**	C	19, 21
CV5810	**EF184**	C	19
CV5820	**Z700U**	O	
CV5830	**EL360**	M	
CV5831	**EF183**	C	19
CV5847	**QQV07-50**	C	42
CV5900	**KS7-85A**	D	50
‡CV5937	**QQV06-40A**	C	42
‡CV5938	**QQV03-20A**	C	42
CV5956	**TD03-10**	M	
CV5957	**XR1-12A**	O	
CV5959	**QY4-400**	D	40, 41
CV5961	**CV5961**	S	
CV5962	**TD03-10D**	M	
CV5989	**§E80CC**	C	
CV6007	**XH3-045**	O	
CV6015	**CV6015**	S	
*CV6044	**Z303C**	O	
CV6072	**JP8-02B**	C	47
CV6087	**LA9-3B**	D	48
CV6094	**DM160**	C	21
*CV6099	**6929**	D	28
CV6108	**YJ1070**	S	48
CV6114	**JPT9-02E**	C	44
CV6122	**QY3-65**	C	41
CV6123	**QZ06-20**	M	
*CV6151	**6914**	O	
CV6183	**YH1060**	D	48
CV6188	**CV6188**	S	
CV6189	**CV6189**	S	
CV6195	**YK1046**	D	50
CV6199	**YJ1050**	D	48
CV6214	**YJ1090**	S	44
CV6215	**YJ1100**	S	44
CV6223	**LB3-250B**	D	48
CV6225	**YJ1030**	S	44
CV6234	**YJ1380**	D	47
CV6248	**YJ1410**	D	44
CV7108	**GEM3**	C	52
CV7109	**GEM4**	C	52
CV7762	**AAY39**	D	52
CV7771	**AAY56**	C	
CV7772	**AAY56R**	C	
CV7776	**AAY51**	D	52
CV7777	**AAY51R**	D	52
CV7778	**AAY51** + **AAY51R** Matched pair	D	52
CV7838	**AAY50**	C	52
CV7839	**AAY50R**	C	52
CV8144	**CV8144**	D	21
CV8269	**JPT9-01D**	C	44
CV8330	**DG7-31**	D	24
CV8479	**TY4-400**	C	39, 43
*CV8505	**YJ1040**	S	48
CV8652	**YJ1010**	D	47
CV8730	**TY6-5000B** + **YD1120**	M	
CV8884	**DH7-11**	D	24
CV8959	**DG7-32**	D	24
CV9155	**§E88C**	M	
CV9334	**KS9-20B**	D	50
CV9424	**YJ1200**	D	48
CV9509	**DP7-11**	D	24
CV9640	**Q13-110BA**	D	24
CV10758	**JP9-2.5E**	D	46
CW1100	**QY5-3000W**	C	40, 41
CX1120	**XH16-200**	O	
CXY10	**CXY10**	D	53
CXY11A	**CXY11A**	D	54
CXY11B	**CXY11B**	D	54
CXY11C	**CXY11C**	D	54
CXY12	**CXY12**	D	53
CXY14A	**CXY14A**	D	54
CXY14B	**CXY14B**	D	54
CXY14C	**CXY14C**	D	54
CXY19	**CXY19**	D	54
CXY20	**CXY20**	D	54
D2M9	**†6AL5**	M	
D3a	**D3a**	S	
D7-190GH	**D7-190GH**	D	24
D10-11GH	**D10-11GH**	O	
D10-11GP	**D10-11GP**	O	
D10-12GH	**D10-12GH**	O	
D10-12GP	**D10-12GP**	O	
D10-160GH	**D10-160GH**	D	24
D10-170GH	**D10-170GH**	D	24

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D13-16BE	**D13-16BE**	O	
D13-16GH	**D13-16GH**	O	
D13-16GP	**D13-16GP**	O	
D13-19GP	**D13-19GP**	O	
D13-21GH	**D13-21GH**	O	
D13-23GH	**D13-23GH**	O	
D13-24BE	**D13-24BE**	O	
D13-26GH	**D13-26GH**	O	
D13-26GM	**D13-26GM**	O	
D13-26GP	**D13-26GP**	O	
D13-27GH	**D13-27GH**	M	
D13-27GM	**D13-27GM**	M	
D13-450GH/01	**D13-450GH/01**	D	24
D13-480GH	**D13-480GH**	D	24
D13-500GH/01	**D13-500GH/01**	D	24
D14-120GH	**D14-120GH**	D	24
D14-121GH	**D14-121GH**	D	24
D14-160GH/09	**D14-160GH/09**	D	24
D77	†**EB91**	C	19
D152	†**6AL5**	M	
DB7-11	**DB7-11**	O	
DB7-36	**DB7-36**	O	
DB7-78	**DB7-78**	O	
DCG1-250	**RG1-250**	M	
DCG1·5-250	**RG1-240A**	C	37
DCG4-1000ED	**RG3-250**	C	37
DCG4-1000G	**RG3-250A**	C	37
*DCG4-5000	**RG3-1250**	C	37
DCG5-5000EG	**RG4-1000**	O	
DCG6-18	**RG4-3000**	C	37
DCG7-100B	**XG15-10**	O	
DCX4-1000	**RR3-250**	C	37
DCX4-5000	**RR3-1250**	C	37
DD6	†**EB91**	C	19
DDM14	**DDM14**	D	35
DET22	**TD03-10**	M	
DET22D	**TD03-10D**	M	
DET22E	**TD03-10E**	M	
DET22G	**TD03-10G**	M	
DET23	**TD03-5**	M	
*DET29	**EC157**	M	
DF60	**DF60**	O	
DF62	**DF62**	O	
DF63	**DF63**	O	
DF652	**DF62**	O	
*DF703	**CV2348**	D	21
DG7-5	**DG7-5**	M	
DG7-6	**DG7-6**	M	
DG7-31	**DG7-31**	D	24
DG7-31/01	**DG7-31**	D	24
DG7-32	**DG7-32**	D	24
DG7-32/01	**DG7-32**	D	24
DG7-36	**DG7-36**	O	
DG13-2	**DG13-2**	O	
DG13-34	**DG13-34**	O	
DH3-91	**DH3-91**	D	24
DH7-11	**DH7-11**	D	24
DH7-78	**DH7-78**	M	
DH10-78	**DH10-78**	O	
DH77	**EBC90**	O	
DH109	**UABC80**	M	
DH119	**UBC81**	O	
DH719	**EABC80**	O	
DK40	**DK40**	O	
DL98	**DL98**	O	
DL620	**DL620**	O	
DM70	**DM70**	M	
*DM71	**DM70**	M	
DM160	**DM160**	C	21
DN7-11	**DN7-11**	M	
DN7-78	**DN7-78**	M	
DN13-34	**DN13-34**	O	
DP61	†**EF95**	C	19
DP7-5	**DP7-5**	M	
DP7-6	**DP7-6**	M	
DP7-11	**DP7-11**	D	24
DP7-78	**DP7-78**	M	
DP10-78	**DP10-78**	O	
DP13-2	**DP13-2**	O	
DP13-34	**DP13-34**	O	
DQ2a	**RG3-250**	C	37
DQ4a	**RG4-1000**	O	
*DX2	**RR3-250**	C	37
DX151	**YK1010**	D	50
DX155	**7093**	D	47
DX184	**55335**	D	50
DX206	**DX206**	C	44
DX267	**DX267**	D	
DX285	**YJ1180**	D	45
DX290	**YJ1320**	D	45
DY51	**DY51**	O	
DY86/87	**DY86/87**	C	
DY802	**DY802**	C	21
E1T	**E1T**	M	
E10-12BE	**E10-12BE**	M	
E10-12GH	**E10-12GH**	M	
E10-12GM	**E10-12GM**	M	
E10-12GP	**E10-12GP**	M	
E10-130BE	**E10-130BE**	M	
E10-130GH	**E10-130GH**	M	
E10-130GM	**E10-130GM**	M	
E10-130GP	**E10-130GP**	M	
E55L	§**E55L**	C	21
E80CC	§**E80CC**	C	
E80CF	§**E80CF**	M	
E80F	§**E80F**	C	
E80L	§**E80L**	C	
‡E81CC	§**M8162**	C	20
E81L	§**E81L**	C	
‡E82CC	§**M8136**	C	20
‡E83CC	§**M8137**	C	20
E83F	§**E83F**	C	
E84L	**E84L**	M	
E86C	§**E86C**	O	
E88C	§**E88C**	M	
E88CC	§**E88CC**	C	20
E88CC/01	§**E88CC/01**	C	20
E90CC	§**E90CC**	C	
‡E91AA	§**M8212**	C	
E91N	§**M8204**	D	36
E92CC	§**E92CC**	M	
E95F	§**M8100**	C	19
E130L	§**E130L**	C	
E180CC	§**E180CC**	C	
E180F	§**E180F**	C	19
E182CC	§**E182CC**	C	
E186F	§**E186F**	C	
E188CC	§**E188CC**	C	
*E236L	**EL360**	M	
E250	**QY4-250**	D	40, 41
E280F	§**E280F**	C	
E288CC	§**E288CC**	C	
E810F	§**E810F**	C	19, 21
E1955	†**EN91**	D	36
E2016	†**EF92**	C	19
*E2134	**EL86**	M	
E2157	†**ECC81**	C	20
E2163	†**ECC82**	C	20
E2164	†**ECC83**	C	20
EA52	**EA52**	C	19
EAA91	†**6AL5**	M	
‡EAA901S	§**M8212**	C	
EABC80	**EABC80**	O	
EB91	†**EB91**	C	19
EBC81	**EBC81**	O	
EBC90	**EBC90**	O	
EBF80	**EBF80**	M	
EBF83	**EBF83**	O	
EBF89	**EBF89**	M	
*EBF171	**EBF80**	M	
*EBF175	**EBF89**	M	
EC55	**TD03-10G**	M	
*EC56	**EC157**	M	
*EC57	**EC157**	M	
EC86	†**EC86**	M	
EC88	†**EC88**	M	
EC91	†**EC91**	M	
EC98	†**EC98**	O	
*EC156	**EC157**	M	
EC157	**EC157**	M	
EC1000	**EC1000**	O	
EC8010	**EC8010**	M	
ECC81	†**ECC81**	C	20
ECC82	†**ECC82**	C	20
ECC83	†**ECC83**	C	20
ECC84	**ECC84**	M	
ECC85	**ECC85**	M	
ECC86	**ECC86**	M	
ECC88	†**ECC88**	C	20
ECC89	**ECC89**	O	
ECC91	†**ECC91**	M	
*ECC186	†**ECC82**	C	20
ECC189	**ECC189**	M	
ECC230	**6080**	C	
*ECC282	†**ECC82**	C	20
‡ECC801S	§**M8162**	C	20
‡ECC802S	§**M8136**	C	20
‡ECC803S	§**M8137**	C	20
ECC804	**6/30L2/ECC804**	M	
ECC2000	§**ECC2000**	M	
ECF80	**ECF80**	C	20
ECF82	**ECF82**	M	
ECF86	**ECF86**	O	
ECF806	**ECF806**	O	
ECH41	**ECH41**	O	
ECH81	**ECH81**	M	
ECH83	**ECH83**	M	
ECH84	**ECH84**	M	
ECL80	**ECL80**	M	
ECL82	**ECL82**	M	
ECL83	**ECL83**	M	
ECL86	**ECL86**	M	
EE17	**XG5-500**	M	
EF36	**EF37A**	M	
EF37	**EF37A**	M	
EF37A	**EF37A**	M	
EF80	**EF80**	C	19
EF83	**EF83**	M	
EF85	**EF85**	M	
EF86	**EF86**	M	
EF89	**EF89**	M	
EF91	†**EF91**	C	19
EF92	†**EF92**	C	19
EF95	†**EF95**	C	19

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EF98	**EF98**	M	
EF183	**EF183**	C	19
EF184	**EF184**	C	19
*EF800	§**E83F**	C	
*EF804	**EF86**	M	
*EF804S	**EF86**	M	
*EF805S	**EF85**	M	
*EF806S	**EF86**	M	
*EF811	**EF183**	C	19
EF812	**6F23/EF812**	M	
*EF814	**EF184**	C	19
EF861	§**E180F**	C	19
*EF905	**EF86**	M	
EH90	**EH90**	O	
EIP-12	**EIP-12**	D	59
EL34	**EL34**	M	
EL36	**EL36**	O	
EL81	**EL81**	M	
EL84	**EL84**	M	
EL85	**EL85**	O	
EL86	**EL86**	M	
EL91	†**EL91**	M	
EL95	**EL95**	M	
*EL171	**EL84**	M	
EL360	**EL360**	M	
*EL803	**EL821**	C	
*EL803S	§**E80L**	C	
EL821	**EL821**	C	
EL822	**EL822**	C	
EL861	§**E81L**	C	
EL5070	**EL5070**	M	
ELC3J	**ZT1011/ XR1-1600A**	C	36
ELC3JA	**ZT1011/ XR1-1600A**	C	36
ELC6J/A	**XR1-6400A**	C	36
ELL80	**ELL80**	O	
EM81	**EM81**	O	
EM84	**EM84**	M	
*EM85	**EM81**	O	
EM87	**EM87**	O	
*EM840	**EM84**	M	
EN31	**EN31**	O	
EN32	**EN32**	D	36
EN70	**EN70**	O	
EN91	†**EN91**	D	36
EN92	**EN92**	C	36
*ES85	**TY2-125**	C	39, 43
ES204A	**TY4-400**	C	39, 43
ES833	**TY4-350**	M	
*ESU101	**RG1-240A**	C	37
ESU103	**RR3-250**	C	37
*ESU150	**RG3-1250**	C	37
ESU200	**RG4-1250**	C	37
ESU866	**RG3-250A**	C	37
ESU866ES	**RG3-250**	C	37
ET51	**ET51**	M	
EY51	**EY51**	M	
*EY83	**EY88**	M	
EY84	†**EY84**	C	
EY86/87	**EY86/87**	M	
EY88	**EY88**	M	
EZ80	**EZ80**	M	
EZ81	**EZ81**	M	
F2	**1923**	O	
FG17	**XG5-500**	M	
*FG27A	**XG1-2500**	C	37
FG33	**XG1-2500**	C	37
FG57	**XG1-2500**	C	37
FG105	**XGQ2-6400**	O	
FX219	**XH16-200**	O	
FX225	**XH8-100**	O	
FX227	**XH3-045**	O	
FX229	**XH25-500**	O	
FX231	**XH16-200**	O	
FZ9011G	**90AG**	D	32
FZ9011V	**90AV**	D	32
FZ9012G	**90CG**	D	32
FZ9012V	**90CV**	D	32
G6C4	§**M8080**	C	
G40-25	**G40-25**	D	56
G40-50	**G40-50**	D	56
G108/1K	†**108C1**	D	33
G150/3D	**150C3**	O	
G150/4K	†**150C2**	D	33
GA50	**90AG**	D	32
GC10B/S	**Z303C**	O	
GD75P	†**75C1**	D	33
GD83M	**83A1**	D	33
GD85M/S	†**85A2**	D	33
GD85PR/S	§**M8098**	C	33
GD90M	†**90C1**	D	33
GD108M	†**108C1**	D	33
GD150A/S	**150C3**	O	
GD150M	†**150C4**	C	33
GD150M/S	†**150C2**	D	33
GD150P/S	†**150B2**	D	33
GEM1	**GEM1**	C	52
GEM2	**GEM2**	C	52
GEM3	**GEM3**	C	52
GEM4	**GEM4**	C	52
GL5720	**XG1-2500**	C	37
GLE10000/ 025/1	**RG3-250**	C	37
GLE15000/3/12	**RG4-3000**	C	37
GN-4	**ZM1020**	C	34
GN-6	**ZM1080**	C	34
GR10A	**Z503M**	O	
*GR10J	**ZM1040**	M	
GR10M	**ZM1020**	C	34
GS10C/S	**Z502S**	O	
*GS10H	**Z504S**	C	35
GS50	**90CG**	D	32
GT1C	**AN1**	O	
GTE130T	**Z803U**	C	35
GTR95M/S	**95A1**	O	
GTR150M/S	**150B3**	O	
GU12	**RG3-250A**	C	37
GU18	**RG3-1250**	C	37
GU20/21	**RG4-1250**	C	37
GU23	**RG4-1250**	C	37
GU50	**RG1-240A**	C	37
GXU1	**RR3-250**	C	37
GXU2	**RR3-1250**	C	37
GXU3	**RR3-1250A**	C	37
GXU4	**RR3-1250B**	C	37
GY501	**GY501**	C	
GZ34	**GZ34**	M	
*GZ40	**EZ80**	M	
HL92	**HL92**	O	
HP6	**EF91**	C	19
IOG-12	**IOG-12**	D	59
IOG-12W/ UKG2	**IOG-12W/ UKG2**	D	59
IOG-13T	**IOG-13T**	D	59
IOG-17	**IOG-17**	D	59
IOG-18	**IOG-18**	D	59
IOG-18N	**IOG-18N**	D	59
IOG-20N	**IOG-20N**	D	59
IOG-71	**IOG-71**	D	59
JNT1-500	**5J26**	D	45
JP2-0·2	**7090**	D	44
JP2-1A	**DX206**	C	44
JP2-2·5A	**YJ1162**	D	44
JP2-2·5W	**YJ1160**	D	44
JP2-5W	**YJ1191**	D	44
JP8-02B	**JP8-02B**	D	47
JP9-01	**JP9-01**	M	
JP9-2·5	**JP9-2·5**	D	46
JP9-2·5B	**YJ1000**	D	46
JP9-2·5C	**JP9-2·5C**	D	46
JP9-2·5D	**JP9-2·5D**	D	46
JP9-2·5E	**JP9-2·5E**	D	46
JP9-2·5F	**JP9-2·5D**	D	46
JP9-2·5H	**JP9-2·5H**	D	46
JP9-2·5K	**JP9-2·5K**	D	
JP9-2·5L	**JP9-2·5L**	D	46
JP9-2·5M	**JP9-2·5M**	D	
JP9-5M	**JP9-5M**	D	
JP9-7	**2J42**	D	46
JP9-7A	**JP9-7A**	D	46
JP9-7D	**JP9-7D**	D	46
JP9-7L	**JP9-7L**	D	46
JP9-7T	**JP9-7T**	D	46
JP9-15	**YJ1110**	D	46
JP9-15B	**JP9-15B**	D	46
JP9-15C	**JP9-15C**	D	
JP9-15D	**JP9-15D**	D	46
JP9-15E	**JP9-15E**	D	
JP9-15F	**JP9-15F**	D	
JP9-15G	**JP9-15G**	D	
JP9-15J	**JP9-15J**	D	
JP9-18	**JP9-18**	D	46
JP9-22B	**JP9-22B**	S	46
JP9-22C	**YJ1124**	D	
JP9-22D	**JP9-22D**	S	46
JP9-22L	**JP9-22L**	S	46
JP9-22R	**JP9-22R**	S	46
JP9-50A	**JP9-50A**	D	46
JP9-75	**JP9-75**	D	47
JP9-80	**4J52A**	D	47
JP9-180	**JP9-180**	D	45
JP9-250	**4J50**	S	45
JP9-250A	**4J78**	S	45
JP9-250B	**JP9-250B**	S	45
JP9-250C	**JP9-250C**	S	45
JP9-250D	**JP9-250D**	S	45
JP9-250E	**JP9-250E**	S	45
JP9-250F	**JP9-250F**	S	45
JP35-30	**7093**	S	47
JPG8-02B	**JPG8-02B**	D	
JPG9-01	**JPG9-01**	S	
JPG9-02	**JPG9-02**	S	
JPG9-02B	**JPG9-02B**	S	
JPG9-02C	**JPG9-02C**	S	44
JPS9-200	**YJ1180**	D	45
JPS16-60	**YJ1320**	D	45
JPT6-1	**YJ1410**	D	44
JPT9-01	**JPT9-01**	S	44
JPT9-01D	**JPT9-01D**	S	44
JPT9-1K	**JPT9-01M**	D	47
JPT9-01M	**JPT9-01M**	D	47
JPT9-02	**JPT9-02**	D	44
JPT9-02D	**JPT9-02D**	M	

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JPT9-60	**2J51A**	D	47
*K340	**2K25**	D	50
K353	**YK1090**	D	50
K358	**YK1091**	D	50
*K365	**YK1000**	D	51
*K391	**YK1046**	D	50
K3003	**KS9-40G**	D	50
K3018	**YK1191**	D	51
*K3020	**KS9-40B**	D	50
KR11000	**YK1091**	D	50
KS7-85	**KS7-85**	D	50
KS7-85A	**KS7-85A**	D	50
KS7-85B	**KS7-85B**	D	50
KS9-20	**723A/B**	D	50
KS9-20A	**2K25**	D	50
KS9-20B	**KS9-20B**	D	50
KS9-20D	**KS9-20D**	D	50
KS9-20M	**KS9-20M/2K25**	D	
KS9-40	**KS9-40**	D	50
KS9-40B	**KS9-40B**	D	50
KS9-40D	**KS9-40D**	D	50
KS9-40G	**KS9-40G**	D	50
KS35-50	**55335**	D	50
KS70-40	**YK1010**	D	50
KV12	**KV12**	D	
KXR04-200	**YK1090**	D	50
KY50	**U25/KY50**	M	
KY80	**U26/KY80**	M	
LA9-2	**YH1060**	D	48
LA9-3B	**LA9-3B**	D	48
LB3-250B	**LB3-250B**	D	48
LB6-10	**LB6-10**	D	49
LB6-25	**LB6-25**	D	49
LB6-25A	**LB6-25A**	D	49
LB7-20E	**LB7-20E**	D	49
LDR03	**ORP12**	C	
LN152	**ECL80**	M	
LN309	**PCL83**	M	
LZ319	**PCF80**	C	
M17-140W	**M17-140W**	D	25
M17-141W	**M17-141W**	D	25
M21-11W	**M21-11W**	O	
M21-12W	**M21-12W**	O	
M24-100W	**M24-100W**	D	25
M28-10W	**M28-10W**	O	
M28-12W	**M28-12W**	M	
M31-120W	**M31-120W**	O	
M36-11W	**M36-11W**	O	
M36-13W	**M36-13W**	O	
M36-16W	**M36-16W**	O	
M38-120W	**M38-120W**	D	25
M502	**4J50**	S	45
M502A	**JP9-180**	D	45
M503A	**JP9-7D**	D	46
M508	**JP9-7A**	D	46
M511	**4J78**	S	45
M513B	**YJ1110**	D	46
M515	**YJ1120**	D	46
M526	**2J42**	D	46
M529	**JP9-250B**	S	45
M537A	**YJ1070**	S	48
M538A	**JP9-250F**	S	45
M539	**JP9-250D**	S	45
M542	**5586**	D	45
M549	**JP9-250F**	S	45
M551	**4J52A**	D	47
*M559	**YJ1040**	S	48
M575	**JP9-75**	D	47
M581	**YJ1290**	D	47
M597	**YJ1071**	D	46
M598B	**JP9-18**	D	46
M599A	**JP9-2·5D**	D	46
M599B	**JP9-2·5E**	D	46
M5005	**YJ1200**	D	48
M5022	**YJ1121**	D	46
M5023	**YJ1110**	D	46
M5031	**JP9-7L**	D	46
M5042	**YJ1250**	D	48
M5043	**YJ1300**	D	46
M5064	**JP9-2·5H**	D	46
M8079	§**M8079**	C	19
M8080	§**M8080**	C	
M8081	§**M8081**	C	
M8082	§**M8082**	C	
M8083	§**M8083**	C	19
M8091	§**M8091**	C	
M8096	§**M8096**	M	
M8097	§**M8097**	O	
M8098	§**M8098**	C	33
M8099	§**M8099**	O	
M8100	§**M8100**	C	19
M8132	§**M8132**	S	
M8133	§**M8133**	S	
M8136	§**M8136**	C	20
M8137	§**M8137**	C	20
M8142	§**M8142**	S	
M8157	§**M8157**	M	
M8161	§**M8161**	C	19
M8162	§**M8162**	C	20
M8163	§**M8163**	D	33
M8178	§**M8178**	S	
M8179	§**M8179**	S	
M8190	§**M8190**	O	
M8196	§**M8196**	C	19
M8204	§**M8204**	D	36
M8206	§**M8206**	O	
M8207	§**M8207**	S	
M8208	§**M8208**	S	
M8212	§**M8212**	C	
M8223	§**M8223**	D	33
M8224	§**M8224**	D	33
M8225	§**M8225**	C	33
M8234	§**M8234**	S	
M8248	§**M8248**	S	
MAG3	**2J42**	D	46
MAG4	**YJ1110**	D	46
MAG16	**YJ1121**	D	46
MC13-16	**Q13-110BA**	D	25
ME1001	**TD03-10**	M	
ME1005	**TD03-5**	M	
ME1100	**723A/B**	D	50
ME1101	**2J42**	D	46
ME1101A	**YJ1110**	D	46
ME1101D	**JP9-7D**	D	46
ME1200AA	**ME1200AA**	O	
ME1200AG	**ME1200AG**	O	
ME1201AA	**ME1201AA**	O	
ME1201AG	**ME1201AG**	M	
ME1260	**ME1260**	O	
ME1400	**CV432**	D	21
ME1401	**CV495**	D	21
ME1402	**CV2730**	D	21
ME1403	**CV2348**	D	21
ME1404	**CV8144**	D	21
ME1500	**EN70**	O	
ME1501	**EN32**	D	36
ME1502	**AN1**	O	
ME1503	**XH8-100**	O	
ME1504	**XG1-2500**	C	37
ME1505	**XG2-500**	O	
MG6-2	**MG6-2**	O	
MG13-38	**MG13-38**	D	25
MK13-16	**Q13-110GU**	D	25
MT17	**XG5-500**	M	
MT57	**XG1-2500**	C	37
MT105	**XGQ2-6400**	O	
*MT5544	**XR1-3200A**	C	36
*MT5545	**XR1-6400A**	C	36
MT5557	**XG5-500**	M	
MT5559	**XG1-2500**	C	37
MU13-38	**MU13-38**	D	25
MV6-5	**MV6-5**	O	
MW13-38	**MW13-38**	D	25
MX118	**MX118**	D	58
MX119	**MX119**	D	58
MX120/01	**MX120/01**	D	57
MX123	**MX123**	D	57
MX124/01	**MX124/01**	D	58
MX145	**MX145**	D	57
MX146	**MX146**	D	57
MX147	**MX147**	D	57
MX148	**MX148**	D	57
MX149	**MX149**	D	57
MX151	**MX151**	D	58
MX152	**MX152**	D	58
MX155	**MX155**	D	58
MX163	**MX163**	D	58
MX164	**MX164**	D	58
MX166	**MX166**	D	58
MX167	**MX167**	D	57
MX168	**MX168**	D	57
MX172	**MX172**	D	57
MX177	**MX177**	D	57
MX178	**MX178**	D	57
MX180	**MX180**	D	57
MY13-38	**MY13-38**	D	25
N77	†**EL91**	M	
N119	**UL84**	M	
N144	†**EL91**	M	
N152	**PL81**	M	
N153	**PL83**	M	
N154	**PL82**	M	
*N308	**PL36**	M	
N309	**PL83**	M	
N329	**PL82**	M	
N359	**PL81**	M	
N378	**PL84**	C	
N379	**PL84**	C	
N709	**EL84**	M	
*NL710	**ZT1011/ XR1-1600A**	C	36
NL715	**XG5-500**	M	
NL1051A	**ZX1051**	C	36
*OM5A	**EF37A**	M	
OM5B	**EF37A**	M	
ORP12	**ORP12**	C	
ORP50	**ORP50**	O	
ORP52	**ORP52**	D	29
ORP60	**ORP60**	C	29
ORP61	**ORP61**	D	29
ORP62	**ORP62**	D	29
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ORP90	**ORP90**	C	29

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ORP93	**ORP93**	C	29
OT400	**TY4-350**	M	
PC86	**PC86**	M	
PC88	**PC88**	M	
PC95	**PC95**	O	
PC97	**PC97**	M	
PC900	**PC900**	C	
PCC84	**PCC84**	M	
PCC85	**PCC85**	M	
PCC88	**PCC88**	O	
PCC89	**PCC89**	M	
PCC189	**PCC189**	M	
PCC805	**30L15/PCC805**	M	
PCE800	**30FL1/PCE800**	M	
PCF80	**PCF80**	C	
PCF82	**PCF82**	O	
PCF84	**PCF84**	O	
PCF86	**PCF86**	M	
PCF200	**PCF200**	M	
PCF201	**PCF201**	M	
PCF800	**30C15/PCF800**	M	
PCF801	**PCF801**	M	
PCF802	**PCF802**	D	20
PCF805	**30C18/PCF805**	M	
PCF806	**PCF806**	M	
PCH200	**PCH200**	M	
PCL82	**PCL82**	C	
PCL83	**PCL83**	M	
PCL84	**PCL84**	C	20
PCL85	**PCL805/85**	D	20
PCL86	**PCL86**	D	20
PCL88	**30PL14/PCL88**	M	
PCL800	**30PL13/PCL800**	M	
PCL801	**30PL1/PCL801**	M	
PCL805	**PCL805/85**	D	20
PCL805/85	**PCL805/85**	D	20
PD500	**PD500**	C	19
*PE50	**90CG**	D	32
*PE54	**90AG**	D	32
PF818	**30F5/PF818**	M	
PFL200	**PFL200**	C	20
PL2D21	†**EN91**	D	36
PL17	**XG5-500**	M	
PL21	†**EN91**	D	36
PL36	**PL36**	M	
PL57	**XG1-2500**	C	37
PL81	**PL81**	M	
PL81A	**PL81A**	M	
PL82	**PL82**	M	
PL83	**PL83**	M	
PL84	**PL84**	C	
PL105	**XGQ2-6400**	O	
PL165A	**XH16-200**	O	
PL174	**XH16-200**	O	
PL255	**XG2-12**	O	
PL260	**XG2-25**	O	
PL302	**30P19/PL302**	M	
PL345	**XH3-045**	O	
PL435	**XH8-100**	O	
PL500	**PL504**	D	21
PL504	**PL504**	D	21
PL505	**PL509**	D	21
PL508	**PL508**	C	
PL509	**PL509**	D	21
PL522	**XH16-200**	O	
PL801	**30P12/PL801**	M	
PL802	**PL802**	C	21
PL1267	**Z300T**	M	
*PL5544	**XR1-3200A**	C	36
*PL5545	**XR1-6400A**	C	36
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PL5552A	**ZX1052**	C	36
PL5553B	**ZX1053**	C	36
PL5555	**5555**	O	
PL5557	**XG5-500**	M	
PL5559	**XG1-2500**	C	37
*PL5632	**ZT1011/ XR1-1600A**	C	36
PL5684	**ZT1011/ XR1-1600A**	C	36
PL5727	§**M8204**	D	36
PL5822A	**ZX1061**	C	36
PL6011	**ZT1011/ XR1-1600A**	C	36
*PL6549	**QY3-65**	D	41
PL6574	**EN32**	D	36
PM05	†**EF95**	C	19
PM07	†**EF91**	C	19
PY33	**PY33**	M	
PY81	**PY81/800**	C	
PY81/800	**PY81/800**	C	
PY82	**PY82**	M	
PY88	**PY88**	D	21
PY301	**U191/PY301**	M	
PY500	**PY500A**	D	21
PY500A	**PY500A**	D	21
PY800	**PY81/800**	C	
*PY801	**PY81/800**	C	
Q7-100GU	**Q7-100GU**	D	25
Q13-110BA	**Q13-110BA**	D	25
Q13-110GU	**Q13-110GU**	D	25
QA2403	**M8083**	C	19
QA2406	**M8162**	C	20
QB2/250	**QY2-100**	M	
QB3/200	**QY3-65**	D	41
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QQE03/20	**QQV03-20A**	C	42
QQE06/40	**QQV06-40A**	C	42
QQV02-6	**QQV02-6**	C	42
QQV03-10	**QQV03-10**	C	42
*QQV03-20	**QQV03-20A**	C	42
QQV03-20A	**QQV03-20A**	C	42
QQV03-20B	**QQV03-20B**	C	
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*QQV06-40	**QQV06-40A**	C	42
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QQV07-50	**QQV07-50**	C	42
QQZ02-6	**QQZ02-6**	C	
QQZ03-10	**QQZ03-10**	M	
QQZ03-20	**YL1020/ QQZ03-20**	M	
QQZ06-40	**YL1030/ QQZ06-40**	M	
QS75-20	**75B1**	O	
*QS83-3	†**85A2**	D	33
QS92-10	**7475**	O	
QS95-10	**95A1**	O	
QS150-15	**150B3**	O	
QS150-40	**150C3**	O	
QS1200	†**150B2**	D	33
QS1207	†**150C2**	D	33
QS1208	†**108C1**	D	33
QS1209	†**85A2**	D	33
QS1210	§**M8223**	D	33
QS1211	§**M8224**	D	33
QS1212	§**M8098**	C	33
QS1215	†**90C1**	D	33
*QS1250	**Z900T**	C	35
QV03-12	†**QV03-12**	C	41
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QV08-100	**QV08-100**	C	40, 41
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QV1-150D	**QV1-150D**	M	
*QV2-250B	**QV2-250C**	D	40, 41
QV2-250C	**QV2-250C**	D	40, 41
QY2-100	**QY2-100**	M	
QY3-65	**QY3-65**	C	41
QY3-125	**QY3-125**	D	41
QY3-125B	**QY3-125B**	M	
QY4-250	**QY4-250**	D	40, 41
QY4-400	**QY4-400**	D	40, 41
QY4-500A	**QY4-500A**	D	41
QY5-500	**QY5-500**	D	40, 41
QY5-3000A	**QY5-3000A**	C	40, 41
QY5-3000W	**QY5-3000W**	D	40, 41
QZ06-20	**QZ06-20**	M	
R12	**EY51**	M	
R12A	**EY51**	M	
R18	**EY84**	C	
R121	**EF37A**	M	
R144	†**EF91**	C	19
R265	**6AS6**	C	19
RG1-240A	**RG1-240A**	C	37
RG1-250	**RG1-250**	M	
RG3-250	**RG3-250**	C	37
RG3-250A	**RG3-250A**	C	37
RG3-1250	**RG3-1250**	C	37
RG3-1250GC	**RG3-1250GC**	S	
RG4-1000	**RG4-1000**	O	
RG4-1250	**RG4-1250**	C	37
RG4-3000	**RG4-3000**	C	37
RG250-300	**RG3-250**	C	37
RG250-1000	**RG1-240A**	C	37
RG250-3000	**RG3-250** / **RG3-250A**	C	37
RI-12	**RI-12**	D	60
RK48A	**QY2-100**	M	
RL17	**XG5-500**	M	
RL21	†**EN91**	D	36
RL57	**XG1-2500**	C	37
RL105	**XGQ2-6400**	O	
RPY18	**RPY18**	D	29
RPY19	**RPY19**	D	29
RPY20	**RPY20**	D	29
RPY30	**RPY30**	M	
RPY33	**RPY33**	D	29
RPY43	**RPY43**	D	29

*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

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RPY54	**RPY54**	D	29
RPY55	**RPY55**	D	29
RPY58	**RPY58**	D	29
RPY71	**RPY71**	D	29
RR3-250	**RR3-250**	C	37
RR3-1250	**RR3-1250**	C	37
RR3-1250A	**RR3-1250A**	C	37
RR3-1250B	**RR3-1250B**	C	37
RS613	**TY2-125**	C	39 43
RS630	**TY4-400**	C	39, 43
RS631	**TY4-500**	D	39, 43
*RS683	**QY3-125**	D	41
RS685	**QY3-125**	D	41
RS686	**QY4-250**	D	40, 41
RS687	**QY5-500**	D	40, 41
*RS1002	**QY4-250**	D	40, 41
RS1002A	**QY4-400**	D	40, 41
*RS1006	**TY2-125**	C	39, 43
RS1007	**QY3-125**	D	41
RS1009	**QQV06-40A**	C	42
*RS1012L	**QY5-3000A**	C	40, 41
*RS1012W	**QY5-3000W**	C	40, 41
RS1016	**TY4-500**	D	39, 43
RS1019	**QQV03-20A**	C	42
RS1026	**TY4-400**	C	39, 43
RS1029	**QQV03-10**	C	42
RS1036	**TY5-500**	D	39
RS1046	**TY6-800**	D	39
*RS1081W	**TY12-50W**	M	
*RS2001W	**TY12-50W**	M	
RY12-100	**RY12-100**	O	
S5A/180	**DG13-34**	M	
‡S6F12	§**M8083**	C	19
S914	**YJ1180**	D	45
SIM2	**SIM2**	D	52
SIM5	**SIM5**	D	52
SIM8	**SIM8**	M	
SIM9	**SIM9**	M	
SP6	†**EF91**	C	19
SRS360	**TY4-400**	C	39, 43
SRS4452	**QQV03-20A**	C	42
Ste1000/2·5/15	**XG1-2500**	C	37
Ste1300/01/05	†**EN91**	D	36
Ste2500/0·5/2	**XG5-500**	M	
Ste2500/6/40	**XGQ2-6400**	O	
STV85-10	†**85A2**	D	33
STV108-30	†**108C1**	D	33
STV150-30	†**150C2**	D	33
SV2D21	†**EN91**	D	36
T21-105	†**ECC91**	M	
T54P31	**DH13-78**	M	
T130-1	**TY2-125**	C	39, 43
T350-1	**TY4-400**	C	39, 43
T813	**QY2-100**	M	
TB2·5/300	**TY2-125**	C	39, 43
TB3/750	**TY4-400**	C	39, 43
TB4/1250	**TY4-500**	D	39, 43
TB4/1500	**TY5-500**	D	39
TB5/2500	**TY6-800**	D	39
TBH6/14	**TY8-15H**	C	39, 43
TBH6/6000	**TY6-5000H**	C	43
TBH7/8000	**TY7-6000H**	C	39, 43
TBH7/9000	**TY8-6000H**	C	39
TBL6/14	**TY8-15A**	C	39, 43
TBL6/4000	**TY6-1250A**	C	39
TBL6/6000	**TY6-5000A**	C	43
TBL7/8000	**TY7-6000A**	C	39, 43
TBL7/9000	**TY8-6000A**	C	39
TBL12/25	**TY12-25A**	M	
TBW6/6000	**TY6-5000W**	C	43
TBW7/8000	**TY7-6000W**	C	39, 43
TBW7/9000	**TY8-6000W**	C	39
TBW12/25	**TY12-25W**	M	
TBW12/38	**TY12-20W**	M	
TBW12/100	**TY12-50W**	M	
*TC1-75	**TY2-125**	C	39, 43
*TC2-250	**TY4-400**	C	39, 43
*TC2-300	**TY4-400**	C	39, 43
TD03-5	**TD03-5**	M	
TD03-10	**TD03-10**	M	
TD03-10D	**TD03-10D**	M	
TD03-10E	**TD03-10E**	M	
TD03-10F	**TD03-10F**	M	
TD03-10G	**TD03-10G**	M	
TD17	**EN70**	O	
TD24	**QQV03-10**	C	42
TD25	**QQV06-40A**	C	42
TG200	**XH8-100**	O	
TG1000	**XH16-200**	O	
TH4J52A	**4J52A**	D	47
TH813	**QY2-100**	M	
TH1586	**5586**	D	45
TH5021B	**RG3-250A**	C	37
TH5021V	**RG3-250**	C	37
TH5221B	**RR3-250**	C	37
*TH5221V	**RR3-250**	C	37
TH5586	**5586**	D	45
TH6220A	**XR1-6400A**	C	36
TH6250	**XR1-12A**	O	
TH6435	**XH8-100**	O	
TH6522	**XH16-200**	O	
TH6907	**XH25-500**	O	
*TH7020	**ZX1051**	C	36
*TH7030	**ZX1052**	C	36
*TH7040	**ZX1053**	C	36
*TQ2	**XG5-500**	M	
*TQ2/6	**XG2-6400**	C	37
TS51	†**EF95**	C	19
TS52	†**ECC91**	M	
TS54	§**E83F**	C	
TT10	**QY2-100**	M	
TT16	**QY3-125B**	M	
TT16D	**QY3-125**	D	41
TT17	**XG5-500**	M	
TT18	**QQV07-40**	O	
TT20	**QQV03-20A**	C	42
TT20B	**QQV03-20B**	C	
TT23	**QQV02-6**	C	42
TT24	**QQV03-10**	C	42
TT25	**QQV06-40A**	C	42
*TX2-3	**XR1-3200A**	C	36
*TX2-6	**XR1-6400A**	C	36
TX920	**XG1-2500**	C	37
TY2-125	**TY2-125**	C	39, 43
TY3-250	**TY4-400**	C	39, 43
TY4-350	**TY4-350**	M	
TY4-400	**TY4-400**	C	39, 43
TY4-400C	**TY4-400C**	M	
TY4-500	**TY4-500**	D	39, 43
TY5-500	**TY5-500**	D	39
TY6-800	**TY6-800**	D	39
TY6-1250A	**TY6-1250A**	C	39
TY6-5000A	**TY6-5000A**	C	43
TY6-5000B	**TY6-5000B**	M	
	YD1120		
TY6-5000H	**TY6-5000H**	C	43
TY6-5000W	**TY6-5000W**	C	43
TY7-6000A	**TY7-6000A**	C	39, 43
TY7-6000H	**TY7-6000H**	C	39, 43
TY7-6000W	**TY7-6000W**	C	39, 43
TY8-15A	**TY8-15A**	C	39, 43
TY8-15H	**TY8-15H**	C	39, 43
TY8-6000A	**TY8-6000A**	C	39
TY8-6000H	**TY8-6000H**	C	39
TY8-6000W	**TY8-6000W**	C	39
TY12-20W	**TY12-20W**	M	
TY12-25A	**TY12-25A**	M	
TY12-25W	**TY12-25W**	M	
TY12-50W	**TY12-50W**	M	
TYS4-500	**TYS4-500**	O	
TYS5-3000	**TYS5-3000**	M	
U25/KY50	**U25/KY50**	M	
U26/KY80	**U26/KY80**	M	
U43	**EY51**	M	
U49	**EY86/87**	M	
*U52	**GZ34**	M	
U119	**UY85**	M	
U151	**EY51**	M	
U153	**PY81/800**	C	
U154	**PY82**	M	
U191/PY301	**U191/PY301**	M	
U192	**PY82**	M	
*U251	**PY81/800**	C	
U319	**PY82**	M	
U381	**UY85**	M	
U709	**EZ81**	M	
UABC80	**UABC80**	M	
UB41	**UB41**	O	
UBC81	**UBC81**	O	
UBF80	**UBF80**	M	
UBF89	**UBF89**	M	
UCC85	**UCC85**	M	
UCF80	**UCF80**	O	
UCH21	**UCH21**	O	
UCH71	**UCH21**	O	
UCH81	**UCH81**	M	
UCH171	**UCH81**	M	
UCL82	**UCL82**	M	
UCL83	**UCL83**	M	
UE967	**XG5-500**	M	
UF80	**UF80**	O	
UF85	**UF85**	O	
UF89	**UF89**	M	
UL84	**UL84**	M	
UM84	**UM84**	O	
UU12	**EZ81**	M	
UY85	**UY85**	M	
V40	**RY12-100**	O	
V884	†**EF92**	C	19
V886	†**EL91**	M	
V1103	**QQV03-10**	C	42
VA50	**90AV**	D	32
VKP series	**VKP** series	D	59
VP6	†**EF92**	C	19
*VR75-30	†**75C1**	D	33
*VR105-30	†**108C1**	D	33
VR150-30	**150C3**	O	
*VS10J	**ET51**	M	
VS50	**90CV**	D	32
VS70	**7475**	O	
VT123	**5586**	D	45
W77	†**EF92**	C	19
W719	**EF85**	M	
WD709	**EBF80**	M	

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X119	**UCH81**	M	
X719	**ECH81**	M	
*XE2	**CV495**	D	21
XFR1	**DF62**	O	
XFR2	**DF60**	O	
XFY14	**DL620**	O	
XG1-2500	**XG1-2500**	C	37
XG2	**EN70**	O	
XG2-12	**XG2-12**	O	
XG2-25	**XG2-25**	O	
XG2-500	**XG2-500**	O	
XG2-6400	**XG2-6400**	C	37
XG5-500	**XG5-500**	M	
XG15-10	**XG15-10**	O	
XG15-12	**XG15-12**	O	
XGQ2-6400	**XGQ2-6400**	O	
XH2-045	**XH3-045**	O	
XH8-100	**XH8-100**	O	
XH16-200	**XH16-200**	O	
XH25-500	**XH25-500**	O	
XN4	**ZM1080**	C	34
XP1000	**XP1000**	S	
XP1001	**XP1001**	S	
XP1002	**XP1002**	D	31
XP1003	**XP1003**	S	
XP1005	**XP1005**	S	
XP1010	**XP1010**	C	30
XP1015	**XP1015**	S	
XP1021	**XP1021**	O	
XP1023	**XP1023**	D	
XP1030	**XP1030**	S	
XP1031	**XP1031**	O	
XP1110	**XP1110**	D	30
XP1113	**XP1113**	O	
XP1114	**XP1114**	O	
XP1115	**XP1115**	D	30
XP1116	**XP1116**	D	30
XP1117	**XP1117**	D	30
XP1118	**XP1118**	S	
XP1120	**XP1120**	S	
XP1121	**XP1121**	S	
XP1130	**XP1130**	S	
XP1131	**XP1131**	S	
XP1143	**XP1143**	D	30
XP1180	**XP1180**	O	
XP1210	**XP1210**	S	
XP1220	**XP1220**	S	
XQ1020 series	**XQ1020** series	D	26
XQ1021 series	**XQ1021** series	D	26
XQ1023 series	**XQ1023** series	D	27
XQ1024 series	**XQ1024** series	D	27
XQ1025 series	**XQ1025** series	D	27
XQ1026 series	**XQ1026** series	D	27
XQ1040 series	**XQ1040** series	M	
XQ1050 series	**XQ1050** series	M	
XQ1070 series	**XQ1070** series	D	26
XQ1070/01 series	**XQ1070/01** series	D	26
XQ1071 series	**XQ1071** series	D	26
XQ1071/01 series	**XQ1071/01** series	D	26
XQ1080 series	**XQ1080** series	D	26
XQ1210 series	**XQ1210** series	D	26
XQ1220 series	**XQ1220** series	D	27
XQ1230 series	**XQ1230** series	D	27
XQ1240	**XQ1240**	D	26
XQ1241	**XQ1241**	D	26
XR1-12	**XR1-12A**	O	
XR1-12A	**XR1-12A**	O	
XR1-1600A	**ZT1011/ XR1-1600A**	C	36
*XR1-3200	**XR1-3200A**	C	36
XR1-3200A	**XR1-3200A**	C	36
*XR1-6400	**XR1-6400A**	C	36
XR1-6400A	**XR1-6400A**	C	36
XR41	**YK1010**	D	50
XR81	**55335**	D	50
XX1020	**XX1020**	O	
XX1050	**XX1050**	D	28
XX1052	**XX1050**	D	28
XX1060	**XX1060**	D	28
XX1240	**XX1240**	D	28
XX1241	**XX1241**	D	28
Y25	**DM70**	M	
YD1120	**TY6-5000B** / **YD1120**	M	
YD1150	**YD1150**	D	38
YD1152	**YD1152**	D	38
YD1160	**YD1160**	D	38
YD1161	**YD1161**	D	38
YD1162	**YD1162**	D	38
YD1170	**YD1170**	D	38
YD1171	**YD1171**	D	38
YD1172	**YD1172**	D	38
YD1173	**YD1173**	D	38
YD1180	**YD1180**	D	38
YD1182	**YD1182**	D	38
YD1190	**YD1190**	D	38
YD1192	**YD1192**	D	38
YD1193	**YD1193**	D	38
YD1202	**YD1202**	D	38
YD1203	**YD1203**	D	38
YD1212	**YD1212**	D	38
YD1213	**YD1213**	D	38
YD1220	**TY4-400C**	M	
YD1240	**YD1240**	D	38
YD1244	**YD1244**	D	38
YD1300	**YD1300**	D	42
YD1301	**YD1301**	D	42
YD1330	**YD1330**	D	42
YD1331	**YD1331**	D	43
YD1332	**YD1332**	D	42
YD1333	**YD1333**	D	42
YD1342	**YD1342**	D	38
YH1060	**YH1060**	D	48
YH1090	**YH1090**	D	49
YH1170	**YH1170**	D	49
YH1210	**YH1210**	D	49
YJ1000	**YJ1000**	D	46
YJ1010	**YJ1010**	D	47
YJ1011	**YJ1011**	D	47
YJ1020	**YJ1020**	S	47
YJ1021	**YJ1021**	S	47
YJ1030	**YJ1030**	S	44
YJ1040	**YJ1040**	S	48
YJ1050	**YJ1050**	D	48
YJ1060	**YJ1060**	S	48
YJ1070	**YJ1070**	S	48
YJ1071	**YJ1071**	D	46
YJ1090	**YJ1090**	S	44
YJ1100	**YJ1100**	S	44
YJ1110	**YJ1110**	D	46
YJ1112	**YJ1112**	D	48
YJ1113	**JP9-18**	D	46
YJ1120	**YJ1120**	D	46
YJ1121	**YJ1121**	D	46
YJ1123	**YJ1123**	D	46
YJ1124	**YJ1124**	D	46
YJ1140	**YJ1140**	S	47
YJ1150	**YJ1150**	D	45
YJ1160	**YJ1160**	D	44
YJ1162	**YJ1162**	D	44
YJ1180	**YJ1180**	D	45
YJ1181	**YJ1181**	D	45
YJ1182	**YJ1182**	D	45
YJ1190	**YJ1191**	D	44
YJ1191	**YJ1191**	D	44
YJ1200	**YJ1200**	D	48
YJ1201	**YJ1201**	D	48
YJ1250	**YJ1250**	D	48
YJ1280	**YJ1280**	D	44
YJ1290	**YJ1290**	D	47
YJ1300	**YJ1300**	D	46
YJ1320	**YJ1320**	D	45
YJ1321	**YJ1321**	D	45
YJ1371	**YJ1371**	D	44
YJ1380	**YJ1380**	D	47
YJ1390	**YJ1390**	D	
YJ1410	**YJ1410**	D	44
YJ1420	**YJ1420**	D	44
YJ1430	**YJ1430**	D	48
YK1000	**YK1000**	D	51
YK1001	**YK1001**	D	51
YK1002	**YK1002**	D	51
YK1004	**YK1004**	D	51
YK1005	**YK1005**	D	51
YK1010	**YK1010**	D	50
YK1046	**YK1046**	D	50
YK1090	**YK1090**	D	50
YK1091	**YK1091**	D	50
YK1110	**YK1110**	D	51
YK1150	**YK1150**	D	51
YK1151	**YK1151**	D	51
YK1191	**YK1191**	D	51
YK1200	**YK1200**	D	51
YL1020	**YL1020/ QQZ03-20**	M	
YL1030	**YL1030/ QQZ06-40**	M	
YL1070	**YL1070**	C	40
YL1080	**YL1080**	M	
YL1110	**YL1110**	D	40, 41
YL1130	**YL1130**	M	
YL1150	**YL1150**	D	40, 41
YL1190	**YL1190**	M	
YL1240	**YL1240**	C	42
YL1290	**QV08-100B** / **YL1290**	C	40, 41
YL1420	**YL1420**	D	41
YL1430	**YL1430**	D	41
YL1440	**YL1440**	D	41
YL1470	**YL1470**	D	41
YL1520	**YL1520**	D	41
Z70U	**Z700U**	O	
Z70W	**Z700W**	O	
Z71U	**Z701U**	O	
Z77	†**EF91**	C	19
Z152	**EF80**	C	19
Z300T	**Z300T**	M	
Z303C	**Z303C**	O	
Z502S	**Z502S**	O	
Z503M	**Z503M**	O	
Z504S	**Z504S** / **ZM1070**	C	35

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Z505S	**Z505S** / **ZM1060**	C	35
Z520M	**ZM1020**	C	34
Z521M	**ZM1021**	C	34
Z522M	**ZM1040**	M	
Z550M	**ZM1050**	O	
Z700U	**Z700U**	O	
Z700W	**Z700W**	O	
Z701U	**Z701U**	O	
Z719	**EF80**	C	19
Z729	†**EF86**	M	
Z803U	**Z803U**	C	35
Z900T	**Z900T**	C	35
Z15021	**TY6-800**	D	39
Z15048	**TY4-400C**	M	
ZA1002	**ZA1002**	D	33
ZA1004	**ZA1004**	D	33
ZD152	**EBF80**	M	
ZM1000	**ZM1000**	D	34
ZM1000R	**ZM1000R**	D	34
ZM1001	**ZM1001**	D	34
ZM1001R	**ZM1001R**	D	34
ZM1020	**ZM1020**	C	34
ZM1021	**ZM1021**	C	34
ZM1022	**ZM1022**	C	34
ZM1023	**ZM1023**	C	34
ZM1024	**ZM1024**	O	
ZM1040	**ZM1040**	M	
ZM1041	**ZM1041**	M	
ZM1042	**ZM1042**	M	
ZM1050	**ZM1050**	O	
ZM1060	**Z505S** / **ZM1060**	C	35
ZM1070	**Z504S** / **ZM1070**	C	35
ZM1080	**ZM1080**	C	34
ZM1081	**ZM1081**	C	34
ZM1082	**ZM1082**	C	34
ZM1083	**ZM1083**	C	34
ZM1162	**ZM1162**	D	34
ZM1163	**ZM1163**	D	34
ZM1164	**ZM1164**	D	34
*ZM1170	**ZM1174 or ZM1176**	D	34
*ZM1172	**ZM1175 or ZM1177**	D	34
ZM1174	**ZM1174**	D	34
ZM1175	**ZM1175**	D	34
ZM1176	**ZM1176**	D	34
ZM1177	**ZM1177**	D	34
ZM1200	**ZM1200**	D	35
ZM1206	**ZM1206**	D	35
ZM1232	**ZM1235**	D	34
ZM1235	**ZM1235**	D	34
ZM1237	**ZM1237**	D	34
ZM1251	**ZM1251**	D	34
*ZM1260	**ZM1263**	D	34
*ZM1262	**ZM1263**	D	34
ZM1263	**ZM1263**	D	34
ZM1400 series	**ZM1400** series	D	35
ZT1000	**ZT1000**	O	
ZT1011	**ZT1011/ XR1-1600A**	C	36
ZX1051	**ZX1051**	C	36
ZX1052	**ZX1052**	C	36
ZX1053	**ZX1053**	C	36
ZX1061	**ZX1061**	C	36
ZX1062	**ZX1062**	C	36

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ZZ1000	**ZZ1000**	C	33
0A2	†**150C2**	D	33
0A2WA	§**M8223**	D	33
*0A3	†**75C1**	D	33
0A4G	**Z300T**	M	
0B2	†**108C1**	D	33
0B2WA	§**M8224**	D	33
0D3	**150C3**	O	
0E3	**85A1**	M	
0G3	†**85A2**	D	33
0253	**BXY32**	D	53
1AD4	**DF62**	O	
1G35	**XH8-100**	O	
1G45P	**XH3-045**	O	
*1G50	**EN32**	D	36
*1M1	**DM70**	M	
1M3	**DM70**	M	
*1N16	**RG1-240A**	C	37
1N23D	**BAW95D**	D	52
1N23E	**BAW95E**	D	52
1N23F	**BAW95F**	D	52
1N23WE	**BAW95E**	D	52
1N78E	**AAY52**	D	52
1N78ER	**AAY52R**	D	52
1N78G	**AAY51**	D	52
1N78GR	**AAY51R**	D	52
1N415D	**BAW95D**	D	52
1N415E	**BAW95E**	D	52
1N415F	**BAW95F**	D	52
1N4885	**1N4885**	D	53
1N5152	**1N5152**	D	53
1N5153	**1N5153**	D	53
1N5155	**1N5155**	D	53
1N5157	**1N5157**	D	53
*1P37	**90AG**	D	32
*1P41	**53CG**	M	
1S2	**DY86/87**	C	
1S2A	**DY86/87**	C	
2B29	**QQV07-40**	O	
2B46	**QV06-20**	C	40, 41
2B52	**QQV03-20A**	C	42
2B94	**QQV06-40A**	C	42
2D21	†**EN91**	D	36
2D21W	§**M8204**	D	36
2G57	**XG5-500**	M	
2G/402A	**RR3-250**	C	37
2G/472	**RR3-1250**	C	37
2G/473C	**RR3-1250A**	C	37
2H28	**RR3-250**	C	37
2H66	**RG3-250A**	C	37
2J42	**2J42**	D	46
2J51A	**2J51A**	D	47
2J53	**725A**	D	46
2J55	**2J55**	D	48
2K25	**2K25**	D	50
*2M4B	**GZ34**	M	
2V/400A	**RG3-250A**	C	37
*2V/400B	**RG3-250A**	C	37
*2V/471C	**RG3-1250**	C	37
*2V/471A	**RG3-1250**	C	37
*2V/490C	**RG4-1250**	C	37
2V/500C	**RG4-1250**	C	37
3ALP1	**DG7-5**	M	
3ALP7	**DP7-5**	M	
3AMP1	**CV2431**	O	
3AMP1A	**DG7-32**	D	24
3B28	**RR3-250**	C	37
*3B/340B	**XG5-500**	M	

Type number index	Mullard replacements: Mullard type number	Status	Data Page
3BKP2	**DN7-78**	M	
3BKP31	**DH7-78**	M	
3BYP31	**DH7-11**	D	24
*3C23	**ZT1011/ XR1-1600A**	C	36
3C45	**XH3-045**	O	
*3C/351H	**TY4-350**	M	
*3D21A	**EL360**	M	
*3DT6	†**6AS6**	C	19
*3G/501A	**XR1-6400A**	C	36
3G/502A	**XR1-6400A**	C	36
*3J/192E	**TY6-5000A**	C	43
*3J/202E	**TY7-6000A**	C	39, 43
*3L5T	**TY7-6000A**	C	39, 43
*3Q/221E	**TY12-20W**	M	
*3Q/252E	**TY12-20W**	M	
*3Q/260E	**TY12-20W**	M	
*3Q/261E	**TY12-20W**	M	
*3T500A1	**TY4-500**	D	39, 43
*3T1100	**TY6-800**	D	39
*3V5T	**TY7-6000W**	C	39, 43
*3V20T	**TY12-20W**	M	
*3V25T	**TY12-20W**	M	
*3V202-3	**TY12-20W**	M	
3V390A	**XG1-2500**	C	37
3V490A	**XG2-6400**	C	37
3WP1	**DG7-36**	O	
3WP11	**DB7-36**	O	
4-65A	**QY3-65**	D	41
4-125A	**QY3-125B**	M	
4B13	**QY2-100**	M	
4B32	**RR3-1250**	C	37
4C35	**XH8-100**	O	
4CM4	**PC86**	M	
4CX250B	**QV2-250C**	D	40, 41
4CX250FG	**8621**	C	
4CX250R	**7580W**	C	
*4D21	**QY3-125**	D	41
*4D32	**QY3-65**	C	41
4DL4	**PC88**	M	
*4DT6	†**6AS6**	C	19
*4E2T	**QY3-125**	D	41
4F15R	**QV2-250C**	D	40, 41
4F21	**QY3-125**	D	41
4FY5	**PC97**	M	
4G/280K	†**EN91**	D	36
4HA5	**PC900**	C	
4H32	**RR3-1250**	C	37
*4H73	**RG4-1250**	C	37
*4H88A	**RG4-1250**	C	37
4H/135M	**QV2-250C**	D	40, 41
4H/136M	**QV1-150D**	M	
4H/160M	**QV2-250C**	D	40, 41
*4H/180E	**QY4-500A**	D	41
*4H/181F	**QY4-500A**	D	41
4J50	**4J50**	S	45
4J52A	**4J52A**	D	47
4J78	**4J78**	S	45
4Q025	**RG3-250**	C	37
*4T17	**TY2-125**	C	39,43
4X150A	**QV1-150A**	M	
4X150D	**QV1-150D**	M	
4X250B	**QV2-250C**	D	40,41
4X500A	**QY4-500A**	D	41
*5A/157D	**EF37A**	M	
*5A/159H	†**EF91**	C	19
5A/160H	†**EF91**	C	19
5A/160K	†**EF91**	C	19

*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

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*5A/163K	§E180F	C	19
5A/170K	§E180F	C	19
5A/189K	§M8083	C	19
5ADP1	DG13-34	O	
5ADP2	DN13-34	O	
5ADP7	DP13-34	O	
5AR4	GZ34	M	
*5B/152D	EL360	M	
*5B/257	QV06-20	C	40, 41
*5B/258	EL360	M	
*5B/600A	QY3-65	D	41
*5B/700A	QY3-65	D	41
5C22	XH16-200	O	
5C/100A	QY2-100	M	
*5D22	QY4-250	D	40, 41
5F22A	QY4-250	D	40, 41
5F23A	QY4-400	D	40, 41
*5H69	RG4-3000	C	37
*5HG8	PCF86	M	
5J26	5J26	D	45
*5T4	GZ34	M	
*5T20	TY4-400	C	39, 43
*5T21	TY4-400	C	39, 43
*5T30	TY4-500	D	39, 43
*5T31	TY4-500	D	39, 43
5T33	TY4-350	M	
*5V4	GZ34	M	
6AB8	ECL80	M	
*6AC7	EF80	C	19
*6AG7	EL821	C	
6AJ8	ECH81	M	
6AK5	†EF95	C	19
‡6AK5W	§M8100	C	19
*6AK6	†EL91	M	
6AK8	EABC80	O	
6AL3	EY88	M	
6AL5	†6AL5	M	
‡6AL5W	§M8212	C	
6AM5	†EL91	M	
6AM6	†EF91	C	19
‡6AM6S	§M8083	C	19
6AQ4	†EC91	M	
6AQ8	ECC85	M	
*6AR6	EL34	M	
*6AS5	EL81	M	
6AS6	†6AS6	C	19
‡6AS6W	§M8196	C	19
*6AS7G	6080	C	
6AT6	EBC90	O	
6AU6	6AU6	O	
*6AU7	†ECC82	C	20
6AX8	ECF82	M	
6BD7A	EBC81	O	
6BK8	EF86	M	
6BL8	ECF80	C	20
6BM8	ECL82	M	
*6BN4A	†EC91	M	
6BN5	EL85	O	
6BQ5	EL84	M	
*6BR7	EF86	M	
*6BR8	ECF82	M	
*6BS7	EF86	M	
*6BS8	ECC84	M	
*6BU8	QQV02-6	C	42
*6BW4	EZ81	M	
6BX6	EF80	C	19
6BY7	EF85	M	
*6BZ6	†EF92	C	19
6C4WA	§M8080	C	
6C12	ECH81	M	
6C16	ECF80	C	20
6CA4	EZ81	M	
6CA7	EL34	M	
*6CD6G	EL360	M	
6CF8	EF86	M	
*6CG7	§E80CC	C	
6CH6	EL821	C	
6CJ6	EL81	M	
*6CL6	EL822	C	
6CM4	†EC86	M	
6CM5	EL36	O	
*6CN7	EBC81	O	
6CQ6	†EF92	C	19
6CQ6S	§M8161	C	19
6CS6	EH90	O	
6CW5	EL86	M	
6CW7	ECC84	M	
6D2	†EB91	C	19
6DA5	EM81	O	
6DA6	EF89	M	
*6DB6	†6AS6	C	19
6DC8	EBF89	M	
6DJ8	†ECC88	C	20
*6DK6	†EF91	C	19
6DL4	EC88	M	
6DL5	EL95	M	
6DR8	EBF83	O	
6DS8	ECH83	M	
*6DT5	EL81	M	
*6DT6	†6AS6	C	19
*6DT8	†ECC81	C	20
6EH7	EF183	C	19
6EJ7	EF184	C	19
*6EL7	EF80	C	19
*6EM5	EL84	M	
6ES8	ECC189	M	
6ET6	EF98	M	
*6EW6	EF184	C	19
6F12	†EF91	C	19
*6F18	EF89	M	
6F19	EF85	M	
6F21	†EF92	C	19
6F22	†EF86	M	
6F23	6F23/EF812	M	
6F26	EF85	M	
6F29	EF183	C	19
6F30	EF184	C	19
*6F33	†6AS6	C	19
6F50R	QY4-500A	D	41
6FC7	ECC89	O	
6FD12	EBF89	M	
6FG6	EM84	M	
6FW8	ECC189	M	
6G10	XGQ2-6400	O	
*6G45	XR1-6400A	C	36
*6GK6	EL84	M	
6GM8	ECC86	M	
6GW8	ECL86	M	
*6H51	RG4-3000	C	37
6HG8	ECF86	O	
6HU6	EM87	O	
*6J4WA	§M8248	S	
6J6	†ECC91	M	
‡6J6WA	§M8081	C	
6JX8	ECH84	M	
6L12	ECC85	M	
6L13	†ECC83	C	20
6L16	ECC84	M	
6L34	†EC91	M	
6LD12	EABC80	O	
6LD13	EBC81	O	
6N8	EBF80	M	
6P15	EL84	M	
6P17	†EL91	M	
*6QL6	EL86	M	
6S2	EY86/87	M	
6S2A	EY86/87	M	
6T8	EABC80	O	
*6T35	TY6-800	D	39
*6V3A	EY88	M	
6V4	EZ80	M	
6X2	EY51	M	
6/30L2	6/30L2/ECC804	M	
7AN7	PCC84	C	
7C23	TY6-5000A	C	43
7D9	†EL91	M	
7D10	EL821	C	
7DJ8	PCC88	O	
7FC7	PCC89	M	
*8A8	PCF80	C	
8D3	†EF91	C	19
*8D5	†EF86	M	
*8D8	†EF86	M	
*8F66R	QY4-400	D	40, 41
8GJ7	PCF801	M	
8HG8	PCF86	M	
*8QR5	XG2-6400	C	37
*8T72	TY12-20W	M	
*8T90	TY12-20W	M	
*8T92	TY12-20W	M	
9A8	PCF80	C	
9AQ8	PCC85	M	
*9BR8	PCF82	O	
9D6	†EF92	C	19
*9D7	EF85	M	
9ED4	PD500	C	19
9JW8	PCF802	D	20
*9T71	TY12-50W	M	
9U8	PCF82	O	
10C14	UCH81	M	
10F18	UF89	M	
10FD12	UBF89	M	
10L14	UCC85	M	
10LD12	UABC80	M	
10LD13	UBC81	O	
10P18	UL84	M	
10PL12	UCL82	M	
11D12	6080	C	
11E13	QQV03-10	C	42
11E14	EL360	M	
11E15	QQV03-20A	C	42
11E16	QQV06-40A	C	42
*12A6	CV2411	S	
*12AD5	UF89	M	
*12AD6	ECH83	M	
*12AN8	ECH81	M	
12AT7	†ECC81	C	20
‡12AT7WA	§M8162	C	20
12AU7	†ECC82	C	20
‡12AU7WA	§M8136	C	20
12AV6	HBC91	M	
12AX7	†ECC83	C	20
‡12AX7WA	§M8137	C	20
*12AZ7	†ECC81	C	20

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*12CU6	**PL36**	M	
*12DF7	**§M8137**	C	20
*12DM7	**†ECC83**	C	20
*12DT5	**EL81**	M	
12DT7	**†ECC83**	C	20
*12EN6	**EL81**	M	
12K7GT	**12K7GT**	O	
12K8GT	**12K8GT**	O	
*12QR205	**XG1-2500**	C	37
12SN7GT	**12SN7GT**	O	
14D12	**TY5-500**	D	39
14GW8	**PCL86**	C	20
15A6	**PL83**	M	
15CW5	**PL84**	C	
15D12	**TY6-800**	D	39
15DQ8	**PCL84**	C	20
16A	**†EL91**	M	
16A5	**PL82**	M	
16A8	**PCL82**	C	
17	**XG5-500**	M	
17C8	**UBF80**	M	
17CVP4	**AW43-88**	M	
17KW6	**PL508**	C	
17Z3	**PY81/800**	C	
18GV8	**PCL805/85**	D	20
19A58	**UCH81**	M	
*19BG6G	**PL36**	M	
19D8	**UCH81**	M	
19FL8	**UBF89**	M	
19SU	**PY82**	M	
19Y3	**PY82**	M	
*20A2	**EN32**	D	36
20A3	**†EN91**	D	36
20CG	**20CG**	O	
20CV	**20CV**	O	
*20D4	**ECH81**	M	
20PE11	**20PE11**	D	26
20PE13	**20PE13**	D	26
*21A1	**EN32**	D	36
21A6	**PL81**	M	
21B12	**ZT1011/ XR1-1600A**	C	36
21DKP4	**AW53-88**	O	
21DKP4A	**AW53-88**	O	
22A	**EF37A**	M	
*22S/200A	**GZ34**	M	
*23D	**DG7-6**	M	
23DGP4	**A59-23W/inckit**	M	
23DHP4	**A59-23W/inckit**	M	
23SP4	**A59-23W/inckit**	M	
25E5	**PL36**	M	
25UP22	**A63-120X**	M	
27GB5	**PL504**	D	21
*28AK8	**UABC80**	M	
30AE3	**PY88**	D	21
30C1	**PCF80**	C	
30C15	**30C15/PCF800**	M	
30C18	**30C18/PCF805**	M	
30F5	**30F5/PF818**	M	
30FL1	**30FL1/PCE800**	M	
30L1	**PCC84**	M	
30L15	**30L15/PCC805**	M	
*30P4	**PL36**	M	
30P12	**30P12/PL801**	M	
30P16	**PL82**	M	
30P18	**PL84**	C	
30P19	**30P19/PL302**	M	
30PL1	**30PL1/PCL801**	M	
30PL13	**30PL13/PCL800**	M	
30PL14	**30PL14/PCL88**	M	
33A	**EL821**	C	
38A3	**UY85**	M	
39A	**†ECC82**	C	20
40KG6	**PL509**	D	21
42EC4	**PY500A**	D	21
*44A/160M	**QQV03-10**	C	42
45B5	**UL84**	M	
50BM8	**UCL82**	M	
50C5	**HL92**	O	
52AVP	**52AVP**	O	
52CG	**52CG**	O	
*52KU	**GZ34**	M	
53AVP	**53AVP**	O	
53CG	**53CG**	M	
53CV	**53CV**	M	
53UVP	**53UVP**	O	
54AVP	**54AVP**	O	
56AVP	**56AVP**	D	30
56CVP	**56CVP**	O	
56DUVP	**56DUVP**	D	
56DVP	**56DVP**	D	30
56DVP/03	**56DVP/03**	O	
56TUVP	**56TUVP**	D	30
56TVP	**56TVP**	D	30
56UVP	**56UVP**	O	
57	**XG1-2500**	C	37
57AVP	**57AVP**	D	31
58AVP	**58AVP**	D	31
58CG	**58CG**	M	
58CV	**58CV**	M	
58DVP	**58DVP**	D	31
58UVP	**58UVP**	O	
60AVP	**60AVP**	S	
63TP	**ECL80**	M	
75B1	**75B1**	O	
75C1	**†75C1**	D	33
83A1	**83A1**	D	33
85A1	**85A1**	M	
85A2	**†85A2**	D	33
90AG	**90AG**	D	32
90AV	**90AV**	D	32
90C1	**†90C1**	D	33
90CG	**90CG**	D	32
90CV	**90CV**	D	32
92AG	**92AG**	D	32
92AV	**92AV**	D	32
95A1	**95A1**	O	
105	**XGQ2-6400**	O	
108C1	**†108C1**	D	33
150AV	**150AV**	D	32
150AVP	**150AVP**	D	30
150B2	**†150B2**	D	33
150B3	**150B3**	O	
150C2	**†150C2**	D	33
150C3	**150C3**	O	
150C4	**†150C4**	C	33
150CV	**150CV**	D	32
150CVP	**150CVP**	D	30
150TV	**150TV**	D	32
150UV	**150UV**	O	
150UVP	**150UVP**	O	
*152AVP	**XP1110**	D	30
155UG	**155UG**	D	32
163Pen	**PL82**	M	
171DPP	**UBF80**	M	
213Pen	**PL81**	M	
238B	**5555**	O	
255	**XG2-12**	O	
260	**XG2-25**	O	
272	**XG5-500**	M	
309	**XG5-500**	M	
*403B	**§M8100**	C	19
*404A	**§E180F**	D	19
*409A	**†6AS6**	C	19
*416B	**EC157**	M	
*435	**§E180F**	C	19
*502A	**†EN91**	D	36
517	**XG5-500**	M	
*575A	**RG4-3000**	C	37
*624	**XG2-6400**	C	37
631	**XG1-2500**	C	37
*632B	**XG1-2500**	C	37
651	**ZX1052**	C	36
652	**ZX1051**	C	36
*655	**ZX1053**	C	36
656	**ZX1052**	C	36
657	**ZX1051**	C	36
*673	**RG4-3000**	C	37
676	**XG2-6400**	C	37
710	**ZT1011/ XR1-1600A**	C	36
715	**XG5-500**	M	
723A/B	**723A/B**	D	50
725A	**725A**	D	46
731A	**†EF95**	C	19
*812	**QY4-250**	D	40, 41
*812A	**TY2-125**	C	39, 43
813	**QY2-100**	M	
*814	**QY3-65**	D	41
829B	**QQV07-40**	O	
833A	**TY4-350**	M	
*860	**QY3-125**	D	41
*865E	**QV06-20**	C	40, 41
866A	**RG3-250A**	C	37
*884	**†EN91**	D	36
*855	**†EN91**	D	36
*925	**90CV**	D	32
966	**RG3-250A**	C	37
967	**XG5-500**	M	
1257	**XG1-2500**	C	37
1267	**Z300T**	M	
*1513	**TY5-500**	D	40, 41
*1619	**QV06-20**	C	40, 41
*2050	**EN32**	D	36
2100A	**RY12-100**	O	
3861B	**QV2-250C**	C	40, 41
3874A	**QY2-100**	M	
4049C	**RG3-1250**	C	37
4049D	**RG4-1250**	C	37
4065	**CV495**	D	21
4066	**CV2730**	D	21
4068	**CV2348**	D	21
4069	**CV8144**	D	21
4261	**XG5-500**	M	
*4313C	**Z300T**	M	
*4648	**RG3-250A**	C	37
5121	**†EN91**	D	36
5221	**RR3-250**	C	37
5528	**XR1-6400A**	C	36
5544	**XR1-3200A**	C	36
5545	**XR1-6400A**	C	36
5551A	**ZX1051**	C	36
5552A	**ZX1052**	C	36
5553B	**ZX1053**	C	36

*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

Index and equivalents—continued

Type number index	Mullard replacements: Mullard type number	Status	Data Page
5555	**5555**	O	
5557	**XG5-500**	M	
5559	**XG1-2500**	C	37
5586	**5586**	D	45
*5591	§**M8100**	C	19
5632	**ZT1011/ XR1-1600A**	C	36
5644	§**5644**	O	
5651	†**85A2**	D	33
5651WA	§**M8098**	C	33
‡5654	§**M8100**	C	19
‡5654/6AK5W	§**M8100**	C	19
‡5654/6AK5W/ 6096	§**M8100**	C	19
*5656	**QQV02-6**	C	42
*5663	**EN92**	C	36
5672	**DL620**	O	
5678	**DF60**	O	
5684	**ZT1011/ XR1-1600A**	C	36
*5685	**XR1-6400A**	C	36
*5687	§**E182CC**	C	
5696	**EN92**	C	36
5720	**XG1-2500**	C	37
‡5725	§**M8196**	C	19
‡5725/6AS6W	§**M8196**	C	19
‡5726	§**M8212**	C	
‡5726/6AL5W	§**M8212**	C	
‡5726/6AL5W/ 6097	§**M8212**	C	
‡5727	§**M8204**	D	36
‡5727/2D21W	§**M8204**	D	36
5728	**XG1-2500**	C	37
*5751	§**M8137**	C	20
*5762	**TY6-5000B** / **YD1120**	M	
5763	†**QV03-12**	C	41
‡5783WA	§**M8190**	O	
*5800	**CV2730**	D	21
*5814A	§**M8136**	C	20
5822A	**ZX1061**	C	36
5823	**Z900T**	C	35
5855	**XR1-12A**	O	
5861	**TD03-10G**	M	
5866	**TY2-125**	C	39, 43
5867	**TY4-400**	C	39, 43
5868	**TY4-500**	D	39, 43
5876	**5876**	D	
5877	**XR1-3200A**	C	36
*5886	**CV2348**	D	21
5893	**5893**	D	
5894	**QQV06-40A**	C	42
5895	**QQZ04-15**	O	
5920	§**E90CC**	C	
5923	**TY6-5000W**	C	43
5924	**TY6-5000A**	C	43
5949	**XH25-500**	O	
*5963	§**M8136**	C	20
*5964	§**E90CC**	C	
*5965	§**E180CC**	C	
6011	**ZT1011/ XR1-1600A**	C	36
6027H	**YJ1060**	S	48
6031	**XG1-2500**	C	37
‡6057	§**M8137**	C	20
‡6058	§**M8079**	C	19
‡6060	§**M8162**	C	20
‡6062	§**M8096**	M	
‡6064	§**M8083**	C	19
‡6065	§**M8161**	C	19
‡6067	§**M8136**	C	20
6073	§**M8223**	D	33
6074	§**M8224**	D	33
6075	**QY5-3000W**	C	40, 41
6076	**QY5-3000A**	C	40, 41
6077	**TY12-50W**	M	
6079	**QY5-500**	D	40, 41
6080	**6080**	C	
6084	§**E80F**	C	
6085	§**E80CC**	C	
*6086	§**E83F**	C	
6096	§**M8100**	C	19
6097	§**M8212**	C	
*6098	**EL84**	M	
6099	§**M8081**	C	
‡6100	§**M8080**	C	
‡6100/6C4WA	§**M8080**	C	
‡6101	§**M8081**	C	
‡6101/6J6WA	§**M8081**	C	
6120	**XGQ2-6400**	O	
6130	**XH3-045**	O	
6135	§**M8080**	C	
6146	**QV06-20**	C	40, 41
6155	**QY3-125**	D	41
6156	**QY4-250**	D	40, 41
6187	§**M8196**	C	19
‡6189	§**M8136**	C	20
*6197	§**E80L**	C	
6199	**150AVP**	D	30
6201	§**M8162**	C	20
6220A	**XR1-6400A**	C	36
6227	§**E80L**	C	
*6249	**4J50**	S	45
6250	**XR1-12A**	O	
6252	**QQV03-20A**	C	42
6263	**6263**	D	
6264	**6264**	D	
6267	**EF86**	M	
6268	**XH8-100**	O	
6279	**XH16-200**	O	
6291	**150AVP**	D	30
*6293	**QV06-20**	C	40, 41
6308	§**M8142**	S	
6346	**ZX1051**	C	36
6347	**ZX1052**	C	36
6348	**ZX1053**	C	36
*6350	§**E182CC**	C	
6354	†**150B2**	D	33
6360	**QQV03-10**	C	42
6370	**E1T**	M	
6374	†**EY84**	C	
*6417	**QV03-12**	C	41
6435	**XH3-045**	O	
‡6443	§**M8091**	C	
6463	§**6463**	O	
6482	**Z303C**	O	
‡6486	§**M8196**	C	19
‡6516	§**M8082**	C	
6521	**6521**	D	48
6522	**XH16-200**	O	
*6524	**QQV03-20A**	C	42
*6549	**QY3-65**	D	41
6574	**EN32**	D	36
‡6582	§**M8100**	C	19
6617	**TY12-25W**	M	
6618	**TY12-25A**	M	
6626	§**M8223**	D	33
6627	§**M8224**	D	33
*6663	§**M8212**	C	
*6677	**EL84**	M	
*6678	**ECF82**	M	
*6679	§**M8162**	C	20
*6680	§**M8136**	C	20
6681	§**M8137**	C	20
6686	§**E81L**	C	
6688	§**E180F**	C	19
6689	§**E83F**	C	
6693	**RG4-3000**	C	37
6700	**ET51**	M	
6779	**Z803U**	C	35
6786	**XG15-10**	M	
6807	**XR1-6400A**	C	36
*6808	**XR1-6400A**	C	36
6850	**QQV03-20A**	C	42
*6860	**XR1-6400A**	C	36
*6901	**QQV03-20A**	C	42
6914	**6914**	O	
6922	§**E88CC**	C	20
6923	**EA52**	C	19
6929	**6929**	D	28
6939	**QQV02-6**	C	42
6960	**TY7-6000W**	C	39, 43
6961	**TY7-6000A**	C	39, 43
6972	**6972**	D	
6977	**DM160**	C	21
7008	**YJ1010**	D	47
*7020	**ZX1051**	C	36
7021	**ZX1051**	C	36
*7025	†**ECC83**	C	20
*7027	**EL34**	M	
7028	**JP9-2-5E**	D	46
*7030	**ZX1052**	C	36
7031	**ZX1052**	C	36
7034	**QV1-150A**	M	
7035	**QV1-150D**	M	
*7040	**ZX1053**	C	36
7041	**ZX1053**	C	36
*7044	§**E182CC**	C	
7062	§**E180CC**	C	
7088	**YJ1030**	S	44
7090	**7090**	D	44
7091	**YJ1162**	D	44
7092	**TY6-800**	D	39
7093	**7093**	S	47
7111	**YJ1011**	D	47
7119	§**E182CC**	C	
*7136	**RG4-3000**	D	37
*7181	**JP9-75**	D	47
*7189	**EL84**	M	
7203	**QV2-250C**	D	40, 41
7237	**TY7-6000A**	C	39, 43
7262A	**7262A**	D	26
7292	**YJ1160**	D	44
*7297	**XR1-3200A**	C	36
*7298	**XR1-6400A**	C	36
*7299	**XR1-6400A**	C	36
7308	§**E188CC**	C	
*7316	§**M8136**	C	20
*7320	**EL84**	M	
*7321	**XR1-6400A**	D	36
7378	**QV08-100**	C	40, 41
7386	**XR1-6400**	M	
7527	**QY4-400**	D	40, 41
7534	**E130L**	C	

*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

Index and equivalents—continued

Type number index	Mullard replacements		Data Page
	Mullard type number	Status	
7580	**7580**	C	
7580W	**7580W**	C	
7609	**7609**	C	
7643	§**E80CF**	C	
7650	**YL1110**	D	40, 41
7704	**7704**	C	
7709	**Z700W**	O	
7710	**Z700U**	O	
7711	**Z701U**	O	
7721	§**D3a**	S	
7722	§**E280F**	C	
7737	§**E186F**	C	
7753	**TY6-1250A**	C	39
7788	§**E810F**	C	19, 21
7804	**TY8-15A**	C	39, 43
7807	**TY12-20W**	M	
7900	**7900**	C	
7980	**83A1**	D	33
7981	**XR1-3200A**	C	36
7983	**QQZ03-10**	M	
8020	**RY12-100**	O	
8037	**ZM1020**	C	34
8042	**QZ06-20**	M	
8063	**ZT1011/ XR1-1600A**	C	36
8108	**EC157**	M	
8117	**YL1070**	D	40
8118	**YL1020/ QQZ03-20**	M	
8177	**QY3-1000A**	M	
8223	**E288CC**	C	
8228	**ZZ1000**	C	33
8233	§**E55L**	C	21
8254	§**EC1000**	O	
8255	§**E88C**	M	
8268	**TY8-6000W**	C	39
8269	**TY8-6000A**	C	39
8270	**ZT1000**	O	
8348	**YL1080**	M	
*8356	**YJ1040**	D	48
8408	**YL1130**	M	
8433	**Z504S** / **ZM1070**	C	35
8436	**EC158**	M	
8458	**YL1240**	D	42
8505	**YL1520**	D	41
8532	§**M8248**	S	
8579	**YL1150**	D	40, 41
8580	**YL1190**	M	
8608	**EL5070**	M	
8621	**8621**	C	
8666	**YD1170**	D	38
8667	**YD1171**	D	38
8668	**YD1172**	D	38
8680	**YD1212**	D	38
8728	**YD1150**	D	38
8730	**YD1152**	D	38
8731	**YD1160**	D	38
8732	**YD1161**	D	38
8733	**YD1162**	D	38
8734	**YD1173**	D	38
8735	**YD1182**	D	38
8736	**YD1192**	D	38
8752	**YD1202**	D	38
*18042	§**E83F**	C	
18503	**MX146**	D	57
18504	**MX147**	D	57
18505	**MX148**	D	57
18506	**MX149**	D	57
18509	**MX151**	D	58
18515	**MX152**	D	58
18518	**MX155**	D	58
18520	**MX120/01**	D	57
18529	**MX163**	D	58
18536	**MX166**	D	58
18545	**MX145**	D	57
18546	**MX167**	D	57
18550	**MX164**	D	58
18552	**MX177**	C	57
18553	**MX178**	C	57
38217	**XG5-500**	M	
55035	**2J42**	D	46
55040	**725A**	D	46
55125	**YJ1191**	D	44
55230	**5J26**	D	45
55335	**55335**	D	50
55370	**YK1010**	D	50
55390	**2K25**	D	50
55391	**723A/B**	D	50
55850AM	**XQ1044**	M	
55850F	**XQ1040**	M	
55850N	**XQ1043**	M	
55850S	**XQ1042**	M	
55851-2-AM	**XQ1044**	M	
55851-2-N	**XQ1043**	M	
55875 series	**55875** series	M	
55875-IG series	**55875-IG** series	M	
56000	**RY12-100**	O	

*Replacements shown are near equivalents only. §This is a Special Quality type. †There is a Special Quality version of this type. ‡Replacements shown have identical electrical characteristics but not necessarily identical assessment specification.

Receiving valves
r. f. pentodes book 2 part 1

Type No.	Description	g_m (mA/V)	$-V_{g1}$ ‡ (V)	μ_{g1-g2}	r_a (MΩ)	V_a (V)	V_{g2} (V)	$-V_{g1}$ (V)	I_a (mA)	I_{g2} (mA)	I_h† (mA)	Base
EF92 (CV131) **§M8161** (CV4015)	Variable-μ	2·45	27	30	0·9	200	200	2·5	8·25	2·1	200	B7G
6AS6 (CV2522) **§M8196** (CV4011)	Dual control	3·2	—	—	0·15	120	120	2·0	5·1	3·5	175	B7G
EF95 (CV850) **§M8100** (CV4010)	Low Noise	5·1	—	35	0·4	180	120	2·0	7·7	2·4	175	B7G
EF80 (CV1376)	General purpose	7·4	—	50	0·4	170	170	2·0	10	2·5	300	B9A
EF91 (CV138) **§M8083** (CV4014)	General purpose	7·6	—	70	>0·5	250	250	2·0	10	2·6	300	B7G
EF183	Frame grid, variable-μ	12·5	14·5	—	0·5	200	90	2·0	12	4·5	300	B9A
EF184	Frame grid, sharp cut-off	15	—	60	0·38	200	200	2·5	10	4·1	300	B9A
§E180F (CV3998)	Wideband amplifier	16·5	—	50	0·09	180	150	1·25	13	3·3	300	B9A
§E810F (CV5809)	Wideband amplifier	50	—	57	0·042	120	150	1·9	35	5·0	340	B9A

§ This is a Special Quality Type. † V_h=6·3V. ‡ For 100:1 reduction in g_m.

diodes and double diodes

Type No.	Description	P.I.V. max. (V)	I_a max. (mA)	i_a (pk) max. (mA)	I_h† (mA)	Base
EB91 (CV140) **§M8079** (CV4025)	Double Diode with separate cathodes	420a	9·0a	54a	300	B7G
EA52 (CV5140)	U.H.F. Measurements Diode	1000b	0·3b	5·0b	300	Flying Lead

a Design Centre Ratings. b Absolute Ratings. § This is a Special Quality Type. † V_h=6·3V.

triode

Type No.	Description	V_a (kV)	p_a max. (W)	$-V_g$ at I_a=1·5mA (V)	$-V_g$ max. at I_a=0·1mA (V)	V_h (V)	I_h (mA)	Base
PD500	Shunt stabiliser for colour tv	25	30	7 to 30	40	7·3	300	B9D

Receiving valves
double triodes book 2 part 1

Type No.	μ	gm (mA/V)	ra (kΩ)	Va (V)	—Vg (V)	Ia (mA)	Vh (V)	Ih (mA)	Base
ECC82 (CV491) **§M8136** (CV4003)	17	2·2	7·7	250	8·5	10·5	6·3 / 12·6	300 / 150	B9A
ECC88	33	12·5	2·65	90	1·3	15	6·3	365	B9A
§E88CC (CV2492) **§E88CC/01** (CV2493)	33	12·5	2·65	90	1·2	15	6·3	300	B9A
ECC81 (CV455) **§M8162** (CV4024)	60	5·5	11	250	2·0	10	6·3 / 12·6	300 / 150	B9A
§M8137 (CV4004)	90	1·6	56	250	2·0	1·25	6·3 / 12·6	300 / 150	B9A
ECC83 (CV492)	100	1·6	62·5	250	2·0	1·2	6·3 / 12·6	300 / 150	B9A

All types have double cathodes.

§ This is a Special Quality Type.

triode pentodes and double pentode

Type No.	Description		gm (mA/V)	μ	Va (V)	Vg2 (V)	—Vg1 (V)	Ia (mA)	Ig2 (mA)	Vh (V)	Ih (mA)	Base
ECF80 (CV5215)	Frequency changer gc=2·1 mA/V	(T)	5·0	20	100	—	2·0	14	—	6·3	430	B9A
		(P)	5·5	—	250	200	3·2	7·0	1·8			
PCF802	Triode pentode	(T)	3·5	70	200	—	2·0	3·5	—	9·0	300	B9A
		(P)	5·5	—	100	100	1·0	6·0	1·7			
ECL86	Triode pentode	(T)	1·6	100	250	—	1·9	1·2	—	6·3	660	B9A
		(P)	10	—	250	250	7·0	36	6·0			
PCL84	Triode pentode	(T)	4·0	65	200	—	1·7	3·0	—	15	300	B9A
		(P)	10·4	—	200	200	2·9	18	3·0			
PCL86	Triode pentode	(T)	1·6	100	230	—	1·7	1·2	—	13·3	300	B9A
		(P)	10·5	—	230	230	5·7	39	6·5			
PCL805/85	Triode pentode	(T)	7·0	63	100	—	0	10·5	—	17·5	300	B9A
		(P)	7·25	—	170	170	15	41	2·7			
PFL200	Double pentode	(AMP)	8·5	—	150	150	2·1	10	3·0	17	300	B10B
		(OUT)	22	—	170	170	2·7	30	7·0			

Receiving valves
power pentodes book 2 part 1

Type No.	Description	pa max. (W)	Va (V)	Vg2 (V)	—Vg1 (V)	Ia (mA)	Ig2 (mA)	gm (mA/V)	Vh (V)	Ih (mA)	Base
§**E810F** (CV5809)	High Slope Wideband	5·0a	120	150	1·9	35	5·0	50	6·3	340	B9A
§**E55L** (CV5808)	High Slope Wideband	10a	125	125	3·0	50	5·5	45	6·3	600	B9D
PL504	Monochrome line output	12*	75	200	10	440	30	—	27	300	B9D
PL509	Colour Line output	30	160	160	0	1400	45	—	40	300	B9D
PL802	Video output	6·0	170	170	1·3	30	6·5	40	16	300	B9A

a Absolute Maximum Rating. § This is a Special Quality Type. * See published data.

high voltage diodes

Type No.	Description	P.I.V. max. (kV)	Ia (av) max. (mA)	Vh (V)	Ih (mA)	Base
PY88	Booster diode	6·6	220	30	300	B9A
PY500A	Booster diode	5·6	440	42	300	B9D
DY802	E.H.T. rectifier	25	0·5	1·4	575	B9A

voltage indicator tube

Type No.	Type of Indication	Indicating Condition	Vg (V)	Ia (μA)	Va(b) (V)	Vf (V)	If (mA)	Base
§**DM160** (CV5412) (CV6094)	Fluorescent column	Max. light output Min. light output	0 −3·0	585 <5·0	50	1·0	30	Wired-in

§ This is a Special Quality Type.

electrometer valves

Type No.	Description	—Ig1 (A)	gm (μA/V)	μ	Va (V)	Vg2 (V)	Vg1 (V)	Ia (μA)	†If or Ih (mA)	Base
CV432	Pentode	$<10^{-11}$ $<10^{-11}$	240a 300b	— 20b	45 45	+45a —	−2·0 −2·0	80a 100b	160 (4·5V)	Octal
CV495	Subminiature Triode	$<12{\cdot}5\times10^{-14}$	80	2·0	9·0	—	−2·5	100	13	B5J/F
CV2730	Subminiature Tetrode	$<6{\cdot}0\times10^{-15}$ (−Ig2)	17	1·2 (g2–a)	4·5	−3·2	+3·0	20	13	B5J/F
CV2348	Subminiature Pentode	$<8\times10^{-15}$	10·5	110 (g1–a)	10	+6·5	−2·5	5·0c	8·2	B5J/F
CV8144	Subminiature Triode with controlled Ia/Ig log characteristic	$<10^{-12}$	80	2·0	9·0	—	−2·7	100	14	B5J/F

a Pentode connected. b Triode connected. c Ig2=2·2μA. † Vf or Vh=1·25V unless otherwise stated.

Picture tubes
colour picture tubes book 2 part 1

All Types : Shadow mask. 3-gun. 90° deflection. Compression banded. Push-through presentation. V_h=6·3V. I_h=900mA. B12-246 base. Neck diameter 36·5mm.

Type No.	Screen Diagonal		Final Anode Voltage *		Typical Operating Conditions V_{a1}	$-V_g$	Focusing Electrode	Light Transmission
	(cm)	(in)	Max. (kV)	Min. (kV)	(V)	(V)	(V)	(%)
A49-120X	49	19	27·5	20	210 to 495	100	4200 to 5000	54
A56-120X	56	22	27·5	20	210 to 495	100	4200 to 5000	53
A66-120X	66	26	27·5	20	210 to 495	100	4200 to 5000	53

* Absolute maximum rating system.

monochrome picture tubes

All Types : 110° deflection. Short unipotential gun. Compression banded. Push-through presentation.

Type No.	Screen Diagonal		Max. Final Anode Voltage	Typical Operating Conditions V_{a1}	$-V_g$	Focusing Electrode	V_h	I_h	Light Transmission	Neck Diameter	Base
	(cm)	(in)	(kV)	(V)	(V)	(V)	(V)	(mA)	(%)	(mm)	
A31-120W	31	12	12	250	35 to 69	0 to +350	11	75	50	20	B7G special
A44-120W/R	44	17	18	400	40 to 77	0 to +400	6·3	300	48	28·6	B8H
A50-120W/R	50	20	20	400	40 to 77	0 to +400	6·3	300	45	28·6	B8H
A61-120W/R	61	24	20	400	40 to 77	0 to +400	6·3	300	42	28·6	B8H

Note : In the type number the suffix / R indicates that a ring trap base is fitted to the tube. Tubes without a ring trap base are available under the same type number but with the suffix omitted.

Electro-optical devices screen phosphors

On older types of Mullard cathode ray tubes, the colour of the fluorescence and the persistence of the screen phosphor was indicated by the second letter of the type number. On the latest types of Mullard cathode ray tubes, the properties of the screen phosphor are indicated by the second group of letters in accordance with the Pro-Electron system. For example the type number D7-190GH indicates a single trace oscilloscope tube having a 7cm screen with phosphor GH.

The first letter of the second group of letters denotes the colour of the fluorescence (or phosphorescence in the case of long or very long afterglow screens) according to the regions of the Kelly Chart of Colour Designations for Lights, where applicable:

A — Reddish-purple, purple, bluish-purple.

B — Purplish-blue, blue, greenish-blue.

D — Blue-green.

G — Bluish-green, green, yellowish-green.

K — Yellow-green.

L — Orange, orange-pink.

R — Reddish-orange, red, pink, purplish-pink, purplish-red, red-purple.

W — White.

X — Tri-colour screen.

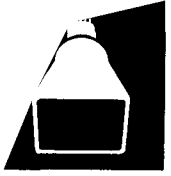
Y — Greenish-yellow, yellow, yellowish-orange.

The second letter is a serial letter to denote particular phosphors. For the 'standard' television picture tube phosphor the letter 'W' is used without a second letter. The fluorescent colour, phosphorescent colour and persistence of various phosphors can be obtained from the following table:

designation of Mullard phosphors

Present System (Pro-Electron)	*Old System*	*Fluorescent colour*	*Phosphorescent colour*	*Persistence*	*Equivalent JEDEC designation*
BA	C	Purplish-blue	—	Very short	—
BC	V	Purplish-blue	—	Killed	—
BD	A	Blue	—	Very short	—
BE	B	Blue	Blue	Medium short	P11
BF	U	Blue	—	Medium short	—
GB	M	Purplish-blue	Yellowish-green	Long	P32
GE	K	Green	Green	Short	P24
GH	H	Green	Green	Medium short	P31
GJ	G	Yellowish-green	Yellowish-green	Medium	P1
GK	G*	Yellowish-green	Yellowish-green	Medium	—
GL	N	Yellowish-green	Yellowish-green	Medium short	P2
GM	P	Purplish-blue	Yellowish-green	Long	P7
GN	J	Blue	Green (Infrared excited)	Medium short (fluorescence)	—
GP	—	Bluish-green	Green	Medium short	P2
GU	—	White	White	Very short	—
KA	—	Yellow-green	Yellow-green	Medium	P20
LA	D	Orange	Orange	Medium	—
LB	E	Orange	Orange	Long	—
LC	F	Orange	Orange	Very long	—
LD	L	Orange	Orange	Very long	P33
W	W	White	—	—	P4
X	X	Tri-colour screen	—	—	P22
YA	Y	Yellowish-orange	Yellowish-orange	Medium	—

*Used in projection tubes.



Electro-optical devices
oscilloscope tubes book 2 part 2

Type No.	Description or Application	Screen Dia. (cm)	Screen Dia. (in)	Deflection Sensitivity (V/cm) Sy	Deflection Sensitivity (V/cm) Sx	‡Max. Final Anode Voltage (kV)	Operation y-plates	Operation x-plates	Post Defl. Acc.	†Ih (mA)	Base
DH3-91	Simple oscilloscopes General purpose monitor	3	1	45	53 ($V_{a1}+a3+y''=$ 500V)	1·0	Asym.	Sym.	None	300	B8G
D7-190GH	Inexpensive oscilloscopes Monitoring devices	7	3	12	29 ($V_{a1}+a3=1·0$kV)	2·2	Sym.	Sym.	None	300	Special 14-pin 55566
D^H7-11	Low power consumption Transistor drive	7	3	3·7	10·7 ($V_{a3}=300$V $V_{a4}=1·2$kV)	5·0	Sym.	Sym.	Helical	88	Special 14-pin 40467
DG7-31 **DG7-32**	General purpose monitors	7	3	21·8	37·8 ($V_{a1}+a3=$ 500V)	0·8	Sym.	Asym. Sym.	None	300	B12A
D10-160GH	Inexpensive oscilloscopes Read-out devices	10	4	14	33 ($V_{a1}+a3=$ 1·5kV)	2·2	Sym.	Sym.	None	300	Special 14-pin 55566
D10-170GH	Short length High sensitivity	10	4	3·5	13·5 ($V_{a1}+a3=1·0$kV $V_{a4}=6·0$kV)	6·6	Sym.	Sym.	Yes	300	Special 14-pin 55566
D13-450GH/01	Sectional plates Internal graticule Intended for precision wide-band oscilloscopes between 100 and 250 MHz	13 (Rectangular)	$4\frac{1}{2}\times3\frac{1}{2}$	3·0	9·9 ($V_{a3}=1·5$kV $V_{a4}=15$kV)	16·5	Sym.	Sym.	Yes	300	Special 14-pin 55566
D13-480GH	Inexpensive oscilloscopes Read-out devices	13	5	15	31 ($V_{a1}+a3=$ 2·0kV)	2·2	Sym.	Sym.	None	300	Special 14-pin 55566
D13-500GH/01	Delay-line system of vertical deflection Intended for precision ultra wide-band oscilloscopes	13 (Rectangular)	5	2·0	15 ($V_{s1}=2·5$kV $V_{a8}=15$kV)	20	Sym. Helical	Sym.	Yes	300	Special 14-pin 55566
D14-120GH	Short length High sensitivity	14 (Rectangular)	$4\frac{1}{2}\times4$	4·2	15·5 ($V_{a1}+a3=1·5$kV $V_{a4}=10$kV)	11	Sym.	Sym.	Yes	300	Special 14-pin 55566
D14-121GH	As D14-120GH except for side connections to x and y plates	14 (Rectangular)	$4\frac{1}{2}\times4$	4·2	15·5 ($V_{a1}+a3=1·5$kV $V_{a4}=10$kV)	11	Sym.	Sym.	Yes	300	Special 14-pin 55566
D14-160GH/09	High sensitivity medium-band oscilloscopes. Internal graticule with external coil assy. correction	14 (Rectangular)	$4\frac{1}{2}\times4$	4·2	15·5 ($V_{a1}+a3=1·5$kV $V_{a4}=10$kV)	11	Sym.	Sym.	Yes	300	Special 14-pin 55566

† $V_h=6·3$V. ‡ Absolute ratings.

Electro-optical devices
television monitor tubes book 2 part 2

All Types: Magnetic Deflection. Electrostatic Focusing. Metal-backed Rectangular Screen.

Type No.	Description	Screen diagonal (cm)	Screen diagonal (in)	Deflection Angle (deg.)	Max. Final Anode Voltage (kV)	Typical Operating Conditions Va1 (V)	—Vg (V)	Focusing Electrode (V)	Vh (V)	Ih (mA)	Base
M17-140W	Television viewfinder tube	17	7	70	16	400	32 to 62	0 to +400	6·3	300	B8H
M17-141W	As M17-140W but with reinforced faceplate	17	7	70	18	400	32 to 62	0 to +400	6·3	300	B8H
M24-100W	Precision television studio monitor	24	9½	90	16	600	32 to 85	0 to +400	6·3	300	B8H
M38-120W	Precision television studio monitor	38	15	110	18	400	40 to 85	0 to +400	6·3	300	B8H

data display tubes

Preferred screen variants of the preceding television monitor tube types are available for data display applications.

flying spot scanner tubes

Type No.	Description	Screen Dia. (cm)	Screen Dia. (in)	Resolution (Lines)	Va (kV)	—Vg (V)	Ih† (mA)	Base
Q7-100GU	*Primarily for EVR applications.* Magnetic deflection, Electrostatic focus	7	3	800	10	35 to 70	300	B8H
Q13-110BA	Magnetic Tube with metal-backed screen	13	5	>1000	25	50 to 100	300	B12A
Q13-110GU	Magnetic Tube for colour television with metal-backed screen							

† Vh=6·3V.

projection tubes

Type No.	Description	Fluorescence	Screen Dia. (cm)	Screen Dia. (in)	Va (kV)	Ia(pk) (mA)	—Vg (V)	Ih† (mA)	Base
MG13-38	Projection Tubes with metal-backed screen for high brightness large area displays	Green	13	5	50	2·5	100 to 170	660	B12A
MU13-38		Blue							
MW13-38		White							
MY13-38		Red							

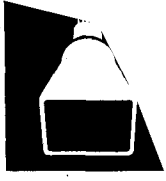
† Vh=6·3V.

Electro-optical devices
camera tubes book 2 part 2

Type No.	Application	Description	Size (mm)	Focusing	Deflection	Min. Resolution Capability (TV lines)	Length (mm)
XQ1210 **XQ1210R** **XQ1210G** **XQ1210B**	Monochrome Red Image Green Image Blue Image	Miniature *Plumbicon TV pick-up tubes. Separate mesh. Intended for use in compact monochrome and colour broadcast cameras	16·5	Electrostatic	Magnetic	500	136
2OPE11	General purpose	Integral mesh vidicon TV pick-up tube for high definition miniature cameras. 95mA heater	17·7	Magnetic	Magnetic	400	108
2OPE13	General purpose	Separate mesh vidicon TV pick-up tube for high definition miniature cameras. 95mA heater	17·7	Magnetic	Magnetic	550	108
†**XQ1070** **XQ1070L** **XQ1070R** **XQ1070G** **XQ1070B**	Monochrome Luminance Red Image Green Image Blue Image	*Plumbicon TV pick-up tubes incorporating a separate mesh. Suitable for monochrome and colour broadcast use	25	Magnetic	Magnetic	750	162
†**XQ1071** **XQ1071R** **XQ1071G** **XQ1071B**	Monochrome Red Image Green Image Blue Image	*Plumbicon TV pick-up tubes incorporating a separate mesh. Suitable for monochrome and colour industrial use	25	Magnetic	Magnetic	600	162
XQ1080 **XQ1080L** **XQ1080R** **XQ1080G** **XQ1080B**	Monochrome Luminance Red Image Green Image Blue Image	*Plumbicon TV pick-up tubes. Separate mesh. Anti-comet-tail electron gun for highlight handling and lightpipe for adjustable bias lighting to minimise lag under low-key conditions. Suitable for monochrome and colour broadcast use.	25	Magnetic	Magnetic	750	158
XQ1240 **XQ1241**	Industrial, medical and broadcast General purpose	Separate mesh vidicon TV pick-up tubes for high definition monochrome and colour use. 95mA heater	25	Magnetic	Magnetic	1000	159
7262A	Industrial and General purpose	Integral mesh vidicon TV pick-up tube for high definition industrial and general purpose cameras. 110mA heater	25	Magnetic	Magnetic	500	130
XQ1020 **XQ1020L** **XQ1020R** **XQ1020G** **XQ1020B**	Monochrome Luminance Red Image Green Image Blue Image	*Plumicon TV pick-up tubes incorporating a separate mesh for use at higher beam currents and with dynamic focus. Suitable for monochrome and colour broadcast use	30	Magnetic	Magnetic	600	220
XQ1021 **XQ1021R** **XQ1021G** **XQ1021B**	Monochrome Red Image Green Image Blue Image	*Plumicon TV pick-up tubes incorporating a separate mesh for use at higher beam currents. Suitable for monochrome and colour industrial use	30	Magnetic	Magnetic	600	220

*Registered trade mark for television camera tubes.

†XQ1070 and XQ1071 series tubes are provided with anti-halation glass discs but are available without the disc under type numbers with a /01 suffix, e.g. XQ1070/01G.

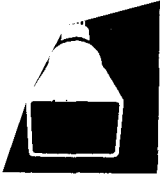


Electro-optical devices
camera tubes (cont.) book 2 part 2

Type No.	Application	Description	Size (mm)	Focusing	Deflection	Min. Resolution Capability (TV lines)	Length (mm)
XQ1023 **XQ1023L** **XQ1023R**	Monochrome Luminance Red Image	*Plumbicon TV pick-up tubes incorporating a separate mesh for sensitive high definition monochrome and colour use. Extended red response	30	Magnetic	Magnetic	700	220
XQ1024 **XQ1024R**	Monochrome Red Image	*Plumbicon TV pick-up tubes incorporating a separate mesh for industrial use. Extended red response	30	Magnetic	Magnetic	700	220
XQ1025 **XQ1025L** **XQ1025R**	Monochrome Luminance Red Image	As XQ1023 but incorporating an infrared filter	30	Magnetic	Magnetic	700	220
XQ1026 **XQ1026R**	Monochrome Red Image	As XQ1024 but incorporating an infrared filter	30	Magnetic	Magnetic	700	220
XQ1220 Series **XQ1230 Series**	Medical, scientific and low light level TV systems	*Plumbicon TV pick-up tubes. Separate mesh. Anti-comet-tail electron gun. Lightpipe. Fibre optic faceplate for direct coupling to X-ray image intensifiers and light intensifiers with fibre optic windows. XQ1220 series has non-cladded fibre optic XQ1230 series has black-cladded fibre optic.	30	Magnetic	Magnetic	25 lp/mm	210

*Registered trade mark for television camera tubes.

†XQ1070 and XQ1071 series tubes are provided with anti-halation glass discs but are available without the disc under type numbers with a /01 suffix, e.g. XQ1070/01G.



Electro-optical devices
image intensifier tubes book 2 part 2

Type No.	Description	Screen Dia. (mm)	Photocathode	Tube Resolution (line pairs/mm)	Linear Magnification of Image	V_{a-k} max. (kV)
XX1050	Self-focusing electrostatic image intensifier tube with fibre optic windows having a low background luminance	25	S25	60	0·935	16
XX1060	High gain self-focusing image intensifier assembly for very low light level applications	25	S25	25	0·82 to 1·0	2·85*
XX1240	Variable gain self-focusing miniature channel image intensifier assembly for compact low light level applications	18	S25	20	0·79	11†
XX1241	Encapsulated version of XX1240	18	S25	20	0·79	11†

* V supply (p—p).

† Consisting of 4·75kV cathode to channel plate, a variable voltage 0 to 1·5kV across the channel plate depending on the required gain and 4·75kV channel plate to anode.

image converter tubes

Type No.	Description	Screen Dia. (mm)	Photocathode	Tube Resolution (line pairs/mm)	Linear Magnification of Image	V_{a-k} max. (kV)
6929	Diode Image Converter sensitive to infrared with electrostatic self-focusing	14·5	Caesium on oxidised silver	50	0·75	12·5

Other image converter tubes, e.g. to specification CV6099, are available.

Photosensitive devices
cadmium sulphide photoconductive cells book 2 part 2

All types : Spectral response range 0·3 to 0·9 μm

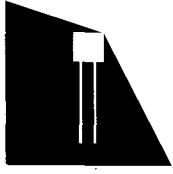
Type No.	Incidence of Illumination	Max. Dissipation (mW)	at (°C)	Max. Cell Voltage (d.c. or pk.) (V)	Nominal[a] Cell Resistance (kΩ)	Ambient Temperature Limits (°C)	Base
ORP52	Side-on and End-on	400	25	200	1·2	—40 to +70	Wired-in
ORP60	End-on	70 20	25 70	350	60	—40 to +70	Wired-in
ORP61	Side-on	70 20	25 70	350	60	—40 to +70	Wired-in
ORP62	Side-on	100	25	350	45	—40 to +70	Wired-in
ORP69	Side-on and End-on	100	25	350	30	—40 to +70	Wired-in
ORP90	Side-on	1000 300	25 70	350	1·0	—40 to +70	B7G
ORP93	Side-on	1000 350	25 70	400	1·7	—40 to +70	B7G
RPY18	Side-on	500	25	100	0·5	—40 to +70	Wired-in
RPY19	Side-on	500	25	400	3·0	—40 to +70	Wired-in
RPY20	Side-on	1000	25	400	1·5	—40 to +70	Wired-in
RPY33	End-on (Cadmium sulpho-selenide)	75	25	50	2·5 (at 25 lux)	—40 to +60	Wired-in
RPY43	Side-on	750	25	400	1·5	—40 to +70	Wired-in
RPY54	Side-on	500	25	200	1·5	—40 to +70	Wired-in
RPY55	End-on	1000	25	200	0·42	—40 to +70	Wired-in
RPY58	Side-on (Monograin)	100	40	50	0·6	—40 to +60	Wired-in
RPY71	Side-on (Linear monograin)	50	25	50	3·0 to 6·0 (at 10 lux)	—40 to +70	Wired-in

a Measured at 50 lux and with lamp of colour temperature 2700K.

Photosensitive devices
photomultipliers book 2 part 2

Type No.	Description	Photocathode Diameter (mm)	Photocathode Surface	Av. Anode Sensitivity Sensitivity (A/lm)	Av. Anode Sensitivity at V_b (kV)	Cathode Sensitivity (μA/lm)	No. of Stages	Max. Dark Current at Min. Anode Sensitivity (nA)
XP1110	Intended for scintillation counting under limited dimensional conditions	14	Caesium antimony	250	1·8	65	10	100
XP1115	Rugged tube intended for scintillation counting and optical measurements	14	Caesium antimony	250	1·8	65	10	100
XP1116	Rugged construction Suitable for industrial equipment	14	Caesium on oxidised silver	100	1·8	20	10	10 000
XP1117	Rugged construction Suitable for Laser applications	14	Sodium potassium caesium antimony	100	1·8	100	9	100
XP1143	Intended for measurement of very short light pulses of high luminous flux	Useful Area 280mm²	Caesium antimony	0·45	3·5	45	6	6000[a]
150AVP	General purpose tube suitable for flying spot scanning, spectrometry and scintillation counting	32	Caesium antimony	700	1·8	70	10	50
150CVP	Tube with S1 photocathode	32	Caesium on oxidised silver	100	1·8	25	10	10 000
XP1010	Low noise Intended for X and γ ray spectrometry	32	Caesium antimony	700	1·8	80	10	50
56AVP	Very high gain and uniform electron transit time	42	Caesium antimony	6500	2·2	65	14	5000[b]
56DVP	As 56AVP but with high quantum efficiency photocathode	42	Potassium caesium antimony	—	—	45	14	1000[b]
56TVP	Tube with Trialkali photocathode for use with Laser applications	42	Sodium potassium caesium antimony	11 500	2·5	115	14	5000[b]
56TUVP	Intended for use where high sensitivity in the visible and ultraviolet region is required	42	Sodium potassium caesium antimony	11 500	2·5	115	14	5000[b]

[a] For gain of 10^4. [b] For gain of 10^6.



Photosensitive devices
photomultipliers (cont.) book 2 part 2

Type No.	Description	Photocathode Diameter (mm)	Photocathode Surface	Av. Anode Sensitivity Sensitivity (A/lm)	Av. Anode Sensitivity at Vb (kV)	Cathode Sensitivity (μA/lm)	No. of Stages	Max. Dark Current at Min Anode Sensitivity (nA)
XP1002	Trialkali photocathode for Laser applications	44	Sodium potassium caesium antimony	400	1·8	150	10	50
58AVP	Tube with a very high gain and uniform electron transit time. Curved window surface	110	Caesium antimony	7000	2·4	70	14	12 000[b]
58DVP	For nuclear physics applications	110	Potassium caesium antimony	—	—	45	14	2000[b]
57AVP	Tube with an exceptionally large area photocathode surface	200	Caesium antimony	250	1·8	50	11	1000

[a] For gain of 10^4. [b] For gain of 10^6.

Photosensitive devices
photoemissive tubes book 2 part 2

Type No.	Description	Photocathode Projected Area (cm^2)	Photocathode Surface	Sensitivity† ($\mu A/lm$)	at (V)	Max. Anode Supply Voltage (V)	Max. Cathode Current (μA)	Max. Dark Current (μA)	Max. Dark Current at Anode Supply Voltage (V)	Base
92AV	Vacuum	2·1	Caesium antimony	45	85	100	25 nA/mm^2	0·05	85	B7G
92AG	Gasfilled	2·1	Caesium antimony	130	85	90	12·5 nA/mm^2	0·1	85	B7G
90CV (CV2134)	Vacuum	3·0	Caesium on oxidised silver	20	50	250	10	0·05	100	B7G
90CG (CV2133)	Gasfilled	3·0	Caesium on oxidised silver	125	90	90	2·0	0·1	90	B7G
90AV (CV2132)	Vacuum	4·0	Caesium antimony	45	100	100	5·0	0·05	100	B7G
90AG (CV2270)	Gasfilled	4·0	Caesium antimony	130	85	90	2·5	0·1	85	B7G
155UG	Gasfilled photoemissive tube with end-on incidence, sensitive to ultraviolet radiation and intended for use as an on-off device in flame failure circuits. Spectral response 0·20 to 0·29 μm									

† Sensitivity measured with the whole cathode area illuminated by a lamp of colour temperature 2700K and with a series resistor 1 MΩ.
Note : Caesium/antimony cathode is particularly sensitive to daylight and bluish light. Caesium/oxidised silver cathode is particularly sensitive to incandescent light and near infrared radiation.

photoemissive tubes for photometry

Type No.	Photocathode Min. Useful dia (mm)	Photocathode Surface	‡Luminous Sensitivity ($\mu A/lm$) Typical	Min.	Max. Anode Supply Voltage (V)	Cathode Current per mm^2 of the Photocathode ($\mu A/mm^2$)	λ at max. Response (μm)	Max. Envelope Temperature (°C)
150CV	26	Caesium on oxidised silver	20	—	100	0·05	0·8	60
150TV	26	Caesium antimony	150	100	100	0·05	0·42±0·03	60
150AV	30	Caesium antimony	60	35	100	0·05	0·42±0·03	60

‡ Measured with a tungsten ribbon lamp having a colour temperature of 2850K.

Cold cathode devices
voltage reference tubes book 2 part 3

Type No.	Description	Maintaining Voltage (V)	Preferred Cathode Current (mA)	Max. Incremental Resistance (Ω)	Max. Voltage Jumps (mV)	V min. for Ignition (V)	Base
ZZ1000	Subminiature	80·1 to 81·9	3·0	—	—	120	Flying Lead
83A1	High performance	83 to 84·5	4·5	350	1·0	130	B7G
85A2 (CV449) §**M8098** (CV4048)	Voltage reference	83 to 87	6·0	450	50	115	B7G

§ This is a Special Quality Type.

voltage stabiliser tubes

Type No.	Description	Nominal Maintaining Voltage (V)	Burning Current Max. (mA)	Burning Current Min. (mA)	Max. Regulation Voltage (V)	V min. for Ignition (V)	Base
75C1 §**M8225** (CV4080)	Close tolerance	78	60	2·0	8·0	115 110	B7G
90C1 (CV5173)	Close tolerance	90	40	1·0	14	115	B7G
108C1 (CV1833) §**M8224** (CV4028)	Low regulation voltage	108	30	5·0	3·5	133 130	B7G
150B2 (CV2225) §**M8163** (CV4104)	Close tolerance	150	15	5·0	5·0	180	B7G
150C2 (CV1832)	General purpose	150	30	5·0	6·0	185	B7G
150C4 §**M8223** (CV4020)	Close tolerance	150	30	5·0	5·0	185 165	B7G

§ This is a Special Quality Type.

switching diodes

Type No.	Description	Ignition Voltage (V)	Maintaining Voltage (V)	Extinction Voltage (V)	Ik (mA)	Base
ZA1002	Neon filled subminiature switching diode with a large and stable difference between ignition and maintaining voltage	170	109	—	3·5	Flying Lead
ZA1004	Neon filled subminiature switching diode for use with control voltages $\geqslant$6V	90	—	83·5	1·0	Flying Lead

Cold Cathode devices
indicating tubes book 2 part 3

Type No.	Description	Characters Displayed	Character Height (mm)	Minimum Supply Voltage (V)	Maintaining Voltage (V)	Recommended Cathode Current (mA)	Base
ZM1000 **ZM1000R**	In line, side-viewing indication As ZM1000 but with red filter	Numbers 0-9	14	170	—	2·5	Special 14-pin
ZM1001 **ZM1001R**	In line, side-viewing indication As ZM1001 but with red filter	Characters +, —, ~, X, Y, Z	10 to 14	170	—	2·5	Special 14-pin
ZM1020 **ZM1022**	In line, end-viewing indication Incorporates a red filter As ZM1020 but without red filter	Numbers 0-9	15·5	170	140	2·0	B13B
ZM1021 **ZM1023**	In line, end-viewing indication Incorporates a red filter As ZM1021 but without red filter	Characters A, V, Ω, +, —, %, ~	15·5	170	140	2·0	B13B
ZM1080 **ZM1082**	In line, side-viewing indication Incorporates a red filter As ZM1080 but without red filter	Numbers 0-9	13	170	140	2·0	Flying Lead
ZM1081 **ZM1083**	In line, side-viewing indication Incorporates a red filter As ZM1081 but without red filter	Characters —, +, ~	10·5	170	140	2·0	Flying Lead
ZM1162	In line, end-viewing indication Rectangular envelope	Numbers 0-9	15·5	170	140	2·5	Rectangular 14-pin
ZM1163	In line, end-viewing indication Rectangular envelope	Characters —, +, ~, ×	15·5	170	140	2·5	Rectangular 14-pin
ZM1164	In line, end-viewing indication Rectangular envelope	Numbers 0-9 with decimal point on left hand	15·5	170	140	2·5	Rectangular 14-pin
ZM1174 **ZM1175**	In line, side-viewing indication Incorporates a red filter As ZM1174 but without red filter	Numbers 0-9 with decimal point on left hand	15·5	170	140	2·5	Flying Lead
ZM1176 **ZM1177**	In line, side-viewing indication Incorporates a red filter As ZM1176 but without red filter	Numbers 0-9 with decimal point on right hand	15·5	170	140	2·5	Flying Lead
ZM1235	In line, side-viewing indication Inverted version of ZM1170 (leads mounted at top)	Numbers 0-9	15·5	170	140	10 to 18mA peak	Flying Lead
ZM1237	In line, side-viewing indication (leads mounted at top)	Characters $\frac{1}{8}$, $\frac{1}{4}$, $\frac{3}{8}$, $\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$	15·5	170	140	10 to 18mA peak	Flying Lead
ZM1251	Flat pack, alpha-numeric construction dot matrix	7 × 5 dot matrix with 2 decimal points	9·8	220	145	2mA peak per dot	Special flat lead
ZM1263	In line, side-viewing indication Incorporates a red filter	Characters —, +, ~, *	10·5	170	140	2·5	Flying Lead

* This is a symbol shaped like a Catherine-wheel on type ZM1263 that may be used for special indications, e.g. fault condition.

Cold cathode devices
Pandicon* multiple indicator tubes book 2 part 3

Type No.	Description	Characters Displayed	Character Dimensions (mm)	Minimum Supply Voltage (V)	Anode Current (mA)	Base
ZM1200	Multiple numerical indicator tube 14 decades	Numbers 0-9, decimal point, punctuation mark	height 10 pitch 10	170 peak	9·0 peak	2 × special 17-pin
ZM1206	Multiple numerical indicator tube 8 decades	Numbers 0-9, decimal point, punctuation mark	height 10 pitch 10	170 peak	7·5 peak	2 × special 17-pin
ZM1400 series	Flat multiple segmented indicator tube 5 to 17 displays with or without symbol	7-segment characters, decimal point, symbol	height 8 pitch 9	140	6·0 peak max.	flat leads

* Registered trade mark for multiple indicator tubes.

Drive Module: A dynamic drive module type DDM14 is available for Pandicon tube types ZM1200 and ZM1206 or up to 14 single indicator tubes.

counting tubes

All types : End-viewing. Self indicating

Type No.	Description	Max. Stepping Speed (kHz)	Supply Voltage (V)	Output Voltage (V)	Output Current (μA)	Base
Z504S ZM1070	Cold cathode gas-filled decade tube with cathodes 0-9 brought out separately, for use as a counter or selector	5·0	475	35	340	B13B
Z505S ZM1060	Similar to Z504S but capable of operating at higher speeds	50	475	24	800	B13B

trigger tubes

Type No.	Description	Nominal Trigger Ignition Voltage (V)	Anode Supply Voltage (V)	Anode Maintaining Voltage (V)	I_k (av) max. (mA)	Base
Z900T (CV5122)	Triode suitable for stand-by operation on 117V a.c. supply	80	175	62	35	B7G
Z803U (CV2434)	Close tolerance tube with stable characteristics intended for d.c. operation	132	240	105	40	B9A

Power devices
ignitrons for welding applications book 2 part 3

Type No.	Description	Single Phase Control (Welder Duty)a Max. Demand (kVA)	Max. Average Current (A)	*Max. Averaging Time (s)	Three Phase Welder Service Max. $v_{a(pk)}$ (V)	Max. $i_{a(pk)}$ (A)	Ignitor Requirements $v_{ign(pk)}$ (V)	$i_{ign(pk)}$ (A)
ZX1051	Water-cooled Ignitrons primarily intended for resistance welding and similar a.c. control applications Thermostats can be mounted to provide protection against overheating or to economise in the water-flow	200 600	56 30·2	11·8 11·8	1200 1500	600 480	150	12
ZX1052		400 1200	140 75·6	9·4 9·4	— —	— —	150	12
ZX1053		800 2400	355 192	7·3 7·3	600 1500	4000 2400	150	12
ZX1061	Uprated 'B' size tube with physical dimensions as ZX1051 Low arc voltage	400 1200	70 38	15·8 15·8	— —	— —	150	12
ZX1062	Uprated 'C' size tube with physical dimensions as ZX1052 Low arc voltage	760 2280	180 110	13·8 13·8	— —	— —	150	12

a Two tubes connected in inverse parallel on 600V supply. * At 380V r.m.s.

inert gas thyratrons

Type No.	Description	$I_{k(av)}$ max. (A)	Max. Peak Anode Voltage (kV) Forward	Inverse	V_f or V_h (V)	I_f or I_h (A)	Base
EN92 (CV3512)	Tetrode	0·025	0·5	0·5	6·3	0·15	B7G
EN91 (CV797) §**M8204** (CV4018)	Tetrode	0·1	0·65	1·3	6·3	0·6	B7G
EN32 (CV2253)	Tetrode	0·3	0·65	1·3	6·3	0·95	Octal
ZT1011 **XR1-1600A** (CV5234)	Triode	2·5	1·5	1·5	2·5	8·5	B4G
†**XR1-3200A**	Triode	3·2	1·5	1·5	2·5	12	B4D
†**XR1-6400A**	Triode	6·4	1·5	1·5	2·5	21	B4D

† Suffix A to thyratron type numbers indicates the disc seal development of the standard tube. Electrical characteristics are identical.
§ This is a Special Quality Type.

Power devices
high voltage half-wave rectifiers book 2 part 3

Type No.	Description	D.C.† Output (A)	P.I.V. max. (kV)	I_k (av) max. (A)	Full Load† (kV)	V_f (V)	I_f (A)	Base
RG1-240A (CV1072) (CV1626) (CV2738)	Mercury-vapour	0·5	6·5	0·25	2·0	4·0	2·7	British 4-pin
RG3-250 (CV1625)	Mercury-vapour	0·5	10	0·25	3·1	2·5	5·0	Medium Edison Screw
RG3-250A (CV32)	Mercury-vapour	0·5	10	0·25	3·1	2·5	5·0	B4G
RR3-250 (CV1835)	Inert gas	0·5 1·0	10 5·0	0·25 0·5	3·1 1·5	2·5	5·0	B4G
RG3-1250 (CV1629)	Mercury-vapour	2·5	8·0a 13b	1·25	4·1	4·0	7·0	Goliath Edison Screw
RR3-1250 (CV2518)	Inert gas	2·5	10	1·25	3·1	5·0	7·0	B4F
RR3-1250A (CV2399)	Inert gas	2·5	13	1·25	4·1	4·0	11	Goliath Edison Screw
RR3-1250B	Inert gas	2·5	13	1·25	4·1	4·0	7·0	Goliath Edison Screw
RG4-1250 (CV1435)	Mercury-vapour	2·5	10a 20b	1·25	6·3	4·0	11	Goliath Edison Screw
RG4-3000	Mercury-vapour	6·0	15a	3·0	4·8	5·0	11·5	B4D

† Two tubes in a single phase full-wave circuit.

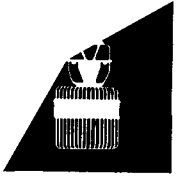
a At condensed mercury temperature 25 to 55°C.

b At condensed mercury temperature 20 to 40°C.

mercury vapour triode thyratrons

Type No.	$I_{k(av)}$ max. (A)	Max. Peak Anode Voltage (kV) Forward	Inverse	†I_h (A)	Base
XG1-2500 (CV5027)	2·5	1·0	1·5	4·5	B4G
XG2-6400	6·4	2·5	2·5	10	B4D

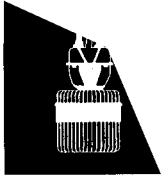
† V_h=5·0V.



Transmitting tubes
triodes for industrial heating book 2 part 4

ceramic/metal construction range of high efficiency external anode power triodes

Type No.	Cooling	Approx. Output at Full Ratings (kW)	Max. Frequency at Full Ratings (MHz)	Max. Frequency at Reduced Ratings (MHz)	p_a Max. (kW)	V_a Max. (kV)	I_k Max. (A)	V_f (V)	I_f (A)	Base
YD1240	Forced-air	2·7	250	—	1·5	5·5	1·4	6·3	33	Coaxial
YD1244	Forced-air									
YD1150	Forced-air	4·5	160	220	2·5	7·2	1·4	6·3	33	Coaxial
YD1152	Water (helix)									
YD1160	Forced-air	8·8	120	220	5·0	7·2	2·8	6·3	66	Coaxial
YD1161	Water (separate jacket)									
YD1162	Water (helix)									
YD1173	Forced-air	13·2	50	—	10	12	2·5	5·4	65	Coaxial
YD1170	Forced-air	15·4	120	—	10	7·2	4·8	5·8	130	Coaxial
YD1171	Water (separate jacket)									
YD1172	Water (helix)									
YD1180	Forced-air	30	100	—	15	9·0	7·5	7·0	175	Coaxial
YD1182	Water (integral jacket)				20					
YD1190	Forced-air	60	30	—	30	9·6	14·5	8·4	235	Coaxial
YD1192	Water (integral jacket)				40					
YD1193	Vapour cooled				40					
YD1202	Water (integral jacket)	120	30	—	80	14·0	24	12·3	255	Coaxial
YD1203	Vapour cooled									
YD1212	Water (integral jacket)	240	30	—	120	16·8	34	12·6	380	Coaxial
YD1213	Vapour cooled									
YD1342	Water (integral jacket)	480	30	—	240	19·2	55	14	555	Coaxial



Transmitting tubes
triodes for industrial heating (cont.) book 2 part 4

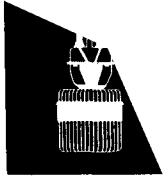
Type No.	Description	Approx. Output at Full Ratings (kW)	Max. Frequency at Full Ratings (MHz)	Max. Frequency at Reduced Ratings (MHz)	p_a Max. (kW)	V_a Max. (kV)	I_k Max. (A)	V_f or V_h (V)	I_f or I_h (A)	Base
TY2-125 (CV1924)	R.F. Power Triode for general purpose industrial heating applications	0·39	150	200	0·135	2·5	0·25	6·3	5·4	B5F
TY4-400	Radiation cooled Triode for pre-heating and plastic welding and induction heating equipment	1·3	100	—	0·4	4·0	0·48	5·0	14	B5F
TY5-500	Radiation cooled Triode for general purpose industrial heating applications	1·5	50	—	0·5	5·0	0·77	5·0	32·5	4-pin Special
TY4-500	Radiation cooled Triode for general purpose industrial heating applications	1·69	100	120	0·45	4·0	0·65	10	9·9	B5K
TY6-800	Radiation cooled Triode for general purpose industrial heating applications	2·7	50	—	0·8	6·0	1·05	6·3	32·5	4-pin Special
TY6-1250A	External anode Power Triode for general purpose industrial heating applications	4·1	50	—	2·1	7·0	2·3	6·3	65	—
TY8-6000A **TY8-6000W** **TY8-6000H**	External anode Power Triodes for general purpose industrial heating applications	7·2	50	—	6·0	8·0	2·5	12·6	33	—
TY7-6000A (CV5239) **TY7-6000W** **TY7-6000H**	External anode Power Triodes for general purpose industrial heating applications	8·25	55	85	6·0	7·2	2·8	12·6	33	—
TY8-15A **TY8-15H**	External anode Power Triodes for general purpose industrial heating applications	14·3	30	—	10 15	8·0	5·0	6·3	130	—

Suffixes A, W and H to the type number indicate forced-air cooled, water cooled and water cooled (integral helix) respectively.

Transmitting tubes
s.s.b. tetrodes book 2 part 4

Type No.	P.E.P. Output (W)	f max. (MHz)	Two Tone Operation Va (V)	Vg2 (V)	Ia (mA)	d3 (dB)	Vf or Vh (V)	If or Ih (A)	Base
QV06-20	46	175	600	200	72	30	6·3	1·25	Octal
YL1150	120	60	600	250	221	30	6·3	2·5	B7A
YL1070	141	60	1000	250	131	30	6·3	1·8	B7A
QV08-100 **QV08-100B** **YL1290**	220	30	750	310	270	28	6·3 19	3·9 2·3	B5F
QV2-250C **4CX250B**	300	175	2000	350	190	28	6·0	2·6	B8F
QY4-250 (CV2131)	510	120	4000	550	128	36	5·0	14·1	B5F
QY4-400 (CV5959)	650	110	4000	705	175	34	5·0	14·5	B5F
YL1110	680	1215	2500	450	350	31	6·3	7·85	Coaxial
QY5-500	900	75	5000	700	200	28	10·0	9·0	B5K
QY5-3000A (CV5219) **QY5-3000W**	1380	200	5000	1000	576	42	6·3	32·5	—

Suffixes A and W indicate forced-air cooled and water cooled respectively.



Transmitting tubes
telecommunications power tetrodes book 2 part 4

Type No.	Description	Approx. Output at Full Ratings (W)	Max. Frequency at Full Ratings (MHz)	Max. Frequency at Reduced Ratings (MHz)	p_a Max. (W)	V_a Max. (V)	V_{g2} Max. (V)	I_k Max. (mA)	V_f or V_h (V)	I_f or I_h (A)	Base
QV03-12 (CV2129)	Natural cooling	10	30	175	12	300	250	70	6·0	0·75	B9A
QV06-20	Natural cooling	52	60	175	20	600	250	160	6·3	1·25	Octal
QV06-20B									12·6(B)	0·625	Octal
QV06-20C									26·5(C)	0·3	Octal
YL1150	Radiation cooled	150	60	—	75	750	300	360	6·3	2·6	B7A
QV08-100	Radiation cooled	200	30	—	100	825	300	450	6·3	3·9	B5F
QV08-100B									19	2·3	
YL1290											
QY3-65 (CV1905) (CV6122)	Radiation cooled	280	50	250	65	3 000	400	230	6·0	3·5	B7A
QY3-125 (CV2130)	Radiation cooled	375	120	200	125	3 000	400	300	5·0	6·5	B5F
QV2-250C	External anode Forced-air cooled	390	500	—	250	2 000	300	250[a]	6·0	2·6	B8F
4CX250B											
YL1110	External anode Forced-air cooled Ceramic/metal	800	400	1 215	700	2 500	1 200	650	6·3	7·85	Coaxial
QY4-500A	External anode Forced-air cooled	930	110	220	500	4 000	500	440	5·0	13·5	Special
QY4-250 (CV2131)	Forced-air cooled	1 000	75	120	250	4 000	600	420	5·0	14·1	B5F
QY4-400 (CV5959)	Forced-air cooled	1 100	110	—	400	4 000	600	420	5·0	14·5	B5F
QY5-500	Radiation cooled	1 760	75	110	500	5 000	700	600	10	9·9	B5K
YL1440	Forced-air cooled Ceramic/metal	2 250	250	—	1 500	4 000	600	1 200	4·2	55	Coaxial
QY5-3000A (CV5219)	Forced-air cooled	4 100	75	220	3 000	5 000	800	1 300	6·3	32·5	Special
QY5-300W	Water cooled										
YL1470	Forced-air cooled Ceramic/metal	5 700	110	—	6 000	7 000	1 000	4 500	6·3	120	Coaxial
YL1420	Forced-air cooled Ceramic/metal	6 300	250	—	6 000	6 000	1 000	4 500	6·3	120	Coaxial
YL1430	Forced-air cooled Ceramic/metal	13 000	250	—	12 000	8 000	1 000	8 500	8·0	120	Coaxial
YL1520	External anode Forced-air cooled Ceramic/metal	27 500	250	—	18 000	9 000	1 000	9 000	11·5	120	Coaxial

[a] I_a max.

Transmitting tubes
double tetrodes book 2 part 4

Type No.	Approx. Output at Full Ratings (W)	Max. Frequency at Full Ratings (MHz)	Max. Frequency at Reduced Ratings (MHz)	p_a max. (W)	V_a max. (V)	V_{g2} max. (V)	I_k max. (mA)	V_h (V)	I_h (A)	Base
QQV02-6 (CV2466)	5·8	500	—	2×3·0	250	200	2×45[a]	6·3 12·6	0·6 0·3	B9A
QQV03-10 (CV2798)	16	100	225	2×5·0	300	200	2×50	6·3 12·6	0·83 0·42	B9A
YL1240	22	200	—	2×7·5	400	200	2×48	6·75 13·5	0·76 0·38	Novar
QQV03-20A (CV2799)	48	200	600	2×10	600	300	2×55	6·3 12·6	1·3 0·65	B7A
QQV03-25	67	200	600	2×12·5	750	300	2×66	6·3 12·6	1·3 0·65	B7A
QQV06-40A (CV2797)	90	200	500	2×20	600	300	2×120	6·3 12·6	1·8 0·9	B7A
QQV07-50 (CV5847)	103	200	500	2×25	750	300	2×150	6·3 12·6	1·8 0·9	B7A

[a] I_a max.

triodes for television translator service

Type No.	Description	Typical Power Output (W)	Typical Power Output At Frequency (MHz)	Max. Frequency (GHz)	p_a max. (W)	V_a max. (kV)	I_a max. (mA)	Intermodulation Product (dB)
YD1300 **YD1301**	Amplifier	35 50	780	1·0	300	1·8	200	—52
YD1330	Amplifier	220	860	1·0	1800	3·5	700	—52
YD1332	Amplifier	220	860	1·0	1800	3·5	700	—52
YD1333	Amplifier	100	860	1·0	900	3·5	550	—56

Transmitting tubes
telecommunications power triodes book 2 part 4

Type No.	Approx. Output at Full Ratings (kW)	Max. Frequency at Full Ratings (MHz)	Max. Frequency at Reduced Ratings (MHz)	p_a max. (kW)	V_a max. (kV)	I_k max. (A)	V_f or V_h (V)	I_f or I_h (A)	Base
YD1331	0·25	1000	—	0·9	3·5	0·55	6·3	5·4	Coaxial
TY2-125 (CV1924)	0·39	150	200	0·135	2·5	0·25	6·3	5·4	B5F
TY4-400	1·2	100	—	0·35	4·0	0·49	5·0	14	B5F
TY4-500	1·69	100	120	0·45	4·0	0·65	10	9·9	B5K
TY6-5000A (CV3926) **TY6-5000W** **TY6-5000H**	6·9	75	220	5·0 6·0 6·0	6·0	1·85	12·6	33	—
TY7-6000A (CV5239) **TY7-6000W** **TY7-6000H**	10	30	—	6·0	7·2	2·8	12·6	33	—
TY8-15A **TY8-15H**	17·7	30	—	10 15	8·0	5·5	6·3	130	—
TY12-15A	41	30	—	15	13	5·8	8·0	130	—

Suffixes A, W and H to power triode type numbers indicate forced-air, water cooled and water cooled (integral helix) respectively.

Microwave tubes
heating magnetrons book 2 part 5

Type No.	Description	Pout (kW)	Frequency (GHz)	Va (kV)	Ia (A)	Vh (starting) (V)	Ih (A)
7090	Generator for microwave therapy	0·2	2·45±0·025	1·65	0·2	5·3	3·3
YJ1420	Microwave Generator for domestic applications	0·95	2·45±0·025	4·0	0·34	3·1	13·5
DX206	Fast warm-up Microwave Generator for cooking	1·0	2·45±0·025	5·6	0·38	4·0	30
YJ1280	Fast warm-up Microwave Generator for cooking	1·2	2·45±0·025	5·7	0·38	5·0	30
YJ1371	Microwave Generator for cooking	1·2	2·45±0·025	3·5	0·6	12	3·0
YJ1160	Water cooled Microwave Generator for industrial processing and cooking	2·5	2·45±0·025	4·6	0·75	5·0	32
YJ1162	As YJ1160 except forced-air cooled						
YJ1191	Water cooled Microwave Generator for industrial processing	5·0	2·45±0·025	7·1	1·25	5·5	46

low power tunable magnetrons

Type No.	Description	Frequency Band	Pout (pulse) (kW)	Frequency (GHz)	Va(pulse) (kV)	Ia(pulse) (A)	Duty Factor	Pulse Duration (μs)	Vh (starting) (V)	Ih (starting) (A)
YJ1030 (CV6225)	Miniature	C	0·12	5·4 to 5·9	1·18	0·8	0·002	3·0	5·0	0·5
YJ1410 (CV6248)	Miniature	C	1·0	5·2 to 5·6	2·8	1·5	0·002	1·0	5·0	0·72
JPT9-01 (CV2420)	C.W.	X	0·01 *	9·15 to 9·6	0·92*	0·05*	—	—	6·3	1·2
JPT9-01D (CV8269)		X	0·01	9·05 to 9·6	0·9	0·06	0·05	5·0	6·3	1·2
JPT9-02E (CV6114)	Low stray radiation field	X	0·017	9·15 to 9·5	1·0	0·14	0·05	5·0	6·3	1·2
JPT9-02 (CV2421)		X	0·025	9·15 to 9·6	1·0	0·12	0·05	5·0	6·3	1·2
JPG9-02C (CV5443)	Low stray radiation field	X	0·025	9·15 to 9·55	1·02	0·14	0·05	5·0	6·3	1·2
YJ1090 (CV6214)	Rugged miniature	X	0·05	9·0 to 9·5	1·18	0·9	0·004	2·0	5·0	0·5
YJ1100	Rugged miniature	X	0·18	9·0 to 9·5	1·18	0·9	0·004	1·0	5·0	0·5

*C. W. operation. D.C. supply.

All types are packaged.

T in type number indicates thimble tuning mechanism.

G in type number indicates geared tuning mechanism.

Microwave tubes
high power radar magnetrons book 2 part 5

Type No.	Description	Frequency Band	Pout(pulse) (kW)	Frequency (GHz)	Va(pulse) (kV)	Ia(pulse) (A)	Duty Factor	Pulse Duration (μs)	Vh (starting) (V)	Ih (starting) (A)
5J26 (CV3602)	Tunable Unpackaged Forced-air cooled	L	610	1·22 to 1·35	27·2	46	0·002	6·0	23·5	2·2
YJ1150	Tunable Unpackaged Forced-air cooled	L	1000	1·25 to 1·35	30	97	0·001	3·0	23·5	2·2
5586	Tunable Unpackaged Forced-air cooled	S	800	2·7 to 2·9	28	70	0·0005	1·0	16	3·0
JP9-180 (CV2373)	Fixed frequency Forced-air cooled	X	180	9·375±0·05	20·5	22·5	0·0005	2·0	12·6	2·25
4J50 (CV2284)	Fixed frequency Forced-air cooled	X	250	9·375±0·03	21·5	27·5	0·001	6·0	13·75	3·25
4J78 (CV3953)				9·086±0·083						
JP9-250B (CV2426)				8·913±0·083						
JP9-250C (CV2427				8·93±0·065						
JP9-250D (CV2425)				8·748±0·083						
JP9-250E (CV2424)				8·583±0·083						
JP9-250F (CV2473)				9·24±0·03						

All types are packaged unless otherwise stated.

spin tuned magnetrons

Type No.	Description	Frequency Band	Pout(pulse) (kW)	Frequency (GHz)	Va(pulse) (kV)	Ia(pulse) (A)	Duty Factor	Pulse Duration (μs)	Vh (starting) (V)	Ih (starting) (A)
YJ1180	Spin tuned over 450 MHz sweep in 500μs	X	205	8·7 to 9·5	22·5	27·5	0·0011	1·5	13·75	3·15
YJ1181	With optional frequency lock			8·7 to 9·5						
YJ1182	With optional frequency lock			9·25 to 9·5						
YJ1320	Spin tuned over 670 MHz sweep in 500μs	J	60	15·9 to 17·1	15·5	15	0·0005	1·0	12·6	1·0
YJ1321	With optional frequency lock			15·9 to 17·1						

All types are packaged.

Microwave tubes
marine radar magnetrons book 2 part 5

Type No.	Description	Frequency Band	P_{out} (pulse) (kW)	Frequency (GHz)	V_a (pulse) (kV)	I_a (pulse) (A)	Duty Factor	Pulse Duration (μs)	V_h (starting) (V)	I_h (starting) (A)
JP9-2-5 **JP9-2-5C** **JP9-2-5D** **JP9-2-5E** (CV10758) **JP9-2-5H** **JP9-2-5L** **YJ1000**	Fixed frequency	X	3·0	9·41±0·065 9·550±0·03 9·445±0·03 9·445±0·03 9·375±0·03 9·445±0·03 9·255±0·065	3·6	3·0	0·0005	0·5	6·3	0·5
YJ1300	Fixed frequency	X	7·0	9·41±0·03	4·3	5·0	0·001	1·0	6·3	0·55
2J42 (CV3676)	Fixed frequency Forced-air cooled	X	10	9·375±0·03	5·5	4·5	0·0025	2·5	6·3	0·6
JP9-7A (CV370)	Fixed frequency Forced-air cooled	X	10	9·24±0·03	5·5	4·5	0·0025	1·0	6·3	0·6
JP9-7D (CV1866)	Fixed frequency Forced-air cooled	X	10	9·375±0·03	5·7	5·5	0·001	1·0	6·3	0·6
JP9-7L	Fixed frequency Forced-air cooled	X	10	9·375±0·03	5·5	4·5	0·001	1·0	6·3	0·6
JP9-7T	Fixed frequency Forced-air cooled	X	10	9·375±0·03	5·7	5·5	0·001	1·0	6·3	0·6
YJ1071	Fixed frequency	X	10	9·41±0·03	5·8	6·0	0·001	1·0	6·3	0·55
YJ1110	Fixed frequency	X	20	9·375±0·03	7·8	7·5	0·001	1·5	6·3	0·55
JP9-15 (CV3997)	Fixed frequency	X	21	9·375±0·03	7·5	7·5	0·001	2·5	6·3	0·55
JP9-15B	Fixed frequency	X	21	9·445±0·03	7·5	7·5	0·001	2·5	6·3	0·55
JP9-15D (CV5123)	Fixed frequency	X	21	9·375±0·03	7·5	7·5	0·001	2·5	6·3	0·55
JP9-18	Fixed frequency	X	21	9·41±0·03	7·2	8·6	0·001	2·5	6·3	0·55
JP9-22B	Fixed frequency	X	25	9·49±0·03	8·3	8·0	0·001	1·0	6·3	0·55
JP9-22D	Fixed frequency	X	25	9·17±0·03	8·3	8·0	0·001	1·0	6·3	0·55
JP9-22L	Fixed frequency	X	25	9·475±0·025	8·3	8·0	0·001	1·0	6·3	0·55
JP9-22R	Fixed frequency	X	25	9·24±0·03	8·3	8·0	0·001	1·0	6·3	0·55
YJ1120	Fixed frequency	X	25	9·41±0·03	8·3	8·0	0·001	1·0	6·3	0·55
YJ1121	Fixed frequency	X	26	9·445±0·03	8·3	9·0	0·001	1·0	6·3	0·55
YJ1123	Fixed frequency	X	26	9·445 +0·015 −0·03	8·3	9·0	0·001	1·0	6·3	0·55
YJ1124	Fixed frequency	X	26	9·65±0·03	8·3	9·0	0·001	1·0	6·3	0·55
JP9-50A	Fixed frequency Forced-air cooled	X	50	9·375±0·03	12·5	12	0·001	1·0	6·3	1·0
725A (CV722)	Unpackaged	X	50	9·375±0·03	12	12	0·001	2·5	6·3	1·0

All types are packaged unless otherwise stated.

Microwave tubes
marine radar magnetrons (cont.) book 2 part 5

Type No.	Description	Frequency Band	P_{out} (pulse) (kW)	Frequency (GHz)	V_a(pulse) (kV)	I_a(pulse) (A)	Duty Factor	Pulse Duration (μs)	V_h (starting) (V)	I_h (starting) (A)
2J51A (CV5134)	Tunable Forced-air cooled	X	60	8·5 to 9·6	13·5	14	0·0012	3·6	6·3	1·0
YJ1290	Fixed frequency Forced-air cooled	X	65	9·445±0·03	14	14	0·001	1·0	6·3	1·0
JP9-75	Fixed frequency Forced-air cooled	X	80	9·375±0·03	15	15	0·001	1·0	10	2·85
4J52A (CV5018)	Fixed frequency Forced-air cooled	X	80	9·375±0·03	15	15	0·001	5·0	12·6	2·2
YJ1140	Fixed frequency Forced-air cooled	J	45	16·5±0·15	12·5	15	0·002	0·5	12·6	3·0
YJ1020	Fixed frequency Forced-air cooled	Q	25	33·05±0·35	12·5	10·5	0·0003	0·05	4·0	3·4
YJ1021			30	33·05±0·35	12·5	12·5	0·0003	0·5	4·0	3·4
7093	Fixed frequency Forced-air cooled	Q	30	34·512 to 35·208	12·5	12·5	0·0003	0·3	5·0	3·8

All types are packaged.

beacon and special purpose magnetrons

Type No.	Description	Frequency Band	P_{out} (pulse) (kW)	Frequency (GHz)	V_a(pulse) (kV)	I_a(pulse) (A)	Duty Factor	Pulse Duration (μs)	V_h (starting) (V)	I_h (starting) (A)
JPT9-01M	Push rod tuning mechanism Low stray radiation field	X	0·015	9·3 to 9·5	1·0	0·10	0·25	50	6·3	1·2
JP8-02B (CV6072)	Fixed frequency	X	0·025	8·8±0·03	0·8	0·15	0·2	4·0	6·3	1·2
YJ1380 (CV6234)	Rugged version	X	0·025	8·8$^{+0·03}_{-0·015}$	0·8	0·15	0·2	4·0	6·3	1·6
YJ1010 (CV8652) **YJ1011**	Tunable Forced-air cooled Tunable calibration facility	X	225	8·50 to 9·60	21·5	27·5	0·001	2·75	13·75	3·1

All types are packaged.

Microwave tubes
airborne radar magnetrons book 2 part 5

Type No.	Description	Frequency Band	Pout (pulse) (kW)	Frequency (GHz)	Va(pulse) (kV)	Ia(pulse) (A)	Duty Factor	Pulse Duration (μs)	Vh (starting) (V)	Ih (starting) (A)
6521	Fixed frequency	C	85	5·38 to 5·42	15	13·5	0·001	2·2	10	3·2
YJ1070 (CV6108)	Fixed frequency	X	10	8·80±0·03	5·5	4·5	0·0025	2·5	6·3	0·5
YJ1040 (CV8505)	Fixed frequency	X	15	9·375±0·03	6·7	5·25	0·0015	2·5	6·3	0·55
YJ1112	Fixed frequency High altitude	X	20	9·375±0·03	7·8	7·5	0·0015	1·5	6·3	0·55
YJ1060	Fixed frequency High altitude	X	20	9·375±0·03	7·2	7·5	0·002	2·5	6·3	0·55
YJ1050 (CV6199)	Fixed frequency	X	22	9·24±0·03	7·5	7·5	0·001	1·0	6·3	0·55
YJ1200 (CV9424)	Fixed frequency	X	45	9·375±0·03	12·4	12	0·0025	5·0	12·6	2·2
YJ1201	High altitude			9·375±0·03						
2J55	Fixed frequency Forced-air cooled	X	50	9·375±0·03	12·5	12	0·001	2·5	6·3	1·0
YJ1250	Fixed frequency Rugged	X	90	9·345±0·03	15·2	17·5	0·0015	7·0	12·6	2·2
YJ1430	Fixed frequency	J	10	16·4 to 16·6	9·0	5·25	0·0006	0·25	12·6	0·62

All types are packaged.

radar travelling wave tubes

Type No.	Description	Frequency Band	Min. Power Output (sat.) (W)	Typical Operation as Amplifier: Frequency Range (GHz)	Noise Factor (dB)	Power Gain (dB)	Helix Voltage (kV)	Collector Voltage (kV)	Collector Current (mA)	Mount Type No.
LB3-250B (CV6223)	Broadband pulsed power Amplifier	S	250	2·7 to 3·3	—	32	†	†	800	S3L1
YH1060 (CV6183)	Broadband low power Amplifier	X	0·002	9·0 to 10	8	25	1·2	1·3	0·4	Packaged
LA9-3B (CV6087)	Broadband low power Amplifier	X	0·001	7·0 to 11·5	22	30	1·3	1·4	0·55	Packaged

† Peak Pulse Cathode Voltage= —5·0kV, other electrodes grounded.

Microwave tubes
communications travelling wave tubes book 2 part 5

Type No.	Description	Frequency Band	Min. Power Output (sat.) (W)	Typical Operation as Amplifier						
				Frequency Range (GHz)	Noise Factor (dB)	Power Gain (dB)	Helix Voltage (kV)	Collector Voltage (kV)	Collector Current (mA)	Mount Type No.
YH1210	U.H.F. TV transposer amplifier	U.H.F.	200	0·47 to 0·86	—	30	3·5	3·5	850	55380
YH1090	Telecommunications power Amplifier	4GHz	25	3·4 to 4·2	24	42	2·2	1·3	60	55329 or 55332
YH1170	Telecommunications power Amplifier	C	22	5·8 to 8·5	27	39	2·8	1·3	55	55337
LB6-10	Telecommunications power Amplifier	C	10	5·9 to 6·5	25	35	2·65	1·7	40	P6L4
LB6-25	Telecommunications power Amplifier	C	25	5·9 to 6·5	28	38	3·4	2·2	45	P6L11
LB6-25A	Telecommunications power Amplifier	6GHz	20	6·4 to 7·2	28	38	3·5	2·2	45	P6L11A
LB7-20E	Telecommunications power Amplifier	7GHz	18	7·1 to 7·8	28	38	3·4	2·0	40	P6L12

Microwave tubes
low power klystrons book 2 part 5

Type No.	Description	Frequency Band	Pout (W)	Mechanical Frequency Range (GHz)	Electronic Tuning Range (MHz)	Vresonator (kV)	Vreflector (—V)	†Ih (A)
KS7-85 (CV5900)	Mechanically-tuned Coaxial output probe	7GHz	0·1	6·5 to 7·5	38	0·3	70 to 205	0·5
KS7-85A		7GHz	0·045	6·5 to 7·5	35	0·3	70 to 205	0·5
KS7-85B		7GHz	0·09	7·2 to 7·8	35	0·3	110 to 230	0·5
723A/B (CV1795)	Mechanically-tuned Coaxial output probe	X	0·025	8·7 to 9·55	40	0·3	90 to 200	0·5
2K25 (CV2792)		X	0·035	8·5 to 9·6	40	0·3	85 to 200	0·5
KS9-20B (CV9334)		X	0·030	9·32 to 9·5	40	0·3	135 to 175	0·5
KS9-20D		X	0·025	9·3 to 9·615	40	0·3	125 to 190	0·5
KS9-40	Mechanically-tuned Waveguide output	X	0·04	9·3 to 9·5	40	0·3	65 to 115	0·5
KS9-40B		X	0·035	9·35 to 9·55	40	0·3	60 to 115	0·5
KS9-40D		X	0·035	9·38 to 9·51	40	0·3	70 to 120	0·5
KS9-40G		X	0·035	9·35 to 9·55	40	0·3	60 to 115	0·5
YK1046 (CV6195)	Mechanically-tuned Light-weight Waveguide output	X	0·03	9·16 to 9·34	30	0·275	75 to 100	0·5
YK1090	Rugged. Mechanically-tuned Flying leads. Waveguide output	X	0·4	10·5 to 12·2	35	0·4	60 to 110	1·2
YK1091	Mechanically-tuned. 3-pin base. Waveguide output	X	0·4	10·5 to 12·2	35	0·4	60 to 110	1·2
55335	Mechanically-tuned Micrometer tuning Waveguide output	Q	0·1	31 to 36	60	2·25	100 to 500	1·02 max.
YK1010	Mechanically-tuned Micrometer tuning Waveguide output Forced-air cooled	O	0·1	67 to 73	100	2·5	20 to 500	1·7 (3·5V)

† Vh=6·3V unless otherwise stated.

Microwave tubes
u.h.f. high power klystrons — c.w. operation book 2 part 5

Type No.	Description	Power Output (kW)	Frequency Range (MHz)	Cooling	Focusing System	Beam Voltage (kV)	Collector Voltage (kV)	Beam Current (A)
YK1001 **YK1002**	Multi-cavity Amplifiers	11	470 to 860	Air Air and Water	Permanent magnet	18·5	13·5	1·9
YK1000 **YK1004**	Multi-cavity Amplifiers	11	400 to 620 610 to 790	Water	Electromagnet	19	19	1·9
YK1005	Multi-cavity Amplifier	11	470 to 860	Air	Permanent magnet	20	16	2·0
YK1150* **YK1151**	Multi-cavity Amplifiers	23	470 to 860	Air	Permanent magnet	20 to 23	4	3·5 to 3·1
YK1191	Multi-cavity Amplifier	45	590 to 720	Water	Electromagnet	21·5	21·5	6·2

* Includes trolley.

S-band high power klystrons — pulse operation

Type No.	Description	Power Output (kW)	Frequency Range (MHz)	Cooling	Focusing System	Beam Voltage (kV)	Collector Voltage (kV)	Beam Current (A)
YK1110	Pulsed Multi-cavity Amplifier	6000*	2993 to 3003	Water	Electromagnet	210*	210*	100*
YK1200	Pulsed Multi-cavity Amplifier	25 000	2993 to 3003	Water	Electromagnet	280*	280*	250*

* Peak values. Pulse duration 2·2 μs. Pulse repetition rate 50 pulse/s.

Microwave solid state germanium tunnel diodes book 1 part 3

Type No.	Description	Cut-off Frequency f_r min (GHz)	I_p typ mA	I_p/I_v min	Noise Measure N_s
AEY13	Low noise microwave amplifier in S band	6·0	2·0	6·0	1·3
AEY15		8·0			
AEY16		10			

microwave mixer diodes

Type No.	Description	Maximum Operating Frequency (GHz)	Typical Noise Figure (dB)	Leakage Current at V_R=0·5V (μA)	Forward Current at V_F=0·5V (mA)	Typical Impedance zif (Ω)	Operating Temperature (°C)
BAW95D	Schottky barrier diode for use in X band	12	7·8	—	—	300	—65 to +150
BAW95E			7·2				
BAW95F			6·8				
BAW95G			6·3				
CAY17	Schottky barrier diode for use in X band	12	6·0	1·0 at 5·0V	0·05 at 0·6V	300	—55 to +150
AAY50 (CV7838) **AAY50R*** (CV7839)	Germanium diode for use in X band	12	6·2	3·0	9·0	400	—55 to +100
BAV22 **BAV22R***	Coaxial Schottky barrier diodes for use in S and X band low noise mixers	12	6·0	—	—	400	—55 to +150
AAY51 (CV7776) **AAY51R*** (CV7777)	Germanium diode for use in J band	18	7·0	3·0	9·0	270	—55 to +100
AAY52 **AAY52R***	Germanium diode for use in J band	18	8·0	3·0	9·0	270	—55 to +100
AAY39 (CV7762) **AAY39A**	Germanium sub-miniature diode for use in X band	18	6·0	3·0	5·0	350	—65 to +150
			7·0				
AAY34	Germanium sub-miniature diodes for use in Q band	40	8·5	10	2·0	750	—65 to +150
AAY59		40	8·5	2·0	2·0	1000	—55 to +100

* Reverse polarity version.

Type No.	Max. Op. Frequency (GHz)	Operating Bands	Typical Noise Factor (dB)	Typical I.F. Impedance (Ω)
SIM2 (CV2154) **SIM5*** (CV2155)	12	X, S, L	9·5	350
GEM1* **GEM2**	12	X	7·5	170
GEM3 (CV7108) **GEM4*** (CV7109)	12	X, S, L	8·5	350

* Reverse polarity version.

Microwave solid state microwave detector diodes book 1 part 3

Type No.	Description	Frequency Range (GHz)	Typical Tangential Sensitivity (dbm)	Min. Figure of Merit	Typical Video Impedance (Ω)
BAV46	Schottky barrier diode for use in X band doppler radar systems	1 to 12	—52	—	850
CAY17	Schottky barrier diode for use at X band	1 to 12	—50*	—	220
BAV75	Schottky barrier diode for low level detector applications	1 to 18	—52	—	—
AEY17	Germanium bonded backward diode for use at X band	1 to 18	—53	120*	300
AEY31	Subminiature germanium bonded backward diode for use up to J band	1 to 18	—53	120*	300
AEY31A		1 to 18	—50	50*	300
AEY29	Germanium bonded backward diode for use at J band	12 to 18	—53	50†	300

* Measured at 9·375 GHz. † Measured at 16·5 GHz in JAN 201 holder.

varactor diodes

Type No.	Description	Capacitance at V_R (pF)	(V)	V_R max. (V)	Typical C_j (pF)	Typical Cut-off Frequency (GHz)
BAY96	Silicon planar diode for use in high efficiency multiplier circuits, input powers up to 30W	16	40	120	32	25
		35	6			
BXY27	Silicon planar epitaxial varactor diode for use in multipliers up to S band and input powers up to 10W	4·5	6	55	4·5	70
BXY28	Silicon planar epitaxial varactor diode for use in high efficiency multipliers in the 2 to 4 GHz range	1·5	6	45	1·5	100 min.
BXY29	Silicon planar epitaxial varactor diode for use in frequency multiplier circuits in the 4 to 8 GHz range	1·0	6	25	1·0	120
BXY32	Silicon planar step recovery diode for high order frequency multipliers with outputs in X band	0·75	6	—	0·75	150
BXY35	Silicon planar epitaxial varactor diodes for frequency multipliers up to 18 GHz, available in a variety of outlines	9	6	100	9	25
BXY36		5	6	70	5	75
BXY37		3	6	70	3	100
BXY38		1·6	6	50	1·6	120
BXY39		1·0	6	40	1·0	150
BXY40		0·65	6	25	0·65	180
BXY41		0·4	6	25	0·4	200
CAY10	Gallium arsenide diode, diffused mesa type, for use in microwave parametric amplifiers, frequency multipliers and switches	0·4	0	6	0·4	250
CXY10	Gallium arsenide diode with a high cut-off frequency for use in parametric amplifiers, frequency multipliers and switches	0·2	0	6	0·2	400
CXY12	Gallium arsenide diode with a high cut-off frequency for use in frequency multipliers up to Q band	0·25	6	10	0·25	500
1N4885	Silicon varactor diode for use in high efficiency multiplier circuits	35	6	150	35	25
1N5152	Silicon planar epitaxial varactor diodes for use in multipliers up to S band	6	6	75	6	100
1N5153		6	6	75	6	100
1N5155	Silicon planar epitaxial varactor diode for use in multipliers up to C band	2	6	35	2	120
1N5157	Silicon planar epitaxial varactor diode for use in multipliers up to X band	0·8	6	20	0·8	200

Microwave solid state gunn effect devices book 1 part 3

Type No.	Description	Operating Voltage (V)	Operating Frequency	Pout (typ.) (mW)	Ptot Max. (25°C) (W)
CXY11A	Ga As bulk effect devices employing the Gunn Effect to produce C.W. oscillations at microwave frequency	7·0	X Band	5	1·0
CXY11B				10	
CXY11C				15	
CXY19		8 to 15	X Band	65	3·0
CXY20				65	3·0
CXY14A				5	
CXY14B		6·0	J Band	10	1·0
CXY14C				15	

solid state sources book 2 part 5

Type No.	Description	Nominal Centre Frequency (GHz)	Pout (mW)	Minimum Mechanical Tuning Range (MHz)	Typical Electronic Tuning Range (MHz)	Output Coupling
CL8360	Gunn Effect Oscillators Mechanically Tuned	8·5	5	±500	—	50 Ω O.S.M.
CL8370		9·5	5	±500	—	50 Ω O.S.M.
CL8380		10·5	5	±500	—	50 Ω O.S.M.
CL8390		11·5	5	±500	—	50 Ω O.S.M.
CL8460		9·35	10	±150	—	50 Ω O.S.M.
CL8470		9·35	10	±150	—	WG16/WR90
CL8300	Gunn Effect Oscillators Mechanically and Electronically Tuned	9·4	3	±50	200	50 Ω O.S.M.
CL8310		9·4	3	±50	200	WG16/WR90
CL8430		9·35	5	±150	50	50 Ω O.S.M.
CL8450		9·35	5	±150	50	WG16/WR90
CL8630	Fixed frequency Gunn Effect oscillator for miniature radar systems	10·69	8	—	—	WG16/WR90
CL8441	Temperature compensated Gunn Effect oscillator to replace the klystron in marine radars. Electronically Tuned	9·4	5	±100	60	WG16/WR90

NOTE: All the oscillators described here require a negative 7V stabilised power supply, with the exception of the CL8441 (—7·5V). The electronically tunable oscillators require a tuning voltage of up to 10V negative.

mixers

Type No.	Description	Frequency Band	Frequency Range (GHz)	Terminals
CL7330	Miniature thin film balanced mixers using Schottky barrier diodes	X	9·0 to 10·0	50 Ω O.S.M.
CL7331		X	10·7 to 11·7	50 Ω O.S.M.
CL7332		X	11·7 to 12·7	50 Ω O.S.M.

Microwave solid state parametric amplifiers book 2 part 5

Type No.	Description	Frequency Band	Noise Figure (dB)	Bandwidth (MHz)	Tuning Range (GHz)
CL9010	Single diode parametric amplifier with pump klystron	S	3·0	15	2·7 to 3·1
CL9011	As CL9010 but with waveguide terminals	S	3·0	15	2·7 to 3·1
CL9012	As CL9010 but packaged in temperature stabilised box	S	3·0	15	2·7 to 3·1
CL9070	Packaged parametric amplifier in temperature stabilised box	L	2·5	15	1·09

ferrite components—circulators and isolators

Mullard offer a comprehensive range of circulators and isolators. Examples from this range are shown below and further miniature circulators are available with octave bandwidths

Type No.	Frequency Range (MHz)	Max. Insertion Loss (dB)	Min. Isolation (dB)	v.s.w.r.	C.W. Power Rating (W)	Coaxial Terminals	Waveguide Flange Type
Coaxial circulators (frequency range 170 to 4200 MHz)							
CL5191	170 to 200	0·4	20	1·2	500	Type N	—
CL5251	470 to 590	0·35	22	1·2	100	Type N	—
CL5171	590 to 720	0·35	22	1·2	100	Type N	—
CL5181	710 to 860	0·35	22	1·2	100	Type N	—
Waveguide circulators (frequency range 3400 MHz, 3 port, to 13 500 MHz, 4 port)							
CL5091	6175 to 6425	0·1	30 opp. ports 20 adj. ports	1·05	150	—	IEC-UER70
Coaxial isolators (frequency range 740 to 3900 MHz)							
CL6001	740 to 810	0·3	22	1·2	100	Type N	—
Waveguide isolators (frequency range 3650 to 13 500 MHz)							
CL6201	3800 to 4200	0·8	30	1·05	10	—	IEC-UER48
CL6251	6425 to 7150	0·3	30	1·05	20	—	IEC-UER70

Particle & radiation detectors
channel electron multipliers book 2 part 2

Type No.	Description	Max. Operating Voltage (kV)	Output	Nominal Resistance (Ω)	Nominal Gain	†Nominal Background Pulse Count Rate (pulse/s)	‡Pulse Height Distribution Resolution
B410AL **B410BL**	Planar spiral tube of internal diameter 2·2mm	3·5	Open-ended Closed	3×10^9	$1{\cdot}5\times10^8$ at 2·5kV	0·1 at 2·5kV	0·5
B419AL **B419BL**	Planar spiral tube of internal diameter 2·2mm with effective aperture of 9mm	3·5	Open-ended Closed	3×10^9	$1{\cdot}7\times10^8$ at 2·5kV	0·25 at 2·5kV	0·5
B310AL **B310BL**	Planar spiral tube of internal diameter 1·25mm	4·0	Open-ended Closed	3×10^9	$1{\cdot}3\times10^8$ at 3kV	0·1 at 3kV	0·5
B312AL **B312BL**	Planar spiral tube of internal diameter 1·25mm with effective aperture of 2×8mm	4·0	Open-ended Closed	3×10^9	$1{\cdot}3\times10^8$ at 3kV	0·2 at 3kV	0·5
B318AL **B318BL**	Planar spiral tube of internal diameter 1·25mm with effective aperture of 4mm	4·0	Open-ended Closed	3×10^9	$1{\cdot}3\times10^8$ at 3kV	0·25 at 3kV	0·5
B330AL **B330BL**	C-shaped tube of internal diameter 1·25mm	4·0	Open-ended Closed	3×10^9	$1{\cdot}5\times10^8$ at 2·5kV	0·1 at 3kV	0·5

† Above an equivalent threshold of 2×10^7 electrons. ‡ At a modal gain of 10^8 and 1000 pulse/s.

channel electron multiplier plates

Type No.	Description	Channel Diameter (μm)	Diameter of Disc (mm)	Thickness of Disc (mm)	Current Gain at 1kV	Max. Current Output at 1kV (μA)	Resistance (Ω)	Channel Pitch (μm)
G40-25	An array of channel electron multipliers fused into the shape of a disc	40	27·1	1·6	1000	1·0	approx. 10^8	50
G40-50		40	53	1·6	1000	10	approx. 10^7	50

Note : Special shapes are available on application.

Particle & radiation detectors
end window beta G-M tubes book 2 part 2

Type No.	Window Diameter (mm)	Window Thickness (mg/cm²)	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX147	9	2 to 3	500	10	90
MX168	17	2·5 to 3	420	24	100
MX148	19·8	1·5 to 2	575	15	175
MX123	24·1	1·5 to 2·5	600	25	60
MX149	27·8	2·5 to 3·5	575	25	190
MX167	51	3·5 to 4	900	30	45

*Shielded with 50mm lead and 3mm aluminium.

gamma sensitive G-M tubes

Type No.	Gamma Sensitivity (counts/min)	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX146	1 400†	500	45	90
MX180	2 200‡	425	60	100
MX120/01	6 800‡	420	90	200
MX145	13 000‡	420	160	200

* Unshielded. † At 1·0mR/h ^{60}Co gamma radiation. ‡ At 1·0mR/h Radium source.

thin wall beta gamma G-M tubes

Type No.	Gamma Sensitivity at 1·0mR/h (counts/min)	Wall Thickness (mean) (mg/cm²)	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX172	5400†	50	420	55	90
MX177	4400‡	50	625	30	70
MX178	8800‡	50	625	60	100

* Shielded with 50mm lead and 3mm aluminium. † Radium source. ‡ ^{60}Co gamma radiation.

Particle & radiation detectors
high current G-M tubes book 2 part 2

Type No.	Gamma Sensitivity at 10mR/h ^{60}Co source (counts/min)	Wall Thickness (mg/cm²)	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX163	250	80 to 100	550	1	11
MX151	1200	80 to 100	575	2	15
MX119	5700	400	600	20	35
MX164	6000	32 to 40	575	12	45

* Shielded with 50mm lead and 3mm aluminium.

liquid sample G-M tube

Type No.	Liquid Capacity (ml)	Wall Thickness (mg/cm²)	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX124/01	9 to 10	30	450	50	100

* Shielded with 50mm lead and 3mm aluminium.

x-ray sensitive G-M tube

Type No.	Efficiency	Recommended Working Voltage (V)	Max.* Background (counts/min)	Dead Time (approx.) (μs)
MX118	Efficiency is over 50% for wavelengths between 0·12 and 0·25nm (1·2 to 2·5Å)	1250	50	150

* Shielded with 50mm lead and 3mm aluminium.

low background & guard G-M tubes

Type No.	Description	Window Diameter (mm)	Max. Background (counts/min) (1)	(2)	Dead Time (approx.) (μs)
MX152	End window	19·8	1·2	5	65
MX166	End window	27·8	2	9	60
MX155	Guard	—	—	—	1000

(1) At 600V shielded with 100mm iron outside 30mm lead in anticoincidence circuit with guard tube MX155.

(2) At 600V shielded with 100mm iron outside 30mm lead.

Vacuum products
ionisation gauges book 2 part 2

Type No.	Description	Tubulation †	Pressure Range (torr)	Gauge Factor	Max. Bake-out Temperature (°C)
EIP-12	Evaporation ion pump incorporating Bayard-Alpert gauge	W	10^{-3} to 10^{-10}	12	450
IOG-12	Single filament Bayard-Alpert gauge	K	10^{-3} to 10^{-10}	12	450
IOG-12W/ UKG2	Wide bore tubulation version of IOG-12	K	10^{-3} to 10^{-10}	12	450
IOG-13T	Nude version of IOG-12	M	10^{-3} to 10^{-10}	12	450
IOG-17	Bayard-Alpert gauge with one tungsten and one lanthanum hexaboride filament	W	10^{-3} to 10^{-10}	12	450
IOG-18	Fine-wire collector Bayard-Alpert gauge	K	10^{-3} to 4×10^{-11}	12	450
IOG-18N	Nude version of IOG-18	M	10^{-3} to 4×10^{-11}	12	450
IOG-20N	Modulated Bayard-Alpert gauge (nude)	M	10^{-3} to 10^{-12}	23	450
IOG-71	Ionisation gauge	W	10^{-3} to 5×10^{-8}	20	450

† K = "Kovar" type sealing glass.
W = Tungsten sealing glass.
M = "Kovar" type metal skirt.

appendage vacuum pumps

Type No.	Description	Tubulation †	Pumping Speed * (l/s)	Pressure Range (torr)
EIP-12	Evaporation ion pump	W	0·4	10^{-3} to $<10^{-11}$
VKP-1	Magnetron 'K' pump	S	1·2	10^{-2} to 10^{-10}
VKP-1K	Magnetron 'K' pump	K	1·2	10^{-2} to 10^{-10}
VKP-1P	Magnetron 'K' pump	W	1·2	10^{-2} to 10^{-10}

† K = "Kovar" type sealing glass.
W = Tungsten sealing glass.
S = Stainless steel.

* See data sheets for details.

Dry reed switch book 2 part 3

Type No.	Description	Switched Voltage (V)	Switched Current (mA)	Switched Power (W)	Contacts	Maximum Dimensions (mm)
RI-12	Dry reed switch capsule primarily designed for telephone exchanges Type approved to P.O. specification T4547A	50	100	5·0	Normally open	3·97 diameter 28·3 length 46·1 overall length including leads

MULLARD CIRCULATORS

No.	Frequency	Isolate	Loss	Weight
CL 5007	470–600 MHz	20dB	0.6 dB	2Kg
CL 5008	590–720 MHz	20dB	0.6 dB	2Kg
CL 5010	710–860 MHz	20dB	0.6 dB	2Kg
CL 5029	710–860 MHz	22dB	0.35dB	2Kg
CL 5191	170–200 MHz	20dB	0.4 dB	6.4Kg

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