

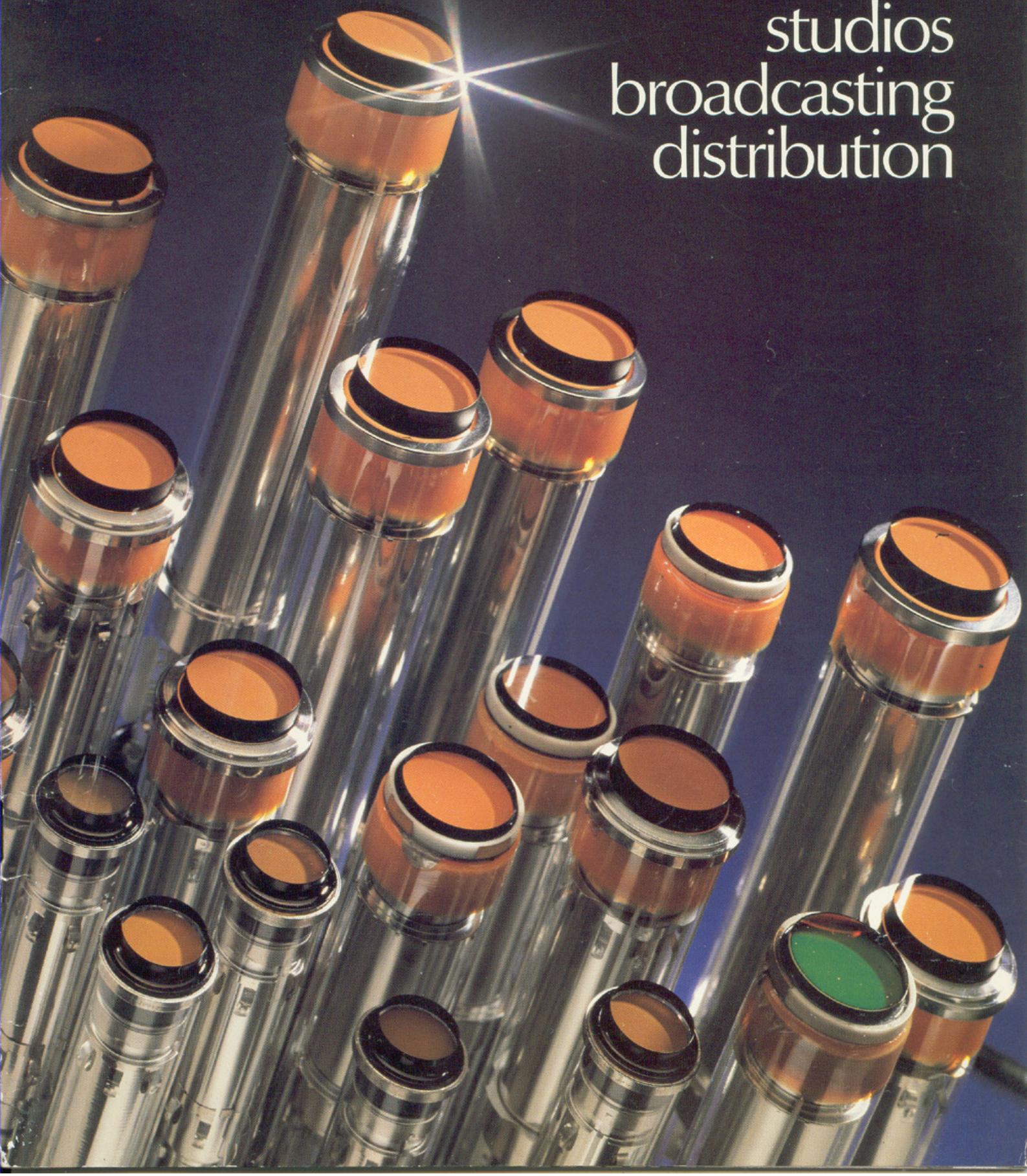


Electronic
components
and materials

PHILIPS

components for TELEVISION

studios
broadcasting
distribution



day and night colour and monochrome

Only Philips cover the application spectrum

® Registered trademarks
for tv camera tubes

Broadcasting

Good colour fidelity combined with high sensitivity and low lag have made the Plumbicon® tube the industry standard for both studio and outside broadcasting. The Philips program covers all tube sizes and

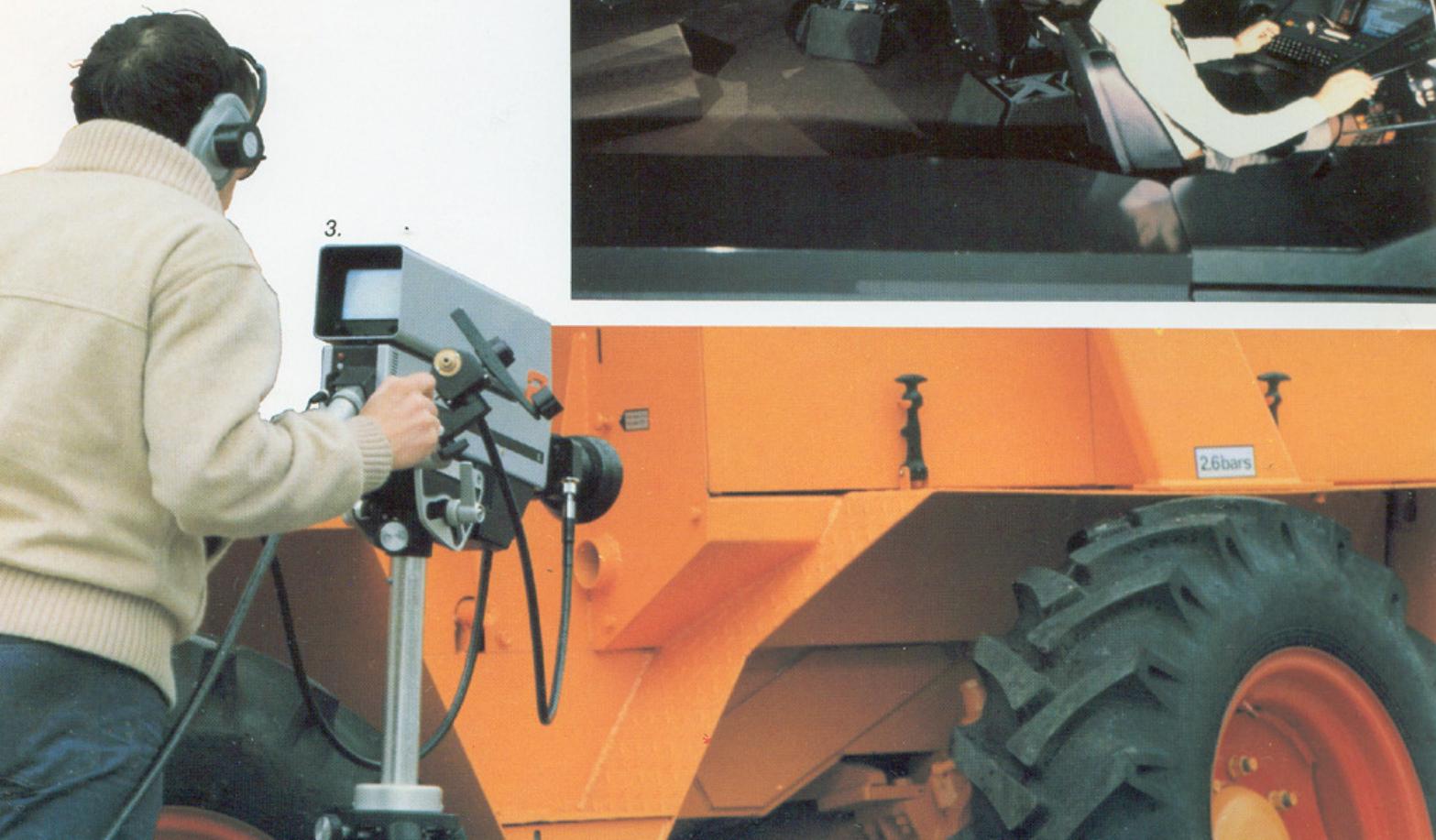
features a wide range of options, including extended red response and facilities to further improve highlight handling. Plumbicon tubes are thus the optimum choice for all broadcast and video software requirements.



1.



2.



3.



Surveillance

Here Philips offer a wide choice of tubes and technologies to meet the different needs of industrial and commercial CCTV. The Vidicon for low budgets and high light levels.

Medical

If it's colour CCTV it's the Plumbicon tube. For X-ray tv the Philips range includes the high-resolution Newvicon® and the Vidicon for surgical applications, plus the fast-response Plumbicon tube for clinical work.

Education

For low budget monochrome systems we offer the Vidicon or Newvicon and for educational colour tv the 1" and 2/3" Plumbicon tubes.



5.

4. Prison surveillance, Bijlmer, Amsterdam.

5. East Asian games, Djakarta.

6. On-the-spot news coverage.

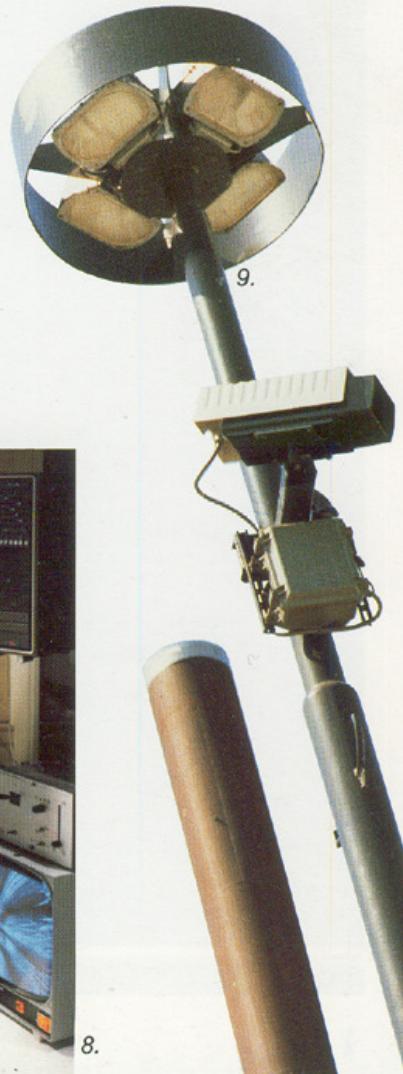
7. Medical observation.

8. Academic research.

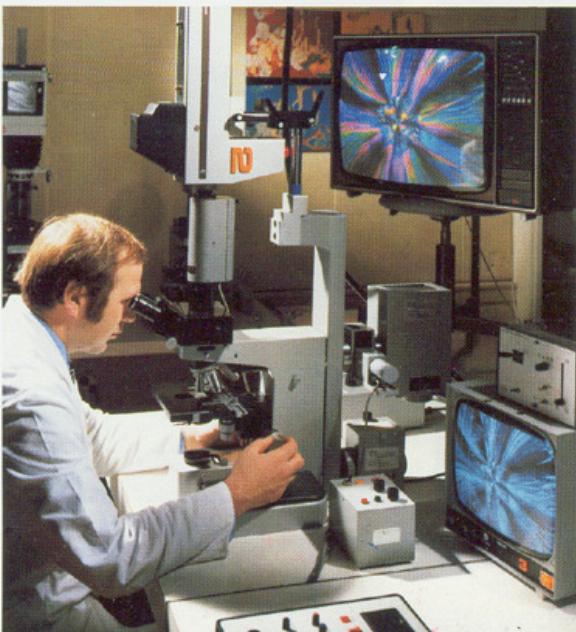
9. Plant security.



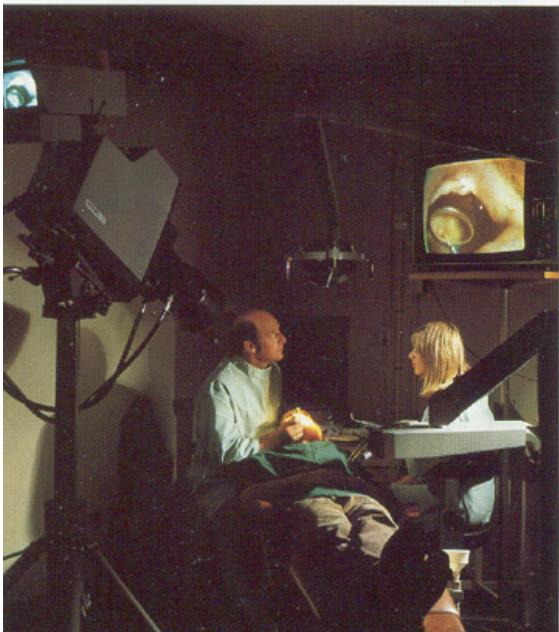
6.



9.

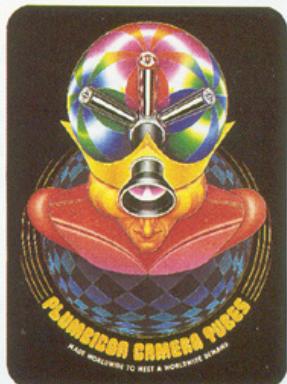


7.



8.

a tube for every task



30 mm (1¼ inch)

- standard

XQ 1020

XQ 1023 extended red response

XQ 1025 extended red response
and infrared filter

- high resolution
- light bias

XQ 1410

XQ 1413 extended red response

XQ 1415 extended red response
and infrared filter

- high resolution
- light bias
- ACT (Anti-Comet-Tail) gun

XQ 1520

XQ 1523 extended red response

XQ 1525 extended red response
and infrared filter

New developments

- narrow scan
- very high resolution
- diode gun (DBC)
- light bias
- low output capacitance

78 XQ

25 mm (1 inch)

- high resolution

XQ 1070

XQ 1073 extended red response

XQ 1075 extended red response
and infrared filter

- high resolution
- light bias
- low output capacitance
- ACT (Anti-Comet-Tail) gun

XQ 1080

XQ 1083 extended red response

XQ 1085 extended red response
and infrared filter

- very high resolution
- light bias
- low output capacitance
- ACT (Anti-Comet-Tail) gun

XQ 1500

XQ 1503 extended red response

XQ 1505 extended red response
and infrared filter

- very high resolution
- diode gun (DBC)
- light bias

XQ 2070

as above, plus

- low output capacitance

73 XQ LOC

18 mm (2/3 inch)

- high resolution

XQ 1427

- very high resolution
- diode gun (DBC)

XQ 2427

as above, plus

- low output capacitance

74 XQ LOC



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Status guide

The status code letters used in this catalogue indicate the status of the products at 1 April 1981

N = New design type. Recommended for new equipment design; production quantities available *after date of publication*.

D = Design type. Recommended for equipment design; production quantities available *at date of publication*.

C = Current type. No longer recommended for equipment design; available for equipment production and for use in existing equipment.

M = Maintenance type. No longer recommended for equipment production; available for maintenance of existing equipment.

Plumbicon® tubes - 1 1/4 inch (30 mm)

- magnetic focusing and deflection
- separate mesh construction



Maintenance types

300 mA; 6,3 V

type	max length mm	photo-conductive layer	quality grade	B/W	L	R	G	B	notes (next page)
XQ1020	215	S	●	●	●	●	●	●	
XQ1023	215	ER	●	●	●	●			
XQ1025	215	ER(F)	●	●	●	●			1

Current types

- provision for light bias
- high resolution

190 mA; 6,3 V

XQ1410	215	SHR	●	●	●	●	●	●	
XQ1413	215	ER	●	●	●	●			
XQ1415	215	ER(F)	●	●	●	●			1

Current types

- anti-comet-tail electron gun (ACT)
- provision for light bias
- high resolution

190 mA; 6,3 V

XQ1520	215	SHR	●	●	●	●	●	●	
XQ1523	215	ER	●	●	●	●	●		
XQ1525	215	ER(F)	●	●	●	●			1

New design types

- diode gun for highlight handling (DBC)
- provision for light bias
- high resolution
- reduced scan target and low output capacitance

190 mA; 6,3 V

78XQ (XQ3410)	215	SHR	●	●	●	●	●	●	
	215	ER	●	●	●	●			1
	215	ER(F)	●	●	●				1

Abbreviations used in the tables

- photoconductive layer
 - S = standard
 - SHR = special high resolution
 - ER = with extended red response
 - ER(F) = with extended red response and infrared reflecting filter on anti-halation glass disc
- quality grade
 - Br = broadcast
- applications
 - B/W = for black and white cameras
 - L = for luminance channel
 - R = for red chrominance channel
 - G = for green chrominance channel
 - B = for blue chrominance channel

Plumbicon® tubes - 1 inch (25 mm)



- magnetic focusing and deflection
- separate mesh construction

More than 80% of the world's colour tv cameras use Plumbicon® tubes



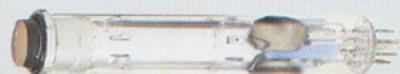
Maintenance types							95 mA; 6,3 V
rear loading type	front loading type	max length mm	photo-conductive layer	quality grade Br	applications B/W L R G B	notes	
XQ1070/02	XQ1070/03	163	SHR	●	● ● ● ● ●	2	
XQ1073/02	XQ1073/03	163	ER	●	● ●	2	
XQ1075/02	XQ1075/03	163	ER(F)	●	● ●	1	
Maintenance types		<ul style="list-style-type: none"> ● anti-comet-tail electron gun (ACT) ● provision for light bias 					95 mA; 6,3 V
XQ1080	XQ1090	163	SHR	●	● ● ● ● ●		
XQ1083	XQ1093	163	ER	●	● ●		
XQ1085	XQ1095	163	ER(F)	●	● ●	1	
Design types		<ul style="list-style-type: none"> ● high resolution anti-comet-tail electron gun (ACT) ● provision for light bias 					190 mA; 6,3 V
XQ1500	XQ1510	163	SHR	●	● ● ● ● ●		
XQ1503	XQ1513	163	ER	●	● ●		
XQ1505	XQ1515	163	ER(F)	●	● ●	1	
New design types		<ul style="list-style-type: none"> ● high resolution ● provision for light bias ● diode gun for highlight handling (DBC) 					95 mA; 6,3 V
XQ2070/02	XQ2070/03	163	SHR	●	● ● ● ● ●		
XQ2073/02	XQ2073/03	163	ER	●	● ●		
XQ2075/02	XQ2075/03	163	ER(F)	●	● ●	1	
73XQLOC		<ul style="list-style-type: none"> ● low output capacitance (LOC) ● high resolution ● provision for light bias ● diode gun for highlight handling (DBC) 					95 mA; 6,3 V
(XQ3070/02)	163	SHR	●	● ● ● ● ●			
(XQ3073/02)	163	ER	●	● ●			
(XQ3075/02)	163	ER(F)	●	● ●		1	

Notes

1. With infrared reflecting filter on anti-halation glass disc.
2. Without anti-halation glass disc:
add suffix /01 to type number.

Plumbicon® tubes - 2/3 inch (18 mm)

- magnetic focusing and deflection
- separate mesh construction



Design types

95 mA; 6,3 V

type	max length mm	photo-conductive layer	quality grade		applications				
			Br	Ind	B/W	L	R	G	B
XQ1427	105	ER SHR	●		●		●	●	●
XQ1428	105	ER SHR		●	●		●	●	●
New design types			● very high resolution ● diode gun for highlight handling (DBC)						
XQ2427	105	ER SHR	●		●		●	●	●
74XQLOC			● low output capacitance (LOC) ● very high resolution ● diode gun for highlight handling (DBC)						
(XQ3427)	105	ER SHR	●		●		●	●	●

Accessories for Plumbicon tubes

	1 1/4" dia. all magnetic		1" dia. all magnetic						2/3" dia. all magnetic					
	ACT light bias	ACT light bias	/02 versions	/03 versions	ACT and light bias	ACT and light bias	DBC and light bias	DBC and light bias		DBC LOC				
	rear loading	rear loading	rear loading	front loading	rear loading	front loading	rear loading	front loading	front loading	front loading				
example	XQ1410	XQ1520	XQ1070/02	XQ1070/03	XQ1080	XQ1090	XQ2070/02	XQ2070/03	XQ1427	XQ3427				
coil unit B/W			AT1116/06S (front loading)				AT1119/01 (rear loading)			AT1109/01S				
coil unit colour	AT1113/..*		AT1116/..* (front loading)				AT1115/..* (rear loading)			AT1109/01 AT1109/10 AT1106*				
socket	56021 56025	56025	56098		56026		56098		56049					
light bias lamp	56106		56106		56027		56106							
adapters** B/W	56122 56123 56124 56125 56126▲ 56139▲▲													
mask	56029		56028						56033	56030				

* Computer selected triplet (digits after the stroke identify variants).

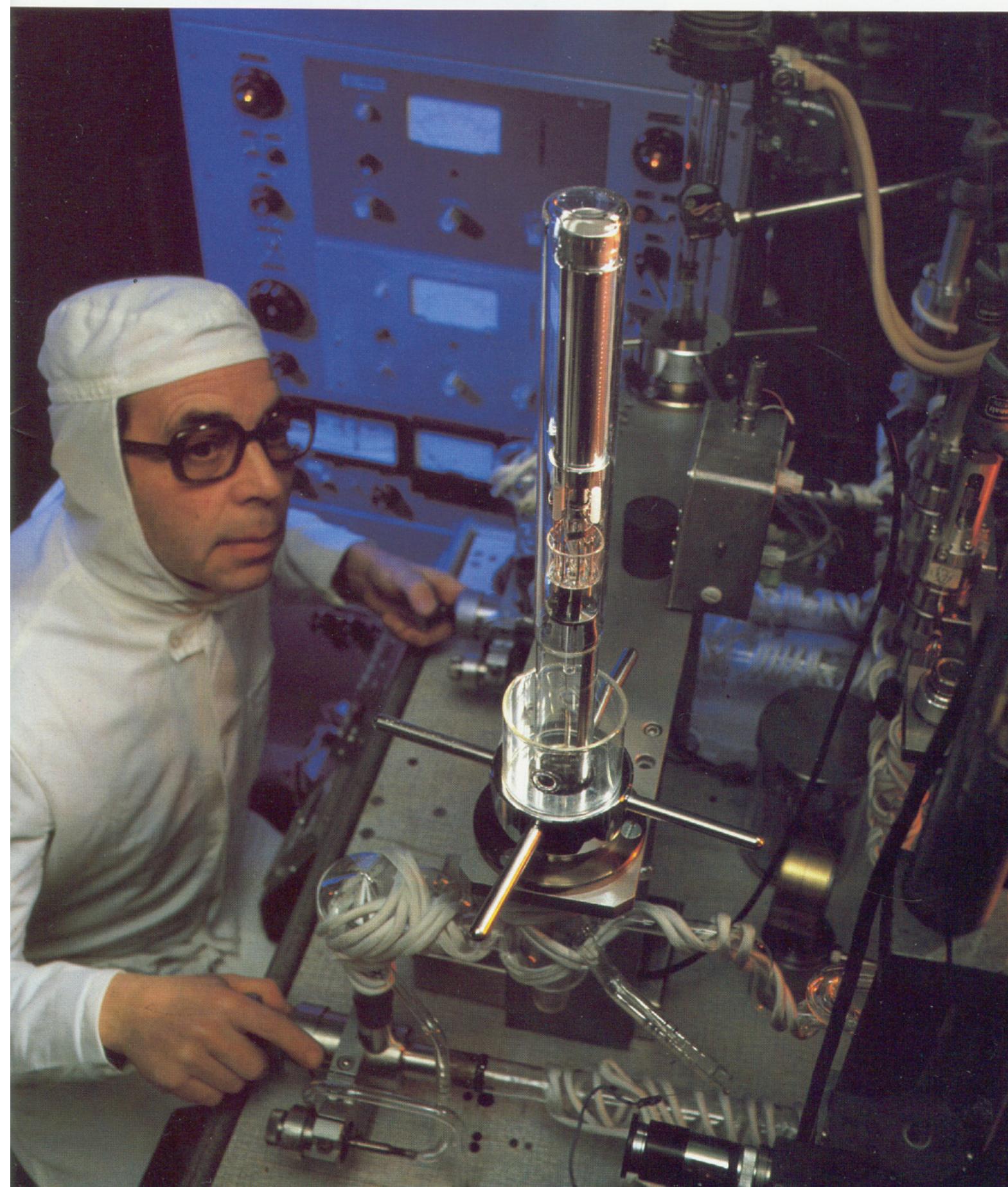
** Adapters for fixed light bias for XQ1410 to XQ1415 and XQ1520 to XQ1525.

▲ Adapter for adjustable light bias for XQ1410 to XQ1415 for use in Marconi Mark VIII camera (variant).

▲▲ Adapter for fixed light bias for XQ1410 to XQ1415 for use in RCA TK47 camera.



Deposition of lead-oxide (PbO_2) layer in Plumbicon tubes.



flying spot scanner tubes photomultiplier tubes

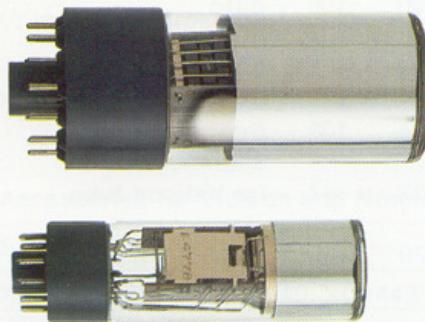
Flying Spot Scanner Tubes

Two tubes are available: the Q13-110GU for professional colour television and the Q7-100GU for semi-professional and home applications. Both tubes have the new GU phosphor which gives them a short decay time and a favourable emission band especially in the red region.

Heater 6,3 V/300 mA;
magnetic deflection.

type	min useful screen mm	deflection angle deg	neck dia. mm	typ first	accelerator	voltage final kV	max overall length mm	focusing
Q7-100GU	Ø 60	36	28	600	—	16	211	electrostatic
Q13-110GU	Ø 108	40	38	—	—	25	347	magnetic

Photomultiplier Tubes



The XP2000, XP2202B, XP1002, XP2008, XP2012B and XP2013B are excellent photomultiplier tubes for flying spot applications. The XP2000 and the XP2202B are 2-inch diameter photomultipliers with bialkaline cathodes with high sensitivity and combine low noise with a uniform collection efficiency. The XP2008 and the XP2012B are 1½-inch photomultipliers with a Super A and a bialkaline cathode respectively. These tubes are primarily intended for use in the blue and green channels.

The XP1002 is a 2-inch photo-

multiplier with a trialkaline cathode just as the XP2013B; both types are intended for use in the red channel. The combination of the new flying spot scanner tube Q13-110GU with photomultipliers XP2202B or XP2000 and XP1002 provides a greatly increased signal-to-noise ratio, due to the increased red emissivity of the flying spot tube. For small systems using the flying spot tube Q7-100GU, the XP2008 or XP2012B and the XP2013B photomultiplier tubes provide the same increased signal-to-noise ratio.

	XP2000	XP2202B	XP1002	XP2008	XP2012B	XP2013B
Spectral response	bialkaline	bialkaline	trialkaline	super A	bialkaline	trialkaline
Useful cathode diameter	44	44	44	32	32	32
Spectral sensitivity	85*	75*	30***	70**	77*	40***
Number of stages	10	10	10	10	10	10
Capacitance: anode to final dynode	7	3	3	3	3	3
Anode dark current at $V_b = 1200$ V	0,5	1	1	5	0,5	1,5
Max. supply voltage	2	1,8	1,8	1,8	1,8	1,8
Max. continuous anode current	0,2	0,2	0,2	0,2	0,2	0,2
						mA
						mA/W

* At 401 nm. ** At 437 nm. *** AT 629 nm.

monitor and display tubes

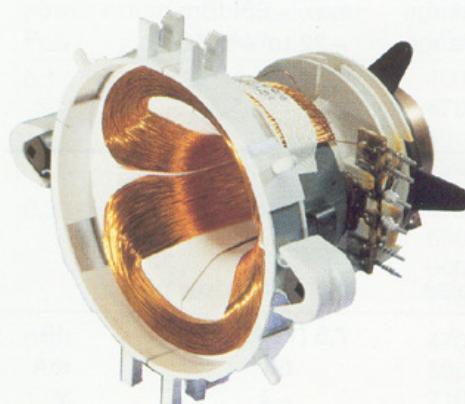


W in the type number indicates standard screen. Monitor tubes can also be supplied with the WA screen having a colour temperature of 6500 K (white "D"). This colour is matched to the white of standard colour tubes.

Heater requires 6.3 V/300 mA; all tubes have magnetic deflection and electrostatic focusing; neck diameter 28 mm.
On request, bonded faceplate versions can be made available.

type	status	min useful screen		deflection angle deg	typ accelerator voltage		max overall length mm	notes
		hor. mm	vert. mm		first V	final kV		
M17-140W	D	124	93	70	400	14	234	
M17-141W	D	124	93	70	600	16	240	with bonded faceplate and metal mounting band
M24-100W	D	190	140	90	600	16	260	
M24-101W	D							
M31-130W	D	257	195	90	600	16	310	
M31-131W	D							

Deflection components for monitor tubes

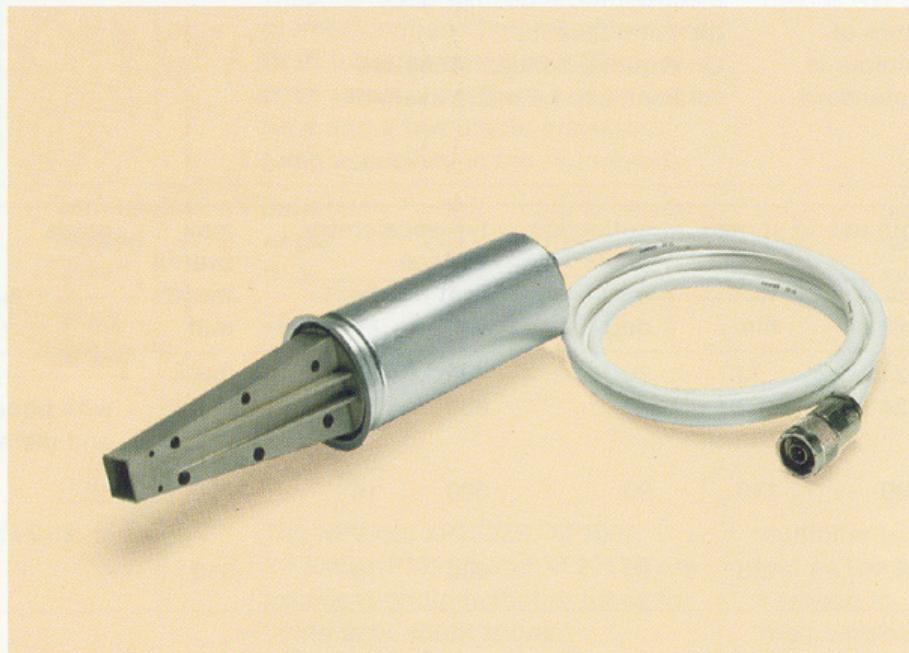


Tube	M17-140W M17-141W	M24-100W M24-101W	M31-130W M31-131W
Defl. yoke	AT1071/07		AT1071/03
Line output transformer	AT2102/02		AT2102/02
Linearity control	AT4036		AT4036
Line driver transformer	—		AT4043/64

components for 12 GHz satellite tv

Microwave downconverter Field-effect transistors

A microwave downconverter for individual home reception and for cable-TV-system head stations is in development. It will be offered as a complete outdoor unit.



Input

frequency range	11,7 to 12,5 GHz
image rejection	-90 dB

Output

i.f. range	0,95 to 1,75 GHz
impedance	50 Ω

Characteristics

noise figure	max 6 dB
conversion gain	35 to 40 dB
local oscillator	10,75 + 0,005 GHz
osc. radiation leakage	max -86 dBm
operating temp. range	-22 to +55 °C
relative humidity	95%

Microwave GaAs field-effect transistors

linear power gain
saturated drain current
pinch-off voltage
transconductance
power output
noise figure at f = 12 GHz
envelope

CFX13 n-channel; low noise

9 (12 GHz)
70
-3
25
10 (10 GHz)
2,8
FO-92

CFX21 n-channel; low power

7,5 (11 GHz)
80
-4
20
65 (11 GHz)
—
FO-92

Pre-tested chips on wafer are available under the numbers **CFX13X** and **CFX21X**.



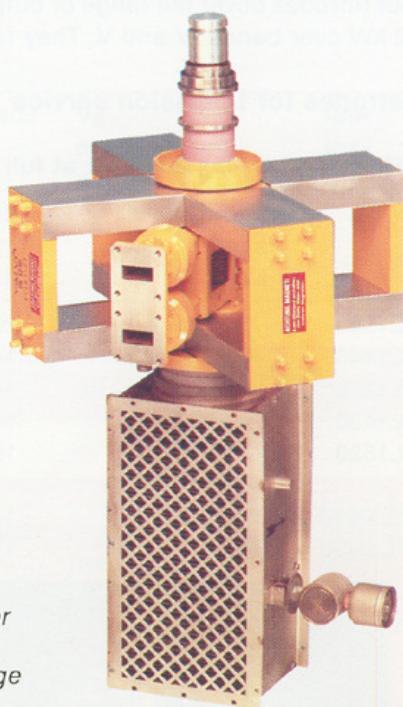
12 GHz klystron for band VI tv full range of circulators

12 GHz Klystrons and Circulators

With future television systems in mind, Philips have developed special components for use in band VI. Samples are available of the new YK1210 air-cooled power amplifier klystron for tv transmitters and transposers in the frequency range 11,8 to 12,2 GHz. It has a bandwidth of 12 MHz and a power gain better than 48 dB. The YK1210 has five internal cavities and permanent magnet focusing. With depressed collector operation, efficiency is approximately 36%. Power output

(sync) as a vision transmitter is 1,15 kW, as a sound transmitter 1,05 kW, and as a transposer 210 W on the basis of a vision/sound ratio of 10:1.

Various types of solid-state up-converters have been developed to drive the klystron, in waveguide as well as in microstrip techniques.



YK1210 air-cooled power amplifier klystron for tv transmitters and transposers in the frequency range 11,8 to 12,2 GHz.

UHF and Microwave Circulators

power rating Pcw	Peak sync kW	frequency range MHz	catalogue number
0,1	0,2	400 – 470	2722 162
		470 – 600	03411
		600 – 800	01551
		790 – 1000	01561
0,3	0,5	470 – 600	03261
		590 – 720	01582
		600 – 800	01592
		710 – 860	01601
0,5	0,9	470 – 600	01612
		590 – 720	01121
		710 – 860	01131
2,0	2,0	470 – 600	01141
		590 – 720	01261
		600 – 800	01281
		710 – 860	01331
			01271

Connector options: type N, female; DIN 47223 HF7/16, EIA 7/8 and EIA1-5/8

Three further components for band VI are available, each with a 10 W continuous rating:

coaxial circulator for 7-12,4 GHz with SMA connector: 2722 162 01822

coaxial isolator for 7-12,4 GHz with SMA connector: 2722 162 02122

transmitting tubes

- Computer aided design ensures a virtually stress-free metal-ceramic structure, thereby minimizing the risk of fracture.
- Forced air cooling is standard, but tubes for water or vapour condensation cooling can be supplied on request.
- All UHF & VHF tetrodes have quick heating thoriated tungsten filaments.
- For all tubes associated cavities are available.

VHF tetrodes

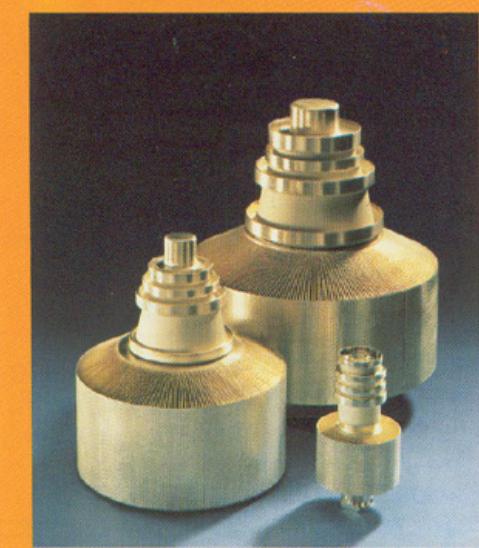


Our tetrodes cover the range of output power between 1 kW and 40 kW over TV bands I and III, and between 500 W and 12 kW over bands IV and V. They feature high efficiency, high gain, and high linearity.

Tetrodes for television service

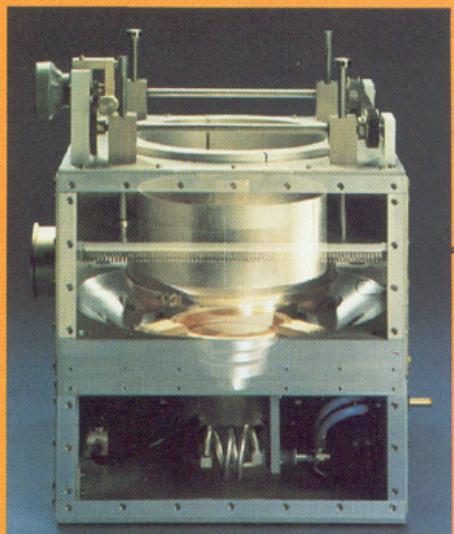
VHF tubes — max 260 MHz at full ratings

type	output power sync kW	gain sync dB	Va	Vg2	Iao	Iablock	Va max kV	Wa max kW	LF linearity min %
YL1540	1,1	20	3	700	0,3	0,5	4,2	2	85
YL1440	1,5	14,5	3	500	0,2	0,7	4	1,5	85
YL1420	8,6	14	5	600	0,65	2,1	6,5	6	85
YL1430	18,4	14,5	7	700	0,75	2,9	9	12	85
YL1520	27,5	15	8	700	0,9	3,9	9	18	85
YL1610	12	16	6	700	1	3,1	7	14	90
YL1630	38	17	8,5	800	1,5	5,4	10	30	90



YL1610 and YL1630
compared with the YL1540

Newly announced additions are the YL1610 and YL1630. Features are their linear transfer characteristics and gains of up to 17 dB.



Phantom view,
YL1630 in broadband input cavity

UHF tubes — max 1000 MHz at full ratings

type	output power sync kW	gain sync dB	Va	Vg2	Iao	Iablock	Va max kV	Wa max kW	LF linearity min %
YL1590	0,6	15,5	3,5	700	0,4	0,6	4	2	90
YL1560	5,5	17	5,5	700	1,0	1,9	6	7	90
YL1580	12	17	5,5	600	1,8	3,5	7,2	12	90



YL1560
YL1580
YL1590

Tetrodes for television transposer service (vision and sound combined)

VHF

type	output power sync kW	gain sync dB	V _a kV	V _{g2} V	I _{ao} A	I _{ablock} A	V _a max kV	W _a max kW	IMP * max dB
YL1440	0,55	15	2,5	600	0,55	0,73	4	1,5	-54
YL1420	2,5	15	4	700	1	1,65	6,5	6	-54
YL1430	7	15	6	800	1,2	2,5	7	12	-54
YL1520	10,5	16	8	900	1,8	3,3	9	18	-54
YL1630	20	17	8	900	2,5	5,8	10	30	-52

UHF

type	output power sync kW	gain sync dB	V _a kV	V _{g2} V	I _{ao} A	I _{ablock} A	V _a max kV	W _a max kW	IMP * max dB
YL1590	0,22	15,6	3,0	700	0,5	0,62	4	2	-55
YL1560	2,2	17	5,0	700	1,2	1,8	6	7	-55
YL1580	4,4	17	5	600	2	3,3	7,5	14	-55

Triodes for television transposer service — max 1000 MHz at full ratings

type	output power sync kW	gain sync dB	V _a kV	I _{ao} mA	I _{ablock} A	V _a max kV	W _a max kW	IMP * max dB
YD1270	25	19	1,5	120	0,145	1,7	0,2	-57
YD1303	25	20	1,5	100	0,130	2	0,15	-57
YD1300	35	20	1,7	130	0,170	2	0,3	-57
YD1302	35	20	1,7	130	0,170	2	0,325	-57
YD1304	55	20	1,8	130	0,185	2	0,325	-57
YD1333	110	16,5	2,5	250	0,420	3,0	0,9	-55
YD1334	110	16,5	2,5	250	0,420	3,5	1,8	-55
YD1330	220	16,5	3	420	0,650	3,5	1,8	-55
YD1336	220	16,5	3	420	0,650	3,5	1,8	-55
YD1335	550	15	3,5	250	0,400	3,8	1,9	-55
YD1337	400	15	1,7	250	0,40	2,2	0,7	-55

* measured by standard 3-tone test -8, -10, -16 dB

u.h.f. power klystrons

Our range of klystrons covers the output power between 10 and 58 kW over the tv bands IV and V. They give high efficiency in combination with high gain.

YK1195, YK1196 and YK1197 deliver 58 kW in three overlapping bands between 470 and 860 MHz. Each tube requires its own accessories. The tubes are vapour cooled and electromagnetically focused. YK1190, YK1191 and YK1192 are similar but deliver only 45 kW.

YK1151 can deliver 25 kW over both bands IV and V; therefore two sets of accessories are available. The tube is air cooled and permanent-magnetic focused.

YK1230 can deliver 27,5 kW over both bands IV and V using only one set of accessories. The tube is electromagnetically focused and can be water, vapour or vapour-condensation cooled. YK1220 is similar but can deliver only 16,5 kW.



type	frequency range MHz	output power (peak sync) kW	gain dB	beam voltage kV	beam current A	efficiency %	focusing
YK1151	470 to 860	12,5	40	20 *	2,1	39	permanent magnet
YK1151	470 to 860	25	44	24 *	3,0	41	permanent magnet
YK1190	470 to 610	45	41	25,5	3,8	48	electromagnetic
YK1191	590 to 720	45	44	25,5	3,8	48	electromagnetic
YK1192	710 to 860	45	41	25,5	3,9	46,5	electromagnetic
YK1195	470 to 610	58	37	26	4,85	47,5	electromagnetic
YK1196	590 to 720	58	39	26	4,85	47,5	electromagnetic
YK1197	710 to 860	58	40	27	4,9	45	electromagnetic
YK1220	470 to 860	16,5	28	17,5	2	45	electromagnetic
YK1230	470 to 860	27,5	36	23,5	2,5	45	electromagnetic

* Operation with depressed collector potential.

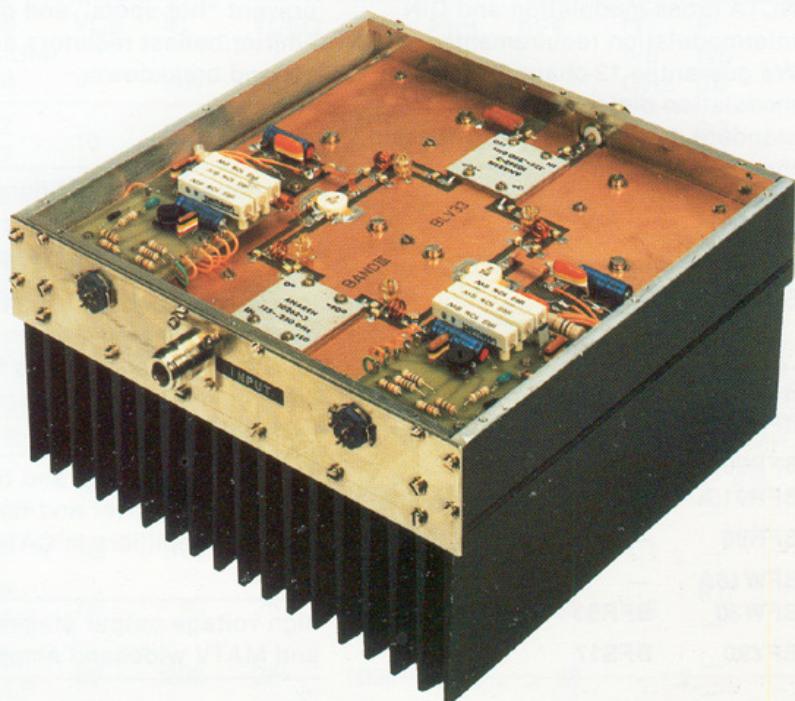
v.h.f. and u.h.f. power transistors



TV transmitters; TV transposers
for band III, IV and V

VIAZ-bau

- Gold sandwich metallization and gold-gold bonding for high reliability
- ion-implantation technology
- high power gain
- modern encapsulation for optimum heat sinking
- line-ups with small-signal driver transistors



*TV band III amplifier
with 2 x BLV33*

operation	type	status	case	f MHz	VCE V	Po sync W	Gp dB	IC mA	dim dB
band III; class-A operation	BLV30	D	SOT-122			1,5	18	460	
	BLV31		SOT-122			5	15	800	
	BLV32F		SOT-160			10	16,5	1600	
	BLV33		SOT-147	225	25	19	9	3200	-55
	BLV33F		SOT-119			15	14	3200	
band III; class-AB operation	BLV36	N	SOT-161	225	28	125*	10,5*	efficiency 65%	
band IV-V; class-A operation	BFR96S	D	SOT-37		10	0,14	11	70	
	BFQ34	D	SOT-122		15	0,3	10	120	
	BLW32	D	SOT-122	860	25	0,5	12	150	-60
	BFQ68	D	SOT-122		15	0,8	10,5	240	
	BLW33	D	SOT-122		25	1,0	10	300	
	BLW34	D	SOT-122	860	25	1,8	9	600	-60
	BLX98	C	SOT-48(2)			3,5	5	850	
	BLW98	D	SOT-122			3,5	7	850	
	BLV57	D	SOT-161			6	8	2 x 850	

* at 1 dB compression point

wideband transistors

selection guide

Wideband transistors for MATV and CATV

- low noise
- excellent linearity
- high output voltage
- long-term reliability

BFQ34, BFQ68 and BFR94 meet all NCTA cross-modulation and DIN intermodulation requirements. We guarantee 12-channel cross-modulation distortion to NCTA standard (better than -105 dB) and three-tone intermodulation to DIN-standard.

Corresponding types in SOT-23 or SOT-89

	SOT-23	SOT-89
BFQ23	BFT93	—
BFQ34	—	BFQ18A
BFR90;A	BFR92;A	—
BFR91;A	BFR93;A	—
BFR96	—	BFQ19
BFW16A	—	BFQ17
BFW30	BFR53	—
BFY90	BFS17	—

Interdigitated emitter and collector prevent "hot spots" and diffused emitter ballast resistors avoid second breakdown.

Application

wideband aerial amplifiers band I to V (40-860 MHz).

wideband distribution amplifiers.

low noise wideband amplifiers in measuring equipment.

r.f. amplifiers and mixers for communication systems (microwave link radar i.f. amplifiers).

high output channel and band aerial amplifiers in driver and final stages. channel amplifiers in CATV and MATV.

high-voltage output stages in CATV and MATV wideband amplifiers.

Ti-Pt-Au metallization:

Gold for conduction;
Titanium for adhesion;
Platinum as migration barrier.

Recommended types

BFQ22 to 24, BFQ32, BFQ34
BFR34, 90, 90A, 91, 91A, 95, 96, 96S

BFW30, BFW92, 93, BFX89, BFY90

BFQ22 to 24, BFQ34, BFQ68
BFR49, BFR90, 90A, 91, 91A, BFY90

BFQ34, BFQ68, BFR64, 65, BFR95
BFW16A, 17A

BFQ34, BFQ68, BFR94

Tetrode MOS-FETS for VHF and UHF applications

- high gain
- extremely low noise
- excellent gain control
- silicon nitride glass barrier passivation for high reliability

Characteristics, measured at $V_{DS} = 10$ V; $ID = 7$ mA; $VG_2-S = 4$ V

BF960 (UHF)	status D	yfs typ 12 mA/V	F typ 2,8 dB at f = 800 MHz	SOT-103
BF980 (UHF)	N	yfs typ 21 mA/V	F typ 2,8 dB at f = 800 MHz	SOT-103
BF981 (VHF)	D	yfs typ 14 mA/V	F typ 0,7 dB at f = 200 MHz	SOT-103
BF982 (VHF)	D	yfs typ 25 mA/V	F typ 1,2 dB at f = 200 MHz	SOT-103



abridged data

Intermodulation distortion

- * VSWR at output < 2 measured at $f(2q-p)$.
 $f_p = 202 \text{ MHz}$, $f_q = 205 \text{ MHz}$ or
 $f_p = 798 \text{ MHz}$, $f_q = 802 \text{ MHz}$.

- ** Intermodulation distortion measured according to DIN three-tone test.

Wideband transistors



type all n-p-n	status	case	CIRCUIT VALUES (typ)					RATINGS			CHARACTERISTICS		
			f MHz	Po* mW	Gp (GUM) dB	VCE V	IC mA	VCEO V	ICM mA	Ptot mW	hFE	fT typ GHz	F typ dB
BFX89	D	TO-72	200 800	6	22 7	10	8	15	50	200	20-150	1,2	3,3 7,0
BFW92	D	SOT-37	200 800	8	23 11	10	10	15	50	190	20-150	1,6	4 at 500 MHz
BFY90	D	TO-72	200 800	12	23 8	10	14	15	50	200	25-150	1,4	2,5 5,5
BFW30	D	TO-72	200 800	15	21 7,5	5	30	10	100	250	> 25	1,6	< 5,0 at 500 MHz
BFW93	D	SOT-37	200 800	15	(22) (10,5)	5	30	10	100	190	> 25	1,7	< 5,0 at 500 MHz
BFW16A	D	TO-39	200 800	150 90	16 6,5	18	70	25	300	1500	> 25	1,2	< 6,0 —
BFW17A	D	TO-39	200	150	16	18	70	25	300	1500	> 25	1,1	—
BFR64	D	SOT-48	200 800	150 90	16 6,5	20	70	25	500	3500	> 25	1,2	6,0 —
BFR65	D	SOT-48	200 800	450	19 4,5	20	200	25	1000	5000	> 30	> 1,2	—

type	polarity	status	case	CHARACTERISTICS (typ)					GUM typ dB	F typ dB	at f MHz
				dim** at f(p+q-r)	Vo dB	VCE MHz	IC mV	mA			
BFQ22	N	D	TO-72	—	—	—	—	—	—	1,9	500
BFQ23	P	D	SOT-37	-60	493,25	300	5	30	16,5	2,4	500
BFQ24	P	D	TO-72	—	—	—	—	—	—	2,4	500
BFQ32	P	D	SOT-37	-60	493,25	500	10	50	14	3,75	500
BFQ34	N	D	SOT-122	-60	793,25	1200	15	120	16	8	500
BFQ51	P	D	SOT-37	—	—	—	—	—	19	2,6	500
BFQ52	P	D	TO-72	—	—	—	—	—	17	2,7	500
BFQ53	N	D	TO-72	—	—	—	—	—	18	2,4	500
BFQ63	P	N	TO-72	—	—	—	—	—	11,5	2,3	500
BFQ68	N	D	SOT-122	-60	793,25	1600	15	240	13	—	800
BFR49	N	D	SOT-100	—	—	—	—	—	17	2,5	1000
BFR90	N	D	SOT-37	-60	493,25	150	10	14	19,5	2,4	500
BFR90A	N	D	SOT-37	-60	493,25	300	5	30	16,5	1,9	500
BFR91	N	D	SOT-37	-60	493,25	425	8	30	14	1,6	800
BFR91A	N	D	SOT-37	-60	793,25	700	20	90	13,5	5	200
BFR94	N	D	SOT-48	-60	493,25	700	20	80	13,5	9	200
BFR95	N	D	TO-39	-61	194,25	1000	18	80	13,5	—	200
BFR96	N	D	SOT-37	-60	493,25	500	10	50	16	3,3	500
BFR96S	N	D	SOT-37	-60	793,25	700	10	70	11,5	4	800
BFT24	N	D	SOT-37	—	—	—	—	—	17	3,8	500

wideband modules

Wideband amplifier modules for every CATV requirement

We understand reliability. Our CATV modules give you the same high performance and reliability that you have come to expect with our well-known CATV/MATV transistors. A push-pull cascode circuit is used in the modules: cascode to reduce transistor non-linearities and noise, and push-pull to meet the highest requirements for second order distortion.

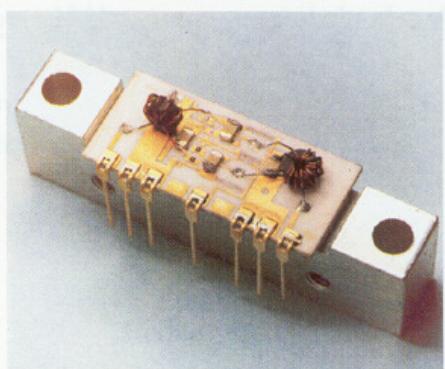
The silicon epitaxial high frequency transistors used in the modules are of proven reliability. Sputter etched titanium-platinum-gold metallization + silicon nitride glass barrier prevent electromigration. And gold-to-gold interconnections from crystal to substrate with 25 µm gold wire ensure freedom from "purple plague". Ballasting resistors are employed to obtain excellent second breakdown performance and a special configuration provides optimal current sharing.

Crystals are eutectically bonded to the substrate which is high quality alumina for good thermal conductivity and high strength. Some of the high stability evaporated NiCr resistors are laser trimmed for optimum d.c. current adjustment. The aluminium heatsink, nickel plated for solderability, is very firmly attached to the substrate for reliable operation. It will withstand extremely wide temperature variations.

All this, coupled with 100% inspection, adds up to very good high frequency performance in terms of high output voltages at low distortion and low noise over a wide operating temperature range with small spreads in power gain and d.c. current.

40 to 300 MHz

Characteristics		Pre-amplifiers				Final amplifiers and line extenders				
		BGY50	BGY52	BGY54	BGY56	BGY51	BGY53	BGY55	BGY57	BGY58
Max. d.c. current at VB = + 24 V	mA	180	180	180	180	220	220	220	220	340
Power gain at f = 50 MHz	dB	12,5 ± 0,4	16,4 ± 0,4	17 ± 0,4	22 ± 0,6	12,5 ± 0,4	16,4 ± 0,4	17 ± 0,4	22 ± 0,6	33 ± 1
Slope cable equivalent 40-300 MHz	dB	+ 0,2 to + 0,8	0 to + 1	0 to + 1	0 to + 1	+ 0,2 to + 0,8	0 to + 1	0 to + 1	0 to + 1	+ 0,5 to + 1,5
Max. flatness of gain 40-300 MHz	dB	± 0,2	± 0,1	± 0,1	± 0,2	± 0,2	± 0,1	± 0,1	± 0,2	± 0,3
Min. return losses Z _s = Z _L = 75	dB	18	18	18	20	18	18	18	20	20
Min. output voltage at Intermod. dist. - 60 dB to DIN 45004B; f = 300 MHz	dBmV	61	61	61	61,5	63,5	63,5	63,5	64	64
Max. second order dist. at V _o = 50 dBmV; f = 210 MHz	dB	- 68	- 68	- 68	- 64	- 70	- 70	- 70	- 66	- 68
Max. noise figure f = 300 MHz	dB	7	6	6	6	8	7	7	7	6



CATV module.

Our team of CATV Applications Engineers and our product development team work in close cooperation.

Their technical support and advice are also available to customers.

More data on the devices listed below is available from the addresses listed on the back cover.

Notes
Module BGY60 is a 2×17 dB interstage amplifier

Data on the types
BGY59, 60, 70, 71, 74 and 75 are preliminary.

40 to 440 MHz

		Characteristics		Pre-amplifiers		Final amplifiers	
BGY59 BGY60				BGY70	BGY74	BGY71	BGY75
340	340	Max. d.c. current at $V_B = +24$ V	mA	180	180	220	220
38,5 ± 1	33,3 ± 1	Power gain at $f = 50$ MHz	dB	12,5 $\pm 0,4$	17 $\pm 0,4$	12,5 $\pm 0,4$	17 $\pm 0,4$
0 to +1	+ 0,5 to + 1,5	Slope cable equivalent 40-440 MHz	dB	+ 0,2 to + 0,8	+ 0,5 to + 1,5	+ 0,2 to + 0,8	+ 0,5 to + 1,5
$\pm 0,3$	$\pm 0,3$	Max. flatness of gain 40-440 MHz	dB	$\pm 0,2$	$\pm 0,1$	$\pm 0,2$	$\pm 0,1$
20	20	Min. return losses $Z_S = Z_L = 75$	dB	18	18	18	18
64	64	Min. output voltage at Intermod. dist. - 60 dB to DIN 45004B; up to 440 MHz	dBmV	62,5	62,5	65	65
-68	-66	Max. second order dist. at $V_O = 50$ dBmV; $f = 265$ MHz	dB	-68	-68	-70	-70
6	6	Max. noise figure $f = 300$ MHz	dB	7	6	8	7

wideband modules

hybrid i.c. amplifiers

For use in RATV, MATV and CATV systems and for general purposes in v.h.f. and u.h.f. applications.

All amplifiers:

frequency range	f	40 to 860 MHz
source and load (characteristic) imp.	$R_s = R_l = Z_0$	75 Ω
operating ambient temperature	Tamb	-20 to +70°C
operating mounting-base temperature (OM323; A and OM337;A)	Tmb	-30 to +100°C
pinning (except OM322)	suitable for 0,1-inch grid	
finish	resin coated	

Typical characteristics at $V_B = 24 V \pm 10\%$

type	status	gain $ sf ^2$ dB	V_o (r.m.s.)* dB μ V	supply current mA	noise figure dB	max VSWR		dimensions		
						typical values	input	output	L mm	H mm
OM320	C	15,5	92	23	5,5	2,2	2,5	—	30	12
OM321	C	15,5	98	33	6	2,5	2	—	30	12
OM322	C	15	103	60	7	1,7	1,7	—	—	—
OM323; A**	C	15	113	100	9	1,9	2,3	—	30	18
OM335	C	27	98	35	5,5	1,9	3,2	—	30	18
OM336	C	22	105	65	7	1,4	1,6	—	30	19
OM337; A**	C	26	112	115	9,8	2,3	1,8	—	30	18
OM339	C	28	105	67	6	1,5	1,5	—	30	19

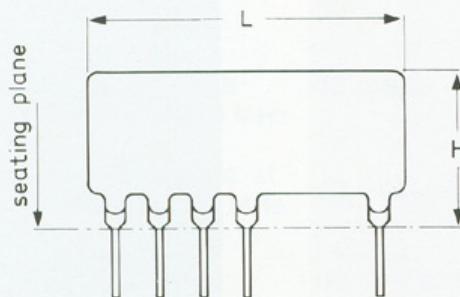
Improved design techniques for h.f. performance resulted in reduced dimensions of the 12 V range.

Typical characteristics at $V_B = 12 V \pm 10\%$

type	status	gain $ sf ^2$ dB	V_o (r.m.s.)* dB μ V	supply current mA	noise figure dB	max VSWR input	max VSWR output	dimensions L mm	H mm
OM345	D	12	79	11,5	5,5	2,0	1,4	14	8
OM350	D	18	98	18	6	1,5	1,9	19	9
OM360	D	23	105	55	7	1,4	1,6	27	9
OM361	D	28	105	50	6	1,3	1,5	27	9
OM370	D	28	111	105	7	2,3	1,9	27	22

* Minimum output voltage at -60 dB intermodulation distortion (DIN 45004, 3-tone, f = 470 MHz).

** The OM323A and OM337A need an external collector-coil and blocking capacitor, the OM323 and OM337 have these built-in.

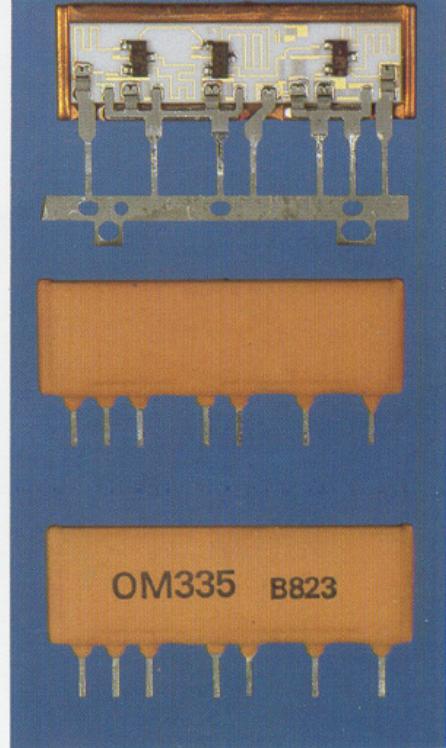
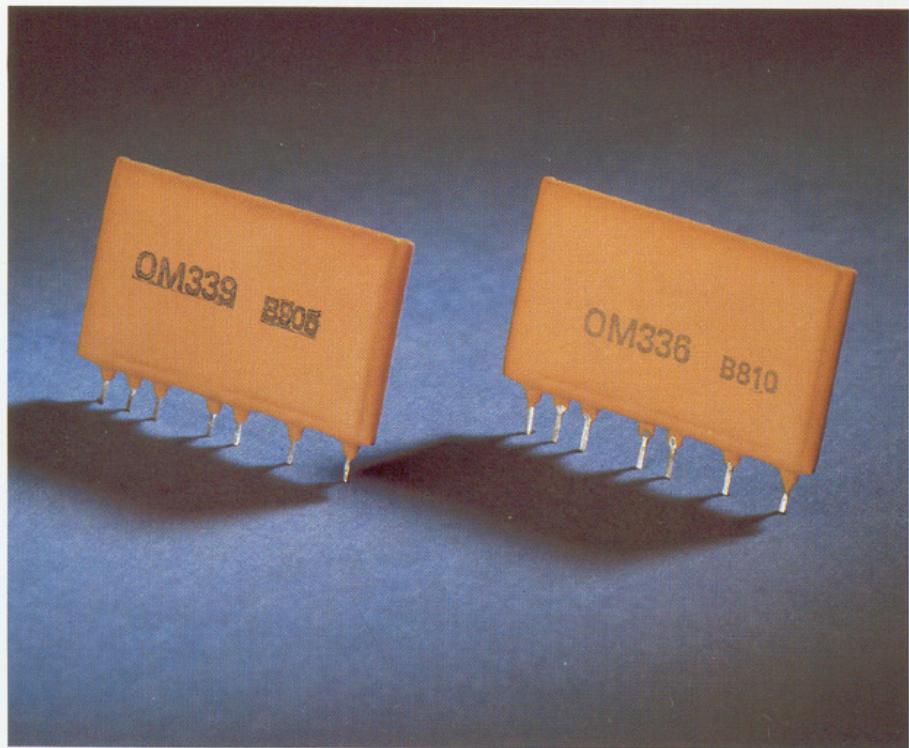
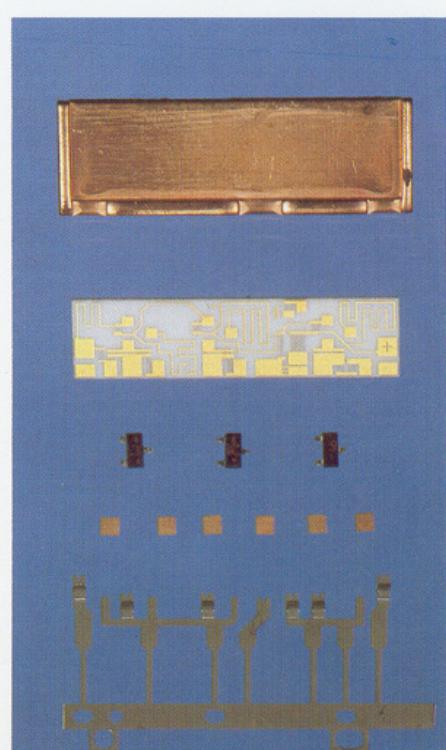
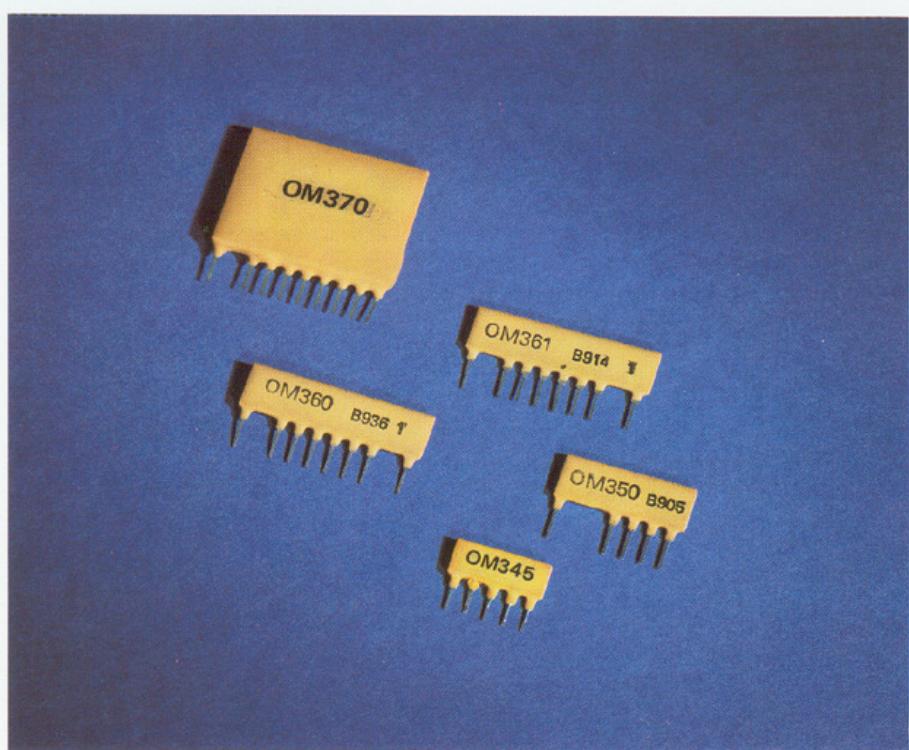
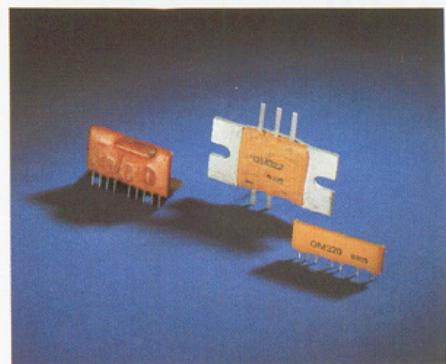


Conversion table for 75 Ω impedance

$dB\mu$ V	mV	dBm
92	39,8	-16,75
98	79,4	-10,75
103	141,3	- 5,75
105	177,8	- 3,75
112	398,1	+ 3,25
113	446,7	+ 4,25



A selection from our range
of IC amplifiers



fibre-optic communications

emitters-receivers

Optical fibre technology has matured to the point where it is a serious contender to take over many of the traditional tasks of coaxial cable. Amongst its advantages are

- very large bandwidth, high information capacity
- immunity to electromagnetic interference
- low attenuation, independent of frequency
- electrical isolation of input and output, no earth-loop problems
- wide-range temperature independence

As input and output devices for optical fibres, the emitters and receivers listed here are but the first in a projected range of Philips products for fibre-optic signal transfer in the broadcasting and telecommunication industries.

Emitters

CQX60 GaAlAs LEDs emitting 300 µW/sr at 830 nm.

CQX61 150 µW/sr at 830 nm.

Enlarged TO-18 coupled to a small light guide for use in active connectors.

CQX62 GaAlAs LEDs emitting 300 µW/sr at 830 nm.

CQX63 150 µW/sr at 830 nm.

Enlarged TO-18 with fibre pigtail of 200 µm core diameter.

375CQY AlGaAs double heterostructure diode laser, coupled to a 50 µm graded

index silica fibre; radiant output power 3 mW, at 850 nm.

Built-in high speed PIN diode for monitoring.

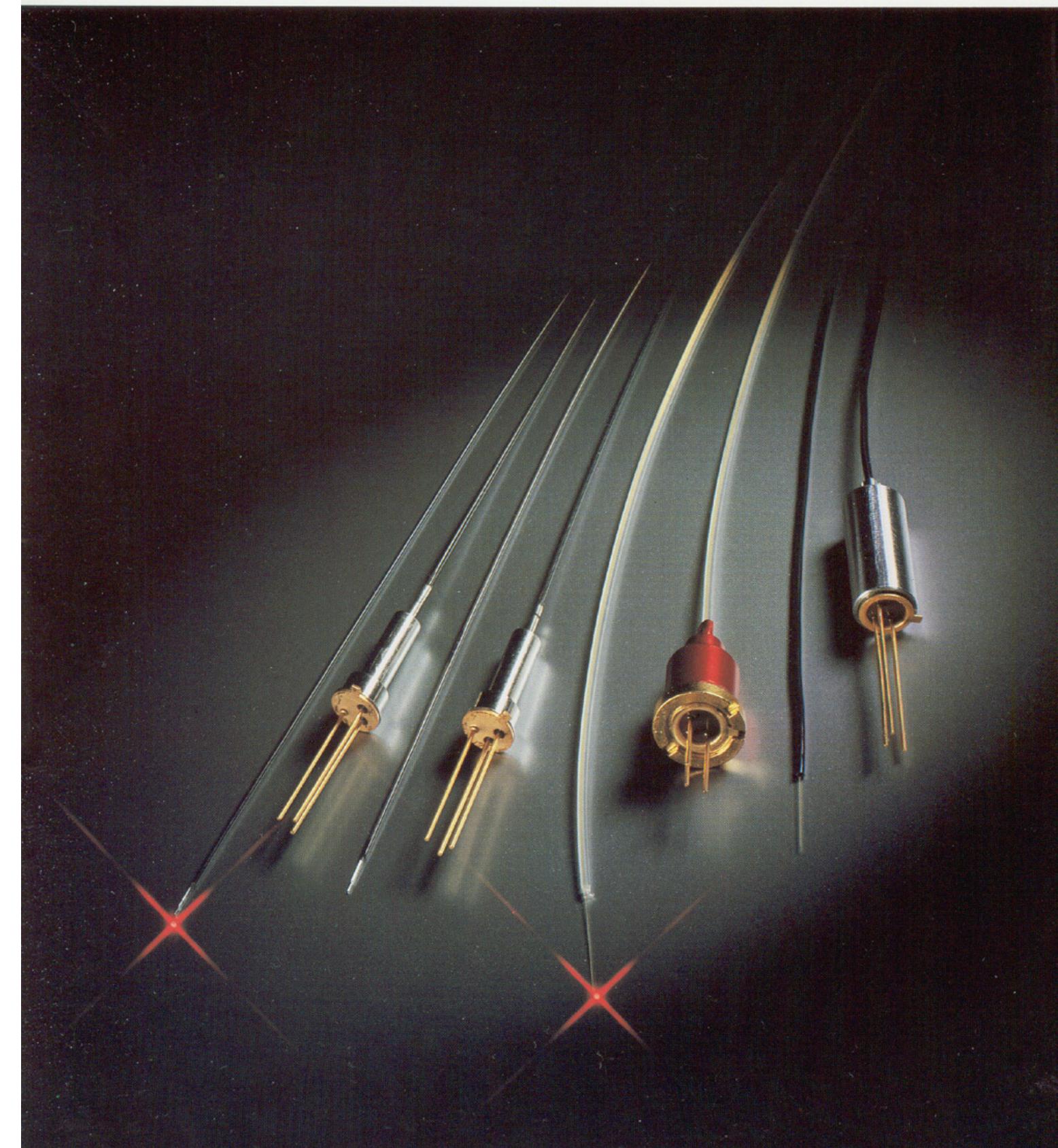
Receivers

BPW44 Si-PIN diode in enlarged TO-18 with fibre pigtail of 200 µm diameter.

BPW45 Si PIN diode with built-in light guide for use in BNC, TNC and SMA optical connectors.

368BPY Si avalanche photodiode, hermetically sealed in modified TO-18.

Coupled directly to a graded-index quartz fibre of 50 µm core diameter.



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for professional, industrial
and consumer uses

from the world-wide
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