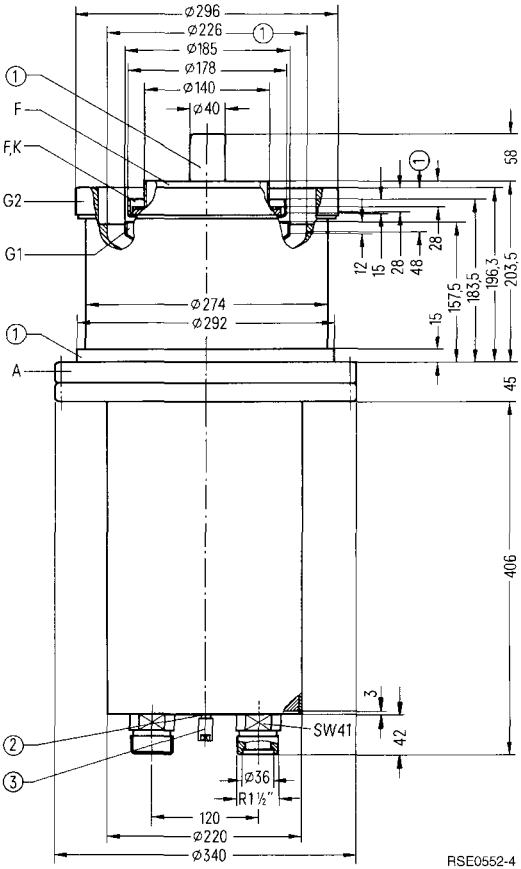
Ordering code Q53-X2074 (RS 2074 SK)
Ordering code Q53-X274 (RS 2074 HF)

Coaxial metal-ceramic tetrode, vapor-condensation-cooled. Due to the favorable current transfer characteristic and the high permissible screen-grid dissipation this tube features very high efficiency.

The version RS 2074 SK is particularly suitable for broadcast transmitters up to 600 kW medium wave and 500 kW short wave, for grid-current free operated modulators in transmitters up to 1000 kW, and for use as switching tube in PDM transmitters up to 1000 kW.

The version RS 2074 HF is particularly suitable for RF amplifiers up to 900 kW/up to 110 MHz.



Dimensions in mm

① Do not use as terminal
② Taphole M12 for screw ring conveyer RöZub105
③ Connector for drain hose with 5 mm internal width

Approx. weight 72 kg

Heating

Heater voltage	U_F	13,5	V
Heater current	I_F	≈ 920	A
Permissible starting current	$I_{F\,M}$	≤ 3000	A
Heating: direct			
Cathode: thoriated tungsten			

Characteristics

Emission current at $U_A = U_{G2} = U_{G1} = 700$ V	I_{em}	600	A
Amplification factor of screen grid at $U_A = 6$ kV, $U_{G2} = 800$ to 1200 V, $I_A = 20$ A	μ_{g21g}	4,5	
Transconductance at $U_A = 6$ kV, $U_{G2} = 1100$ V, $I_A = 50$ A	s	480	mA/V

Capacitances

Cathode/control grid	c_{kg1}	≈ 430	pF
Cathode/screen grid	c_{kg2}	≈ 45	pF
Cathode/anode	c_{ka}	≈ 1,2	pF [1]
Control grid/screen grid	c_{g1g2}	≈ 620	pF
Control grid/anode	c_{g1a}	≈ 7	pF [1]
Screen grid/anode	c_{g2a}	≈ 125	pF

Accessories		**Ordering code**
Cathode connecting strip (4 per tube)	RöKat272	Q81-X1109
SW header socket	RöKpf275	Q81-X1859
Screw ring conveyor	RöZub105	Q1001-X148
Insulating hose	RöZub274SK	Q81-X2178
LL electrolytic target for $1^1/_4$″ hose	RöEl7	Q81-X512

1) Measured by means of a 60 cm diameter screening plate in the screen grid terminal plane.

RF amplifier,
class B operation, grounded control-grid screen-grid circuit

Maximum ratings

Frequency	f	110	MHz
Anode voltage (dc)	U_A	24	kV
Screen grid voltage (dc)	U_{G2}	1600	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	100	A
Peak cathode current	$I_{K\,M}$	650	A
Anode dissipation	P_A	500	kW [2])
Screen grid dissipation	P_{G2}	6,0	kW
Control grid dissipation	P_{G1}	2,0	kW

Operating characteristics

Frequency	f	50	MHz
Output power	P_2	600	kW [1])
Anode voltage (dc)	U_A	16	kV
Screen grid voltage (dc)	U_{G2}	1500	V
Control grid voltage (dc)	U_{G1}	– 500	V
Peak control grid voltage (ac)	$U_{g1\,m}$	700	V
Anode current (dc)	I_A	53	A
Screen grid current (dc)	I_{G2}	2	A
Control grid current (dc)	I_{G1}	3,3	A
Anode input power	$P_{B\,A}$	848	kW
Drive power	P_1	35	kW [1])
Anode dissipation	P_A	248	kW
Screen grid dissipation	P_{G2}	3	kW
Control grid dissipation	P_{G1}	600	W
Efficiency	η	67	%
Anode load resistance	R_A	172	Ω

1) Circuit losses are not included.
2) Higher max. ratings may be released upon request.

RF amplifier, pulse operation,
class B operation, grounded control-grid screen-grid circuit

Maximum ratings

Frequency	f	110	MHz
Anode voltage (dc)	U_A	24	kV
Screen grid voltage (dc)	U_{G2}	1600	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	100	A
Peak cathode current	$I_{K\,M}$	650	A
Anode dissipation	P_A	500	kW [4]
Screen grid dissipation	P_{G2}	6,0	kW
Control grid dissipation	P_{G1}	2,0	kW

Operating characteristics

Frequency	f	108	MHz
Pulse duration	t_p	5×10^{-3}	s
Pulse separation	t_0	15×10^{-3}	s
Pulse output power	$P_{2\,p}$	1550 + 60 [3]	kW [1]
Anode voltage (dc)	U_A	23	kV
Screen grid voltage (dc)	U_{G2}	1,5	kV
Control grid voltage (dc)	U_{G1}	– 650	V [2]
Peak control grid voltage (ac)	$U_{g1\,m\,p}$	720	V
Pulse anode current (dc)	$I_{A\,p}$	104	A
Pulse screen grid current (dc)	$I_{G2\,p}$	3	A
Pulse control grid current (dc)	$I_{G1\,p}$	3	A
Pulse anode input power	$P_{B\,A\,p}$	2390	kW
Pulse drive power	$P_{1\,p}$	1 + 60 [3]	kW [1]
Pulse anode dissipation	$P_{A\,p}$	835	kW
Average anode dissipation	P_A	312	kW
Pulse screen grid dissipation	$P_{G2\,p}$	3,5	kW
Pulse control grid dissipation	$P_{G1\,p}$	100	W
Pulse efficiency	η_p	65	%
Anode load resistance	R_A	115	Ω

1) Circuit losses are not included.
2) For zero signal dc anode current $I_{A\,0}$ = 6 A.
3) Power transition of grounded control-grid screen-grid circuit.
4) Higher max. ratings may be released upon request.

Anode and screen grid modulation,
class C operation, grounded cathode circuit, with 3-*f* circuits

Maximum ratings

Frequency	f	30	MHz
Anode voltage (dc)	U_A	15	kV
Screen grid voltage (dc)	U_{G2}	2200	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	100	A
Peak cathode current	$I_{K\,M}$	650	A
Anode dissipation	P_A	500	kW [5])
Screen grid dissipation	P_{G2}	8,0	kW
Control grid dissipation	P_{G1}	3,0	kW

Operating characteristics

Frequency	f	3	MHz
Carrier power	P_{trg}	620	kW [1])
Anode voltage (dc)	U_A	12	kV
Screen grid voltage (dc)	U_{G2}	1200	V
Control grid bias (dc), fixed	$U_{G1\,fix}$	– 550	V
Control grid resistance	R_{G1}	25	Ω
Peak control grid voltage (ac)	$U_{g1\,m}$	920	V
Anode current (dc)	I_A	58	A
Screen grid current (dc)	I_{G2}	4,4	A
Control grid current (dc)	I_{G1}	6,5	A
Anode input power	$P_{B\,A}$	766	kW
Drive power	P_1	6,0	kW [1])
Anode dissipation	P_A	146	kW [2])
Screen grid dissipation	P_{G2}	5,3	kW
Control grid dissipation	P_{G1}	2,4	kW
Efficiency	η	89	%
Anode load resistance	R_A	135	Ω
Modulation factor	m	100	%
Peak screen grid voltage (ac)	$U_{g2\,m}$	700	V
Modulation power	P_{mod}	420	kW
Control grid current (dc)	I_{G1}	9,1	A [3])
Drive power	P_1	9,8	kW[1])[3])
Anode dissipation at modulation	$P_{A\,mod}$	255	kW [4])
Screen grid dissipation at modulation	$P_{G2\,mod}$	6,4	kW [4])

1) Circuit losses are not included.
2) Even during modulation the indicated maximum ratings must not be exceeded. It has to be observed that during 100 % modulation the anode dissipation increases to about 1,5 times the power dissipation stated for the carrier value.
3) Maximum values at U_A = 0 V.
4) Average values at m = 100 %.
5) Higher max. ratings may be released upon request.

Anode and screen grid modulation, class C operation, grounded cathode circuit

Maximum ratings

Frequency	f	30	MHz
Anode voltage (dc)	U_A	15	kV
Screen grid voltage (dc)	U_{G2}	2200	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	100	A
Peak cathode current	$I_{K\,M}$	650	A
Anode dissipation	P_A	500	kW [5])
Screen grid dissipation	P_{G2}	8	kW
Control grid dissipation	P_{G1}	3	kW

Operating characteristics

Frequency	f	≤ 30	MHz
Carrier power	P_{trg}	525	kW [1])
Anode voltage (dc)	U_A	12	kV
Screen grid voltage (dc)	U_{G2}	1100	V
Control grid bias (dc), fixed	$U_{G1\,fix}$	– 550	V
Control grid resistance	R_{G1}	30	Ω
Peak control grid voltage (ac)	$U_{g1\,m}$	880	V
Anode current (dc)	I_A	54	A
Screen grid current (dc)	I_{G2}	3,3	A
Control grid current (dc)	I_{G1}	4,9	A
Anode input power	$P_{B\,A}$	648	kW
Drive power	P_1	4,2	kW [1])
Anode dissipation	P_A	123	kW [2])
Screen grid dissipation	P_{G2}	3,7	kW
Control grid dissipation	P_{G1}	800	W
Efficiency	η	81	%
Anode load resistance	R_A	112	Ω
Modulation factor	m	100	%
Peak screen grid voltage (ac)	$U_{g2\,m}$	700	V
Modulation power	P_{mod}	355	kW
Control grid current (dc)	I_{G1}	6,4	A [3])
Drive power	P_1	5	kW[1])[3])
Anode dissipation at modulation	$P_{A\,mod}$	215	kW [4])
Screen grid dissipation at modulation	$P_{G2\,mod}$	4,5	kW [4])

1) Circuit losses are not included.
2) Even during modulation the indicated maximum ratings must not be exceeded. It has to be observed that during 100 % modulation the anode dissipation increases to about 1,5 times the power dissipation stated for the carrier value.
3) Maximum values at U_A = 0 V.
4) Average values at m = 100 %.
5) Higher max. ratings may be released upon request.

AF amplifier and modulator,
class B operation, 2 tubes in push-pull circuit, I_{G1} = 0

Maximum ratings

Anode voltage (dc)	U_A	15	kV
Screen grid voltage (dc)	U_{G2}	2200	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	100	A
Peak cathode current	$I_{K\,M}$	650	A
Anode dissipation	P_A	500	kW
Screen grid dissipation	P_{G2}	8,0	kW
Control grid dissipation	P_{G1}	3,0	kW

Operating characteristics at modulator operation for

		1000 kW carrier power		
Output power	P_2	0	600	kW
Anode voltage (dc)	U_A	12	12	kV
Screen grid voltage (dc)	U_{G2}	1500	1500	V
Control grid voltage (dc)	U_{G1}	– 450	– 450	V
Peak control grid voltage (ac) between the 2 tubes	$U_{gg\,m}$	0	860	V
Anode current (dc)	I_A	$2 \times 1{,}8$	$2 \times 37{,}6$	A
Screen grid current (dc)	I_{G2}	0	$2 \times 3{,}5$	A
Anode input power	$P_{B\,A}$	2×22	2×451	kW
Anode dissipation	P_A	2×22	2×150	kW
Screen grid dissipation	P_{G2}	0	$2 \times 4{,}7$	kW
Efficiency	η	—	66,5	%
Effective load resistance (anode to anode)	R_{AA}	—	348	Ω

Tube mounting

Axis vertical, anode up or down.

For connection of the tube use the terminals listed under “Accessories”.

Maximum tube surface temperature

The maximum temperature of the tube surface must not exceed 220 °C. The maximum permissible temperature difference at the tube circumference is 50 °C. The temperature gradient at the tube must not exceed 25 °C/cm. The surface temperature will remain below the maximum values if an air stream of approx. 5 to 6 m^3/min is directed onto the tube terminals.

Vapor condensation cooling

The cooling water diagram gives the minimum water flow rate (distilled or deionized water) for maximum anode dissipation, as well as pressure drop and water outlet temperature at 60 °C water inlet temperature. The diagram applies to a hermetically sealed cooling system with 1.5 bar overpressure at the cooling water outlet with a maximum permissible outlet temperature of 100 °C.

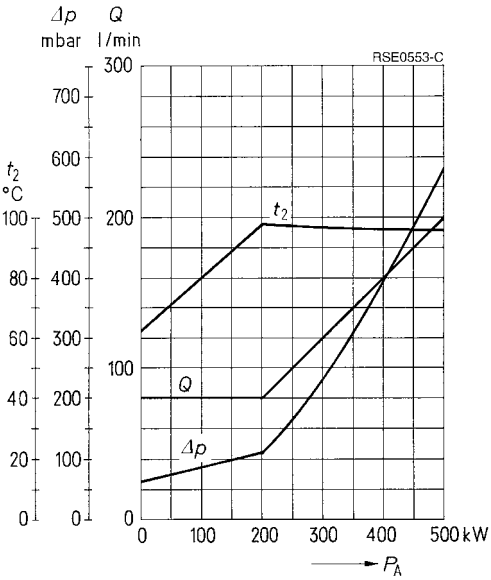
Operation with open cooling cycle (without overpressure) is possible if the maximum outlet temperature remains below 60 °C (sea level, air pressure ≈ 1 bar) with lower inlet temperature and, if required, increased water flow rate.

For more information on vapor condensation cooling refer to “Explanations on Technical Data”.

Safety precautions

The section “Safety precautions” under “Explanations on Technical Data” describes how the tube is to be protected against damage due to electric overload or insufficient cooling. A copper wire with 0,35 mm diameter should be used to test the anode overcurrent trip circuit.

Cooling air diagram

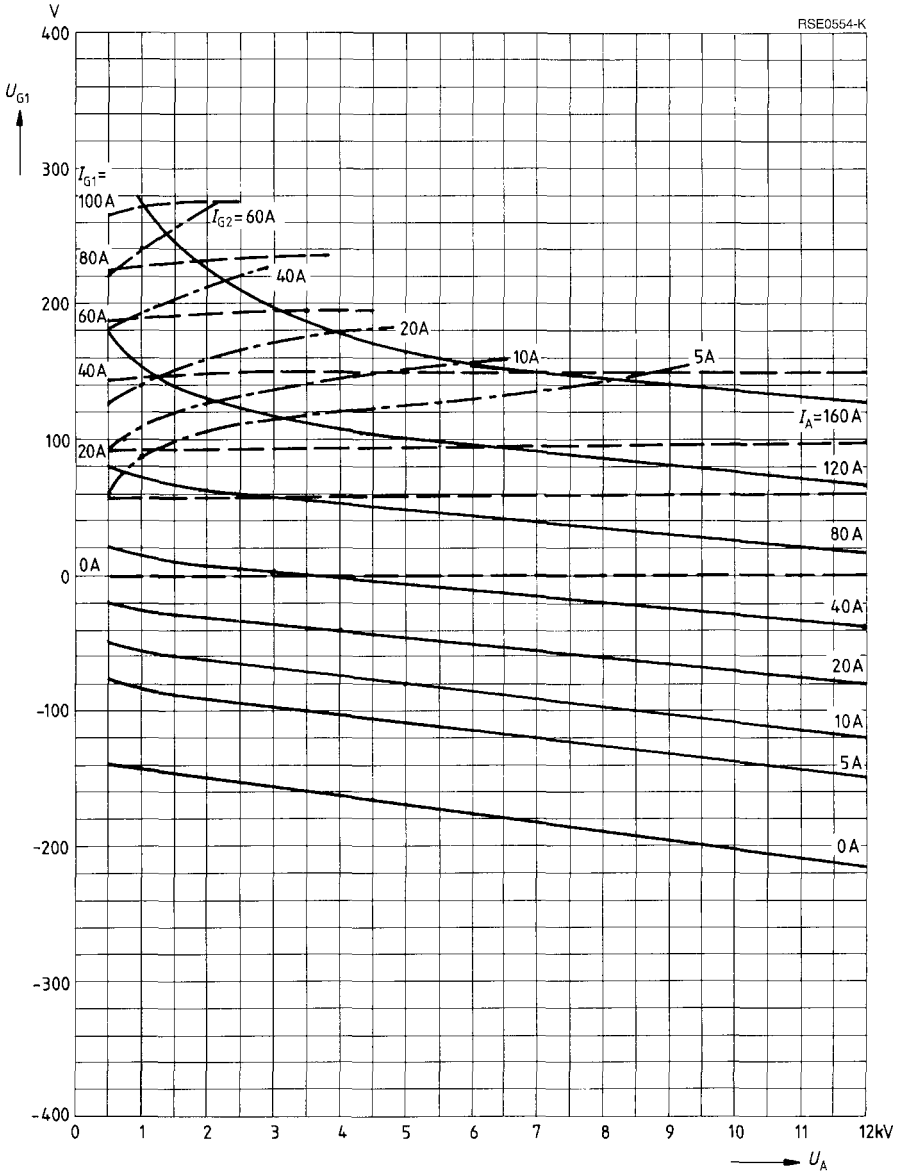


The cooling air is supplied from the electrode terminal side.

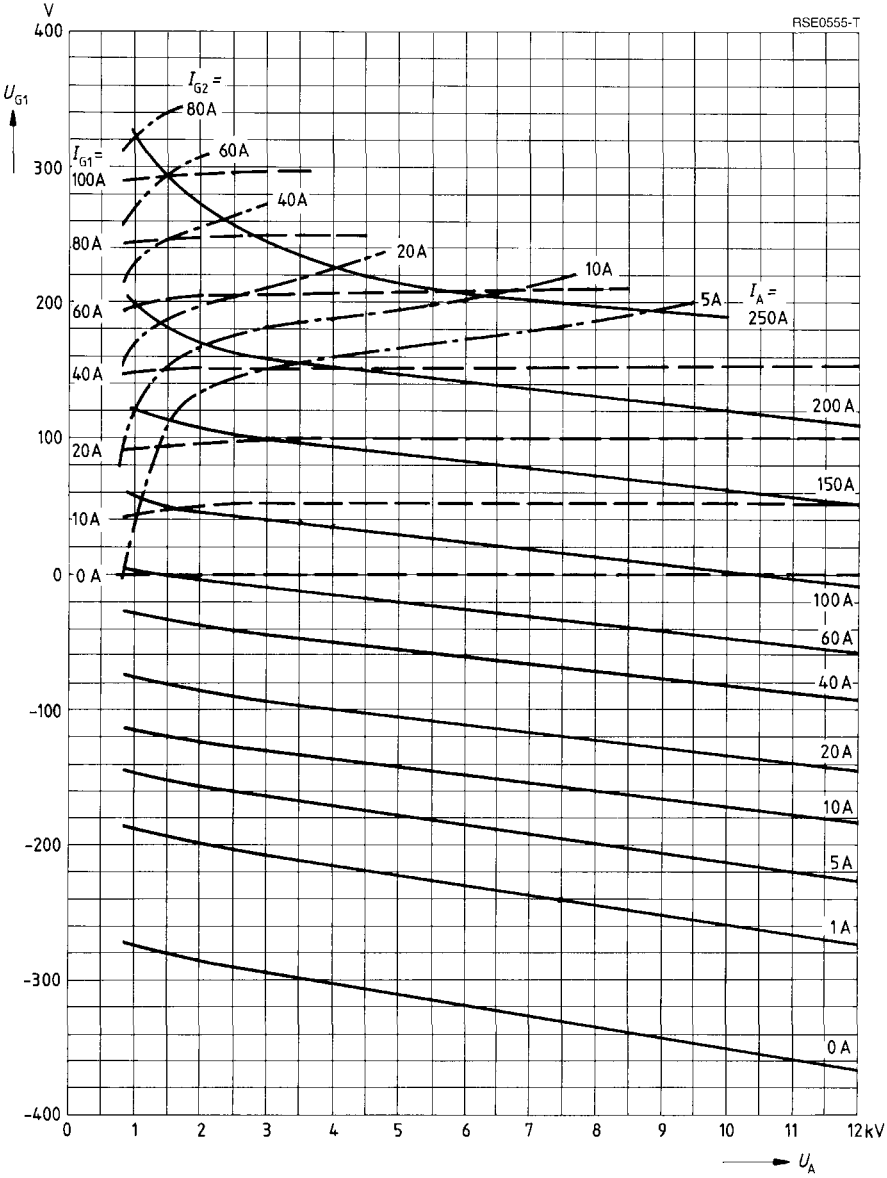
Air pressure = 1,5 bar
t_1 = 60 °C

$U_{G1} = f(U_A)$
$U_{G2} = 500$ V

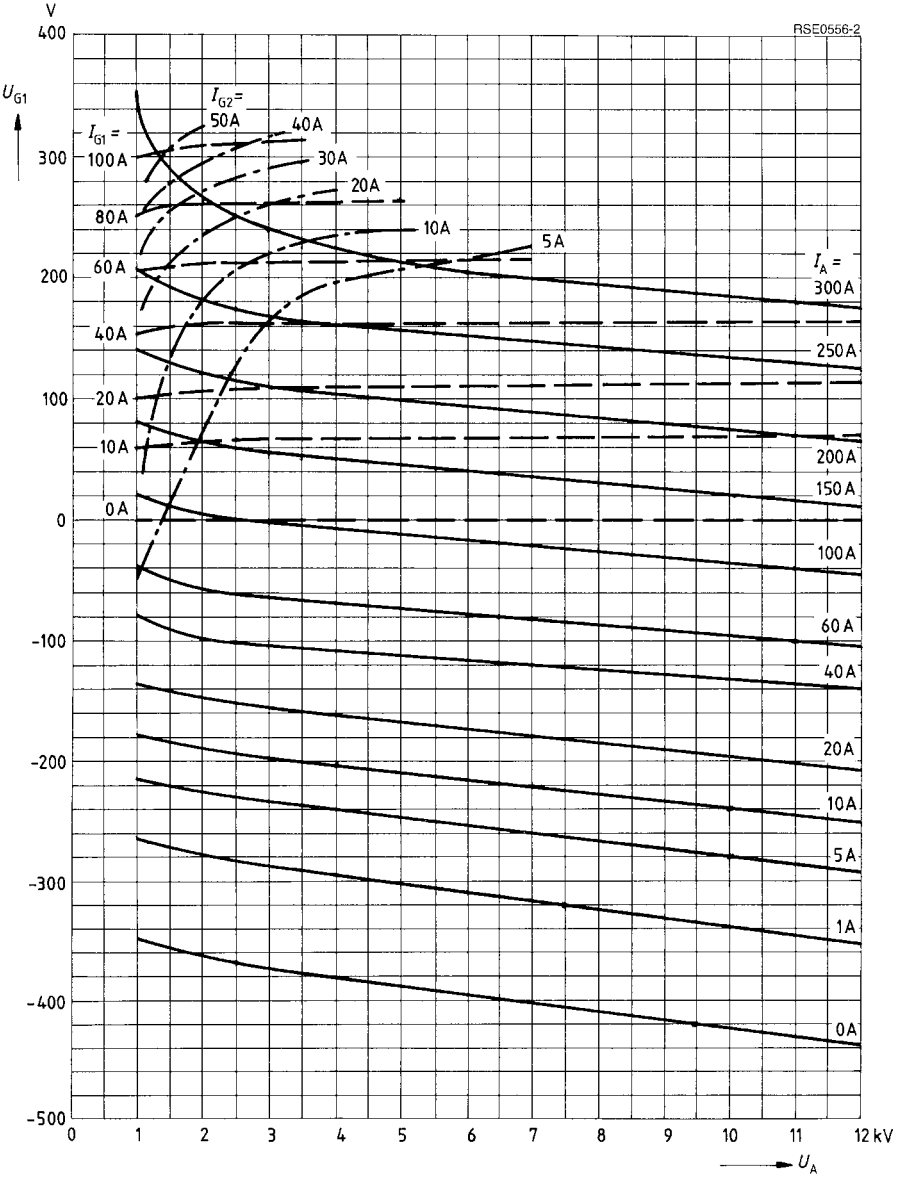
Parameter = I_A ————————
Parameter = I_{G2} —∘—∘—∘—∘—∘—∘—
Parameter = I_{G1} — — — — — — —



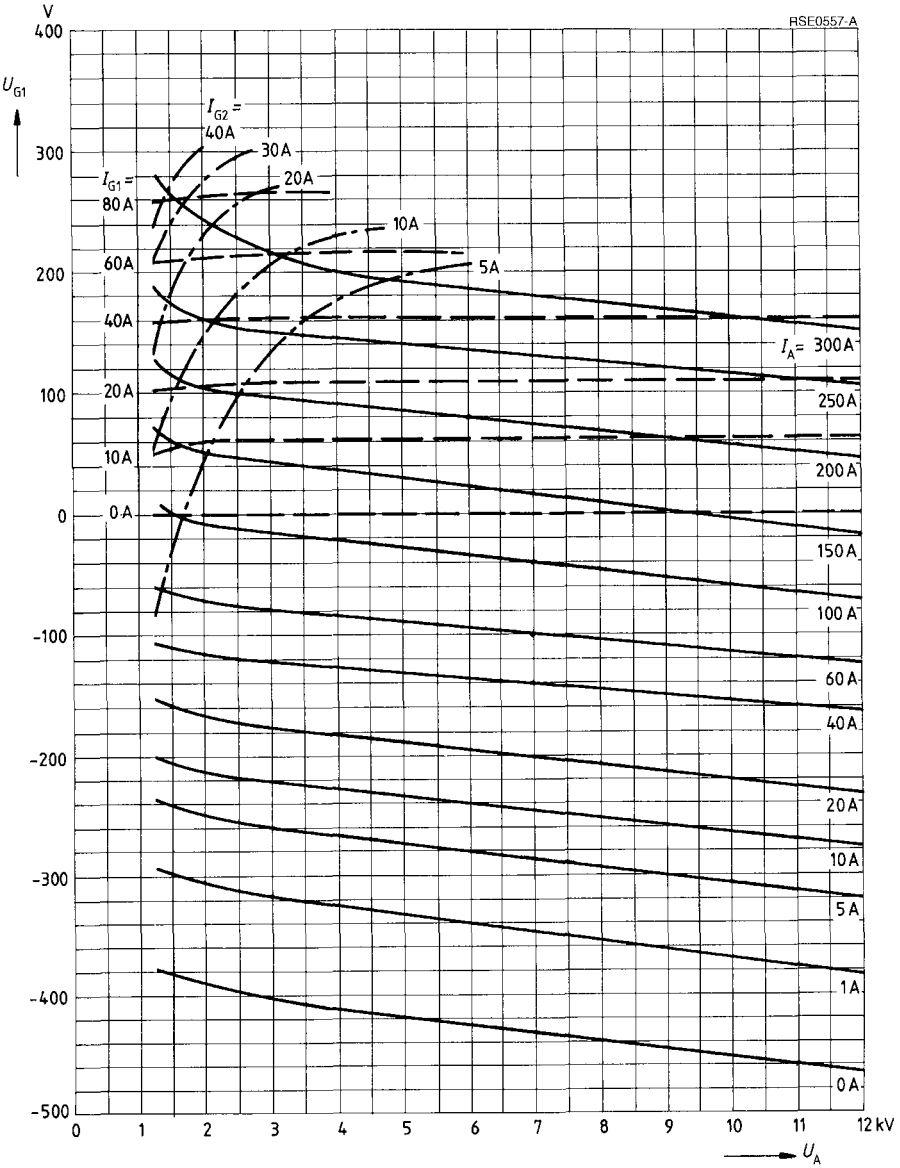
$U_{G1} = f(U_A)$ Parameter = I_A
$U_{G2} = 800$ V Parameter = I_{G2}
Parameter = I_{G1}



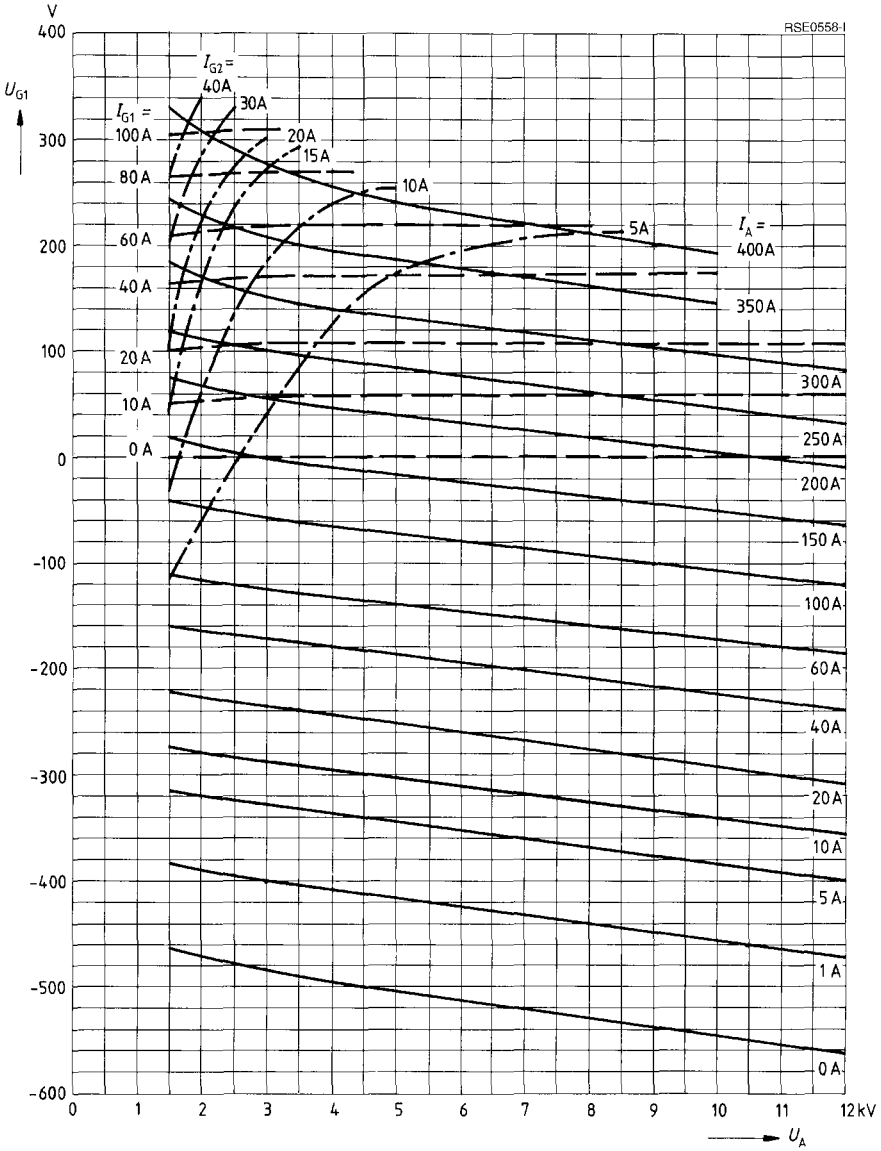
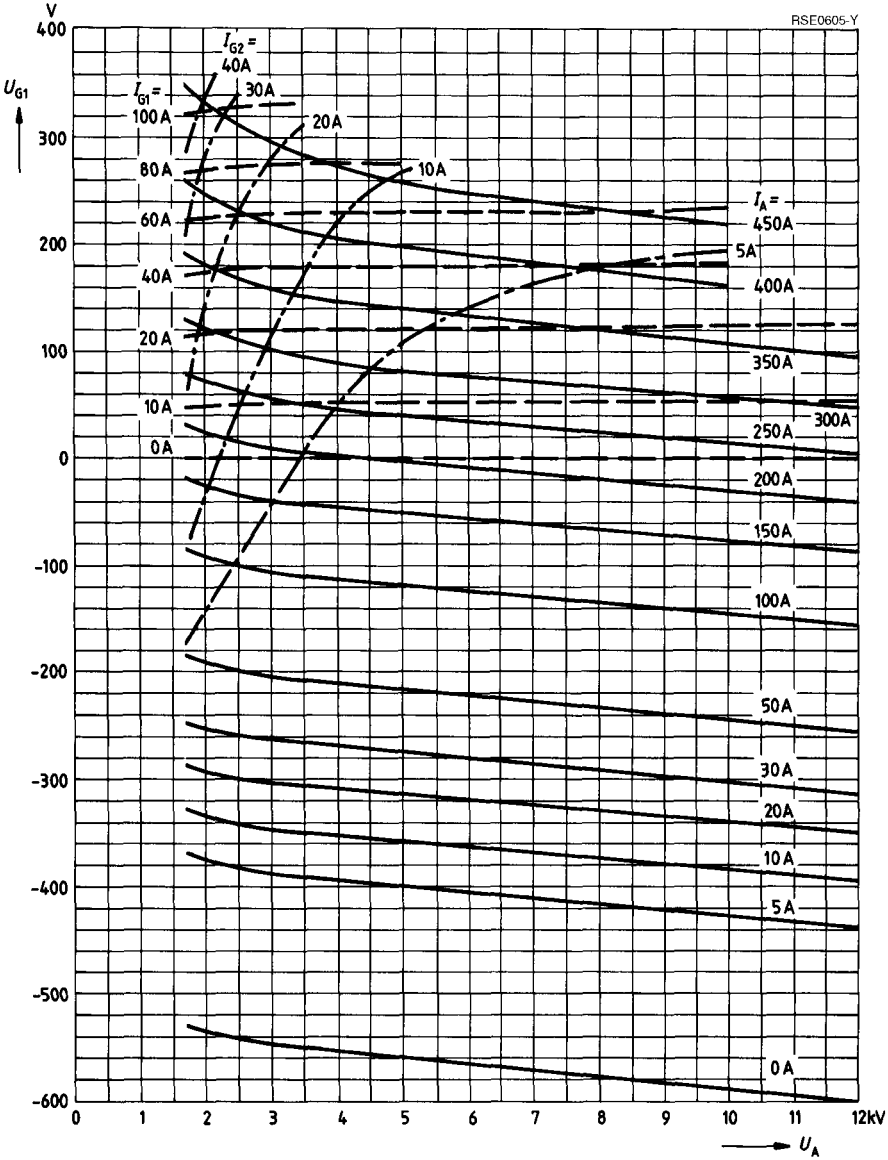
$U_{G1} = f(U_A)$ Parameter = I_A ————————
$U_{G2} = 1100$ V Parameter = I_{G2} —·—·—·—·—
Parameter = I_{G1} — — — — — — —



$U_{G1} = f(U_A)$ Parameter = I_A ————————
$U_{G2} = 1200$ V Parameter = I_{G2} —·—·—·—·—
Parameter = I_{G1} — — — — — — —



$U_{G1} = f(U_A)$ Parameter = I_A ————————
$U_{G2} = 1500$ V Parameter = I_{G2} —·—·—·—·—
Parameter = I_{G1} — — — — — — —



$U_{G1} = f(U_A)$ Parameter = I_A ————————
$U_{G2} = 1750$ V Parameter = I_{G2} —·—·—·—·—·—
Parameter = I_{G1} — — — — — — —