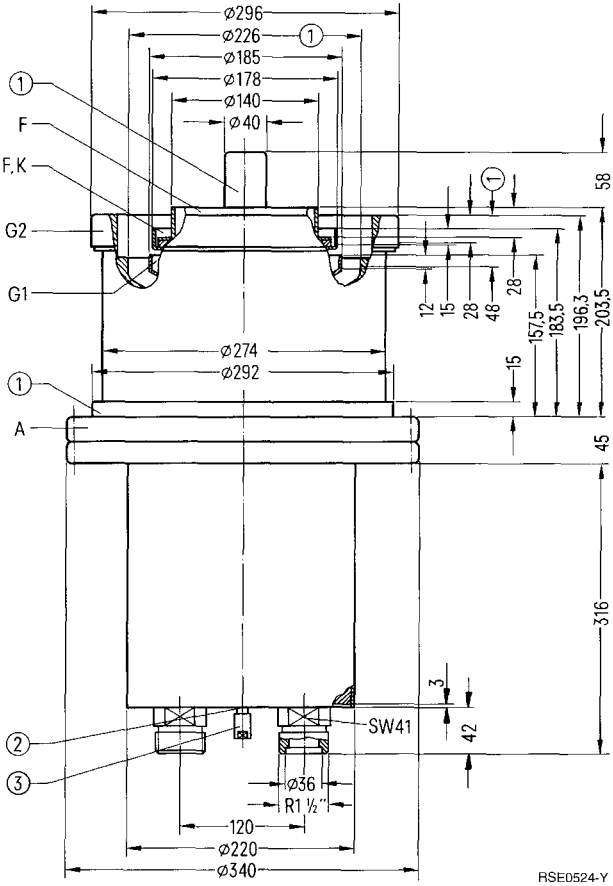
Ordering code Q53-X2042 (RS 2042 SK)
Ordering code Q53-X242 (RS 2042 HF)

Coaxial metal-ceramic tetrode, vapor-condensation-cooled.

The version RS 2042 SK is particularly suitable for broadcast transmitters up to 300 kW medium wave and 250 kW short wave, for grid-current free operated modulators in transmitters up to 600 kW, and for use as switching tube in PDM transmitters up to 600 kW.

The version RS 2042 HF is particularly suitable for RF amplifiers up to 450 kW/up to 170 MHz.



Dimensions in mm

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

Approx. weight 65 kg

Heating

Heater voltage	U_F	8,5	V
Heater current	I_F	≈ 920	A
Permissible starting current	$I_{F\,M}$	≤ 3000	A
Heating: direct			
Cathode: thoriated tungsten			

Characteristics

Emission current at $U_A = U_{G2} = U_{G1} = 600$ V	I_{em}	300	A
Amplification factor of screen grid at $U_A = 6$ kV, $U_{G2} = 800$ to 1200 V, $I_A = 20$ A	μ_{g2g1}	4,5	
Transconductance at $U_A = 6$ kV, $U_{G2} = 1100$ V, $I_A = 20$ A	s	220	mA/V

Capacitances

Cathode/control grid	c_{kg1}	≈ 315	pF
Cathode/screen grid	c_{kg2}	≈ 35	pF
Cathode/anode	c_{ka}	≈ 1,1	pF [1])
Control grid/screen grid	c_{g1g2}	≈ 450	pF
Control grid/anode	c_{g1a}	≈ 4,5	pF [1])
Screen grid/anode	c_{g2a}	≈ 100	pF

Accessories		**Ordering code**
Cathode connecting strip (4 for each tube)	RöKat272	Q81-X1109
Header socket with blocking	RöKpf274K	Q81-X1828
Header socket without blocking	RöKpf274OC	Q81-X1862
Screw ring conveyor	RöZub105	Q1001-X148
Insulating hose	RöZub274SK	Q81-X2178
LL electrolytic target for 1¹/₄″ 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	55	MHz
Anode voltage (dc)	U_A	23	kV
Screen grid voltage (dc)	U_{G2}	1600	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	50	A
Peak cathode current	$I_{K\,M}$	300	A
Anode dissipation	P_A	300	kW [3])
Screen grid dissipation	P_{G2}	4,0	kW
Control grid dissipation	P_{G1}	1,5	kW

Operating characteristics

Frequency	f	50	MHz
Output power	P_2	320 + 13,7 [2])	kW [1])
Anode voltage (dc)	U_A	12	kV
Screen grid voltage (dc)	U_{G2}	1100	V
Control grid voltage (dc)	U_{G1}	– 400	V
Peak control grid voltage (ac)	$U_{g1\,m}$	540	V
Anode current (dc)	I_A	40,5	A
Screen grid current (dc)	I_{G2}	1,0	A
Control grid current (dc)	I_{G1}	0,6	A
Anode input power	$P_{B\,A}$	485	kW
Drive power	P_1	0,3 + 13,7 [2])	kW [1])
Anode dissipation	P_A	165	kW
Screen grid dissipation	P_{G2}	1100	W
Control grid dissipation	P_{G1}	60	W
Efficiency	η	66	%
Anode load resistance	R_A	181	Ω

1) Circuit losses are not included.
2) Power transition of grounded control-grid screen-grid circuit.
3) 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	150	MHz
Anode voltage (dc)	U_A	17	kV
Screen grid voltage (dc)	U_{G2}	1600	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	50	A
Peak cathode current	$I_{K\,M}$	300	A
Anode dissipation	P_A	300	kW [3])
Screen grid dissipation	P_{G2}	4,0	kW
Control grid dissipation	P_{G1}	1,5	kW

Operating characteristics

Frequency	f	≤ 150	MHz
Pulse duration	t_p	$0{,}4 \times 10^{-3}$	s
Pulse seperation	t_0	$0{,}6 \times 10^{-3}$	s
Pulse output power	$P_{2\,p}$	400 + 16 [2])	kW [1])
Anode voltage (dc)	U_A	15	kV
Screen grid voltage (dc)	U_{G2}	1100	V
Control grid voltage (dc)	U_{G1}	– 430	V
Peak pulse control grid voltage (ac)	$U_{g1\,m\,p}$	250	V
Pulse anode current (dc)	$I_{A\,p}$	42	A
Pulse screen grid current	$I_{G2\,p}$	1,0	A
Pulse control grid current (dc)	$I_{G1\,p}$	0,7	A
Pulse anode input power	$P_{B\,A\,p}$	630	kW
Pulse drive power	$P_{1\,p}$	16	kW [1])
Pulse anode dissipation	$P_{A\,p}$	230	kW
Pulse screen grid dissipation	$P_{G2\,p}$	1100	W
Pulse control grid dissipation	$P_{G1\,p}$	60	W
Pulse efficiency	η_p	63	%
Anode load resistance	R_A	190	Ω

1) Circuit losses are not included.
2) Power transition of grounded control-grid screen-grid circuit.
3) 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	V
Screen grid voltage (dc)	U_{G2}	2200	V
Control grid voltage (dc)	U_{G1}	– 1200	V
Cathode current (dc)	I_K	50	A
Peak cathode current	$I_{K\,M}$	300	A
Anode dissipation	P_A	300	kW [5])
Screen grid dissipation	P_{G2}	5,0	kW
Control grid dissipation	P_{G1}	1,5	kW

Operating characteristics

Frequency	f	≤ 30	MHz
Carrier power	P_{trg}	325	kW [1])
Anode voltage (dc)	U_A	12	kV
Screen grid voltage (dc)	U_{G2}	1100	V
Control grid bias (dc), fixed	$U_{G1\,fix}$	– 450	V
Control grid resistance	R_{G1}	65	Ω
Peak control grid voltage (ac)	$U_{g1\,m}$	900	V
Anode current (dc)	I_A	33	A
Screen grid current (dc)	I_{G2}	2,5	A
Control grid current (dc)	I_{G1}	4,0	A
Anode input power	$P_{B\,A}$	396	kW
Drive power	P_1	3,5	kW [1])
Anode dissipation	P_A	71	kW [2])
Screen grid dissipation	P_{G2}	2,75	kW
Control grid dissipation	P_{G1}	0,7	kW
Efficiency	η	82	%
Anode load resistance	R_A	180	Ω
Modulation factor	m	100	%
Peak screen grid voltage (ac)	$U_{g2\,m}$	650	V
Modulation power	P_{mod}	208	kW
Control grid current (dc)	I_{G1}	4,8	A [3])
Drive power	P_1	4,0	kW[1])[3])
Anode dissipation at modulation	$P_{A\,mod}$	116	kW [4])
Screen grid dissipation at modulation	$P_{G2\,mod}$	3,1	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 value 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	50	A
Peak cathode current	$I_{K\,M}$	300	A
Anode dissipation	P_A	300	kW [1])
Screen grid dissipation	P_{G2}	5,0	kW
Control grid dissipation	P_{G1}	1,5	kW

Operating characteristics at modulator operation for

		600 kW carrier power		
Output power	P_2	0	373	kW
Anode voltage (dc)	U_A	12	12	kV
Screen grid voltage (dc)	U_{G2}	1400	1400	V
Control grid voltage (dc)	U_{G1}	– 490	– 490	V
Peak control grid voltage (ac) between the 2 tubes	$U_{gg\,m}$	0	880	V
Anode current (dc)	I_A	$2 \times 1{,}4$	$2 \times 23{,}3$	A
Screen grid current (dc)	I_{G2}	0	2×2	A
Anode input power	$P_{B\,A}$	$2 \times 16{,}8$	2×279	kW
Anode dissipation	P_A	$2 \times 16{,}8$	$2 \times 92{,}5$	kW
Screen grid dissipation	P_{G2}	0	$2 \times 2{,}8$	kW
Efficiency	η	—	66,8	%
Effective load resistance (anode to anode)	R_{AA}	—	560	Ω

1) Higher max. ratings may be released upon request.

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 drop 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.

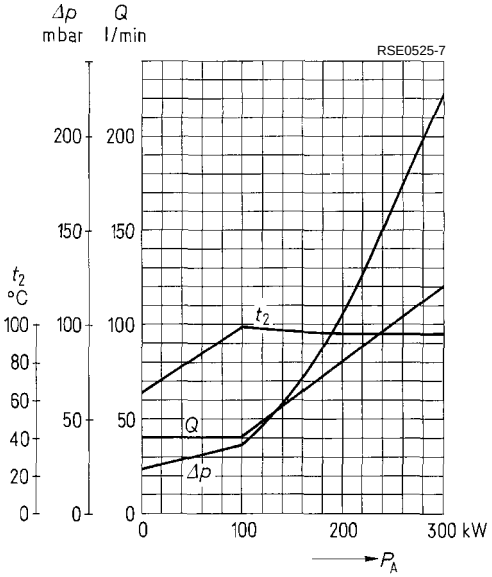
Operation with open cooling cycle (without overpressure) is possible if the maximum outlet temperature remains below 60 °C (sea level, air pressure ≈ 1 bar) with lower inlet temperature and, if required, increased water flow rate.

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 0,40 mm diameter should be used to test the anode overcurrent trip circuit.

Cooling water diagram

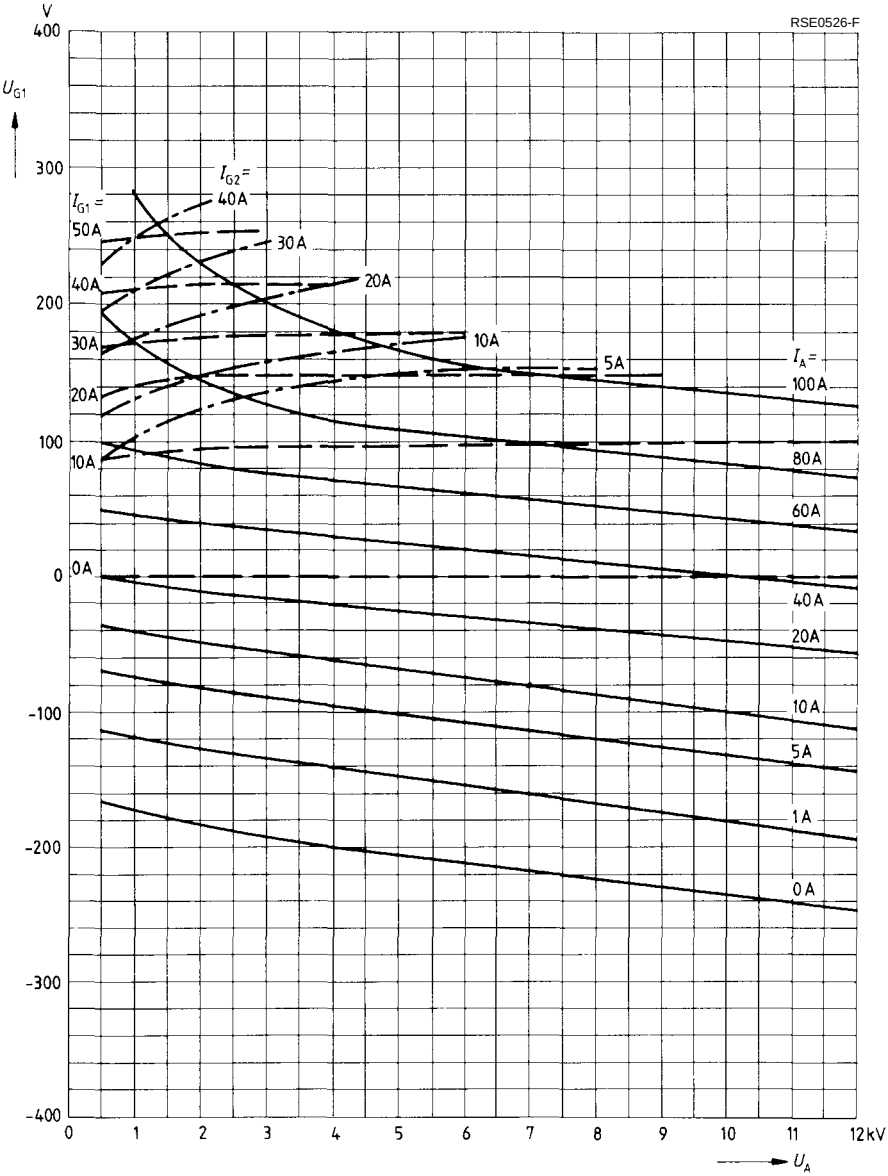


Hermetically sealed cooling system with destilled water.

Overpressure = 1,5 bar
t_1 = 60 °C

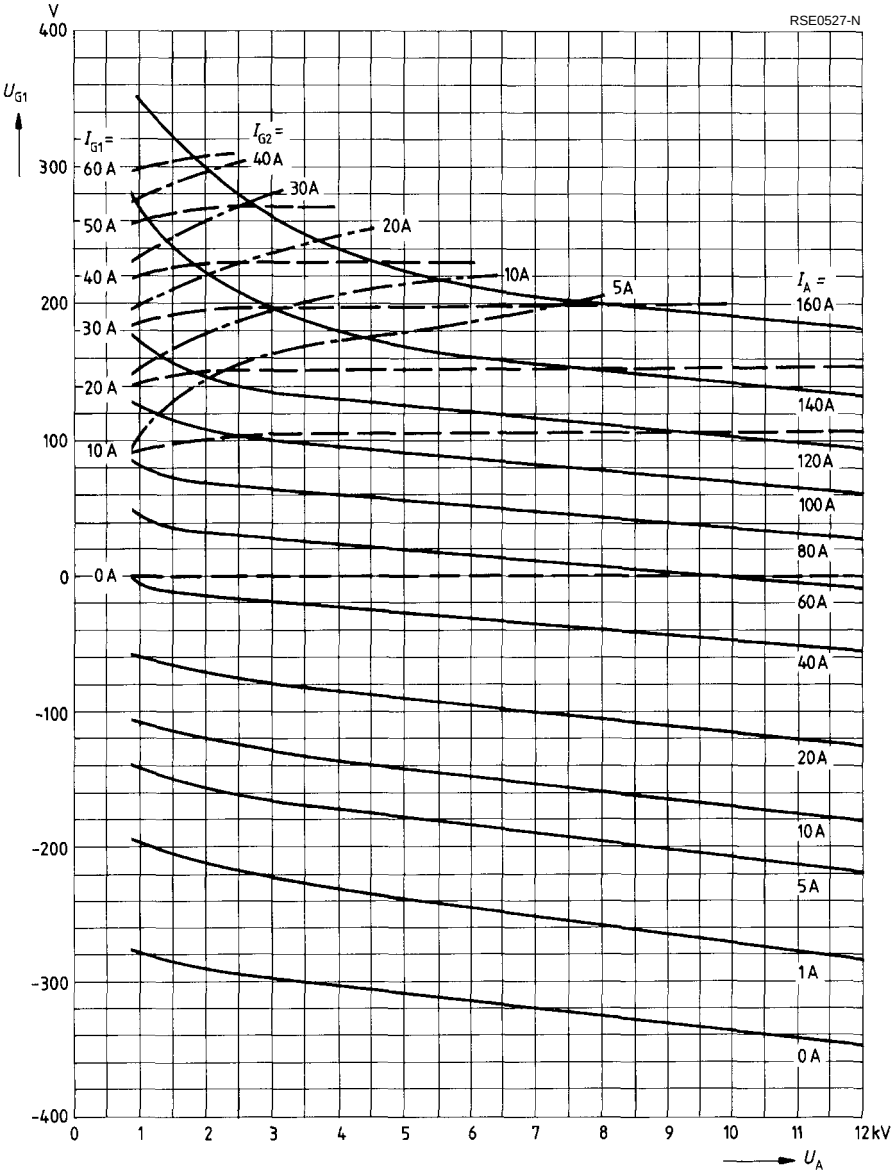
$U_{G1} = f(U_A)$
$U_{G2} = 500$ V

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

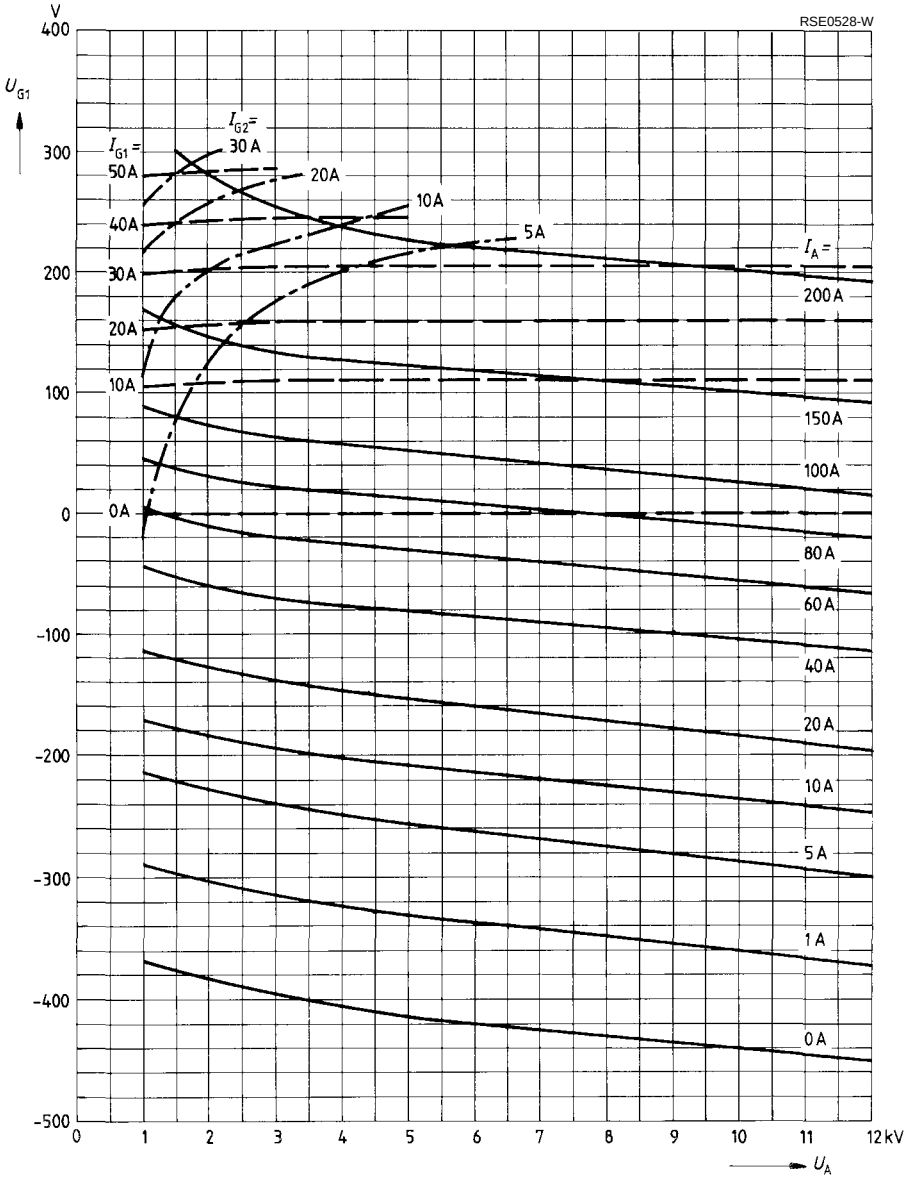


$U_{G1} = f(U_A)$
$U_{G2} = 800$ V

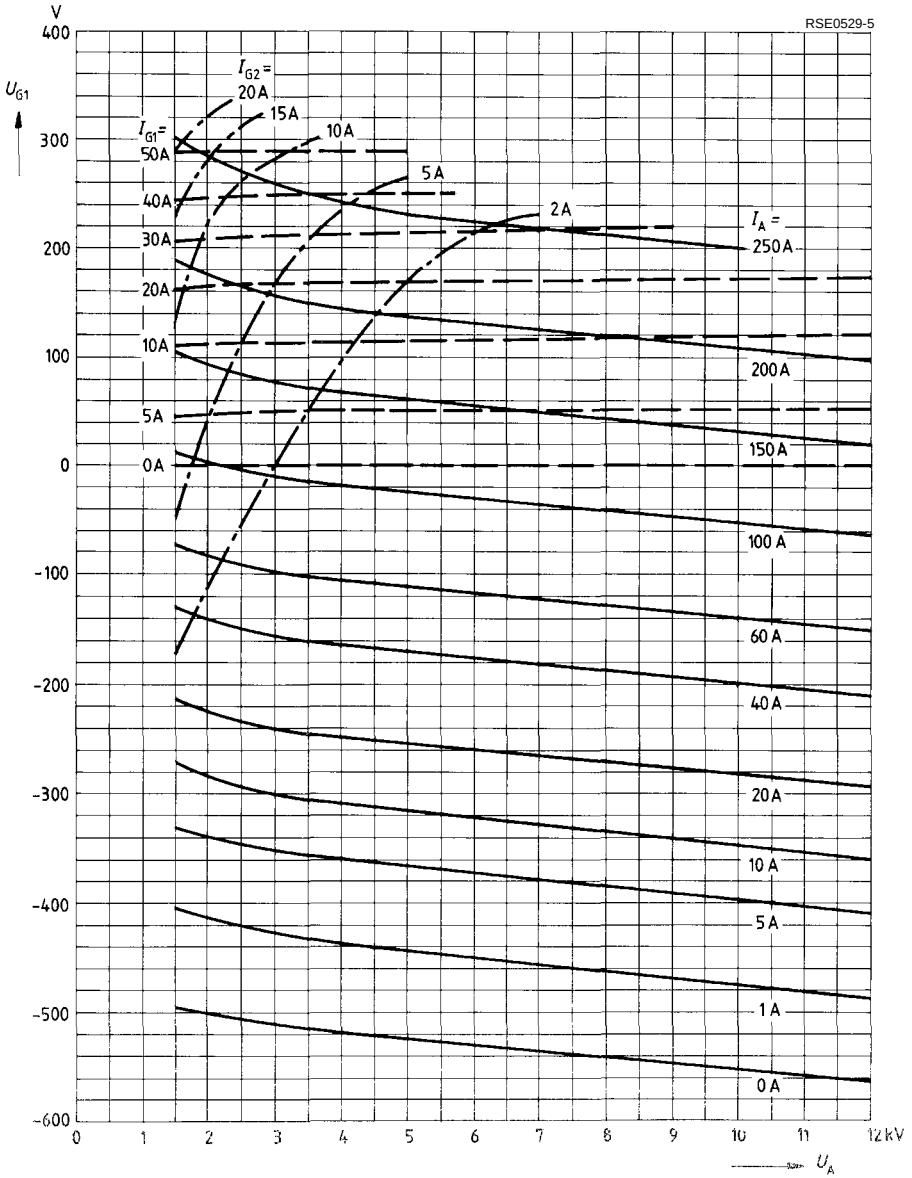
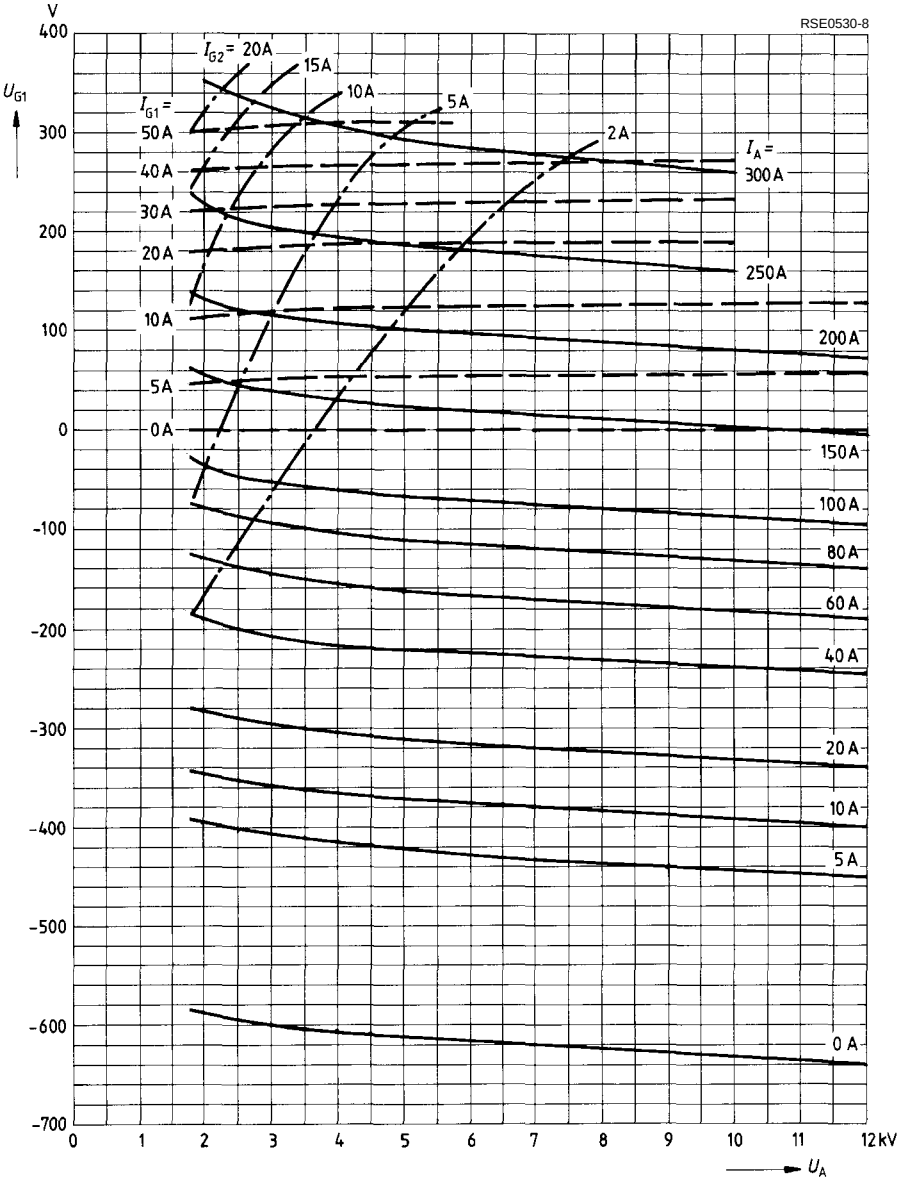
Parameter = I_A ————————
Parameter = I_{G2} —·—·—·—·—
Parameter = I_{G1} — — — — — — —



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



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